

3. POWERTRAIN

303 : Engine

303-00 : Engine System – General Information

Specifications

Specifications

General specifications - Vehicles 3.0L engine.

Item	Specification
Displacement in liters	2.967
Number of cylinders	6
Bore and stroke (mm)	89.0 x 79.5
Compression ratio	10.5:1

General specifications - Vehicles 3.5L engine.

Item	Specification
Displacement in liters	3.554
Number of cylinders	8
Bore and stroke (mm)	86.0 x 76.5
Compression ratio	11.0:1

General specifications - Vehicles with 4.2L engine without supercharger.

Item	Specification
Displacement in liters	4.196
Number of cylinders	8
Bore and stroke (mm)	86.0 x 90.3
Compression ratio	11.0:1

General specifications - Vehicles with 4.2L engine with supercharger.

Item	Specification
Displacement in liters	4.196
Number of cylinders	8
Bore and stroke (mm)	86.0 x 90.3
Compression ratio	9.0:1

Cylinder Head and Valve Train - Vehicles with 3.0L engine

Item	Specification
Valve guide inner diameter (mm)	5.514 - 5.544
Intake valve effective length (mm)	90.13 - 90.93
Exhaust valve effective length (mm)	89.68 - 89.88
Valve stem to guide clearance intake - diametrical (mm)	0.022 - 0.067
Valve stem to guide clearance exhaust - diametrical (mm)	0.035 - 0.08
Valve head diameter intake (mm)	34.85 - 35.15
Valve head diameter exhaust (mm)	29.85 - 30.15
Intake valve face angle degree	45.75°
Exhaust valve face angle degree	45.25°
Valve stem diameter intake (mm)	5.477 - 5.492
Valve stem diameter exhaust (mm)	5.464 - 5.479
Valve spring free length (mm)	44.2
Valve spring installed height (mm)	33.41
Camshaft lobe lift intake (mm)	9.367
Camshaft lobe lift exhaust (mm)	9.461
Camshaft end play (mm)	0.07 - 0.15
Camshaft journal to cylinder head bearing surface clearance diametrical (mm)	0.025 - 0.076
Camshaft journal diameter standard runout limit (mm)	0.04
Camshaft journal diameter standard out of round (mm)	0.013

Cylinder Head and Valve Train - Vehicles with 3.5L engine

Item	Specification
Valve guide inner diameter (mm)	5.02
Intake valve effective length (mm)	88.87 - 89.17
Exhaust valve effective length (mm)	88.40 - 88.70

Valve stem to guide clearance intake - diametrical (mm)	0.012 - 0.067
Valve stem to guide clearance exhaust - diametrical (mm)	0.02 - 0.075
Valve head diameter intake (mm)	34.8 - 35.0
Valve head diameter exhaust (mm)	30.8 - 31.0
Intake valve face angle degree	45° 15'
Exhaust valve face angle degree	45° 15'
Valve stem diameter intake (mm)	4.963 - 4.978
Valve stem diameter exhaust (mm)	4.955 - 4.97
Valve spring free length (mm)	45.45 - 46.2
Valve spring installed height (mm)	33.20
Camshaft lobe lift intake (mm)	9.00
Camshaft lobe lift exhaust (mm)	8.50
Camshaft journal to cylinder head bearing surface clearance diametrical (mm)	<ul style="list-style-type: none"> • Front bearing 0.035 - 0.095 • Other bearings 0.025 - 0.085
Camshaft journal diameter standard runout limit (mm)	<ul style="list-style-type: none"> • Center bearing to outer bearing's 0.07 • Other bearing to outer bearing's 0.05
Camshaft journal diameter standard out of round (mm)	0.005
Maximum permitted cylinder head warp (mm)	0.125

Cylinder Head and Valve Train - Vehicles with 4.2L engine without supercharger

Item	Specification
Valve guide inner diameter (mm)	5.02
Intake valve effective length (mm)	88.87 - 89.17
Exhaust valve effective length (mm)	88.40 - 88.70
Valve stem to guide clearance intake - diametrical (mm)	0.012 - 0.067
Valve stem to guide clearance exhaust - diametrical (mm)	0.02 - 0.075
Valve head diameter intake (mm)	34.8 - 35.0
Valve head diameter exhaust (mm)	30.8 - 31.0
Intake valve face angle degree	45° 15'
Exhaust valve face angle degree	45° 15'
Valve stem diameter intake (mm)	4.963 - 4.978

Valve stem diameter exhaust (mm)	4.955 - 4.97
Valve spring free length (mm)	45.45 - 46.2
Valve spring installed height (mm)	33.20
Camshaft lobe lift intake (mm)	8.50
Camshaft lobe lift exhaust (mm)	8.50
Camshaft journal to cylinder head bearing surface clearance diametrical (mm)	<ul style="list-style-type: none"> • Front bearing 0.035 - 0.095 • Other bearings 0.025 - 0.085
Camshaft journal diameter standard runout limit (mm)	<ul style="list-style-type: none"> • Center bearing to outer bearing's 0.07 • Other bearing to outer bearing's 0.05
Camshaft journal diameter standard out of round (mm)	0.005
Maximum permitted cylinder head warp (mm)	0.125

Cylinder Head and Valve Train - Vehicles with 4.2L engine with supercharger

Item	Specification
Valve guide inner diameter (mm)	5.02
Intake valve effective length (mm)	88.87 - 89.17
Exhaust valve effective length (mm)	88.40 - 88.70
Valve stem to guide clearance intake - diametrical (mm)	0.012 - 0.067
Valve stem to guide clearance exhaust - diametrical (mm)	0.02 - 0.075
Valve head diameter intake (mm)	34.8 - 35.0
Valve head diameter exhaust (mm)	30.8 - 31.0
Intake valve face angle degree	45° 15'
Exhaust valve face angle degree	45° 15'
Valve stem diameter intake (mm)	4.963 - 4.978
Valve stem diameter exhaust (mm)	4.955 - 4.97
Valve spring free length (mm)	45.45 - 46.2
Valve spring installed height (mm)	33.2
Camshaft lobe lift intake (mm)	9.0
Camshaft lobe lift exhaust (mm)	8.1
Camshaft journal to cylinder head bearing surface clearance diametrical (mm)	<ul style="list-style-type: none"> • Front bearing 0.035 - 0.095 • Other bearings 0.025 - 0.085
Camshaft journal diameter standard runout limit (mm)	<ul style="list-style-type: none"> • Center bearing to outer

	bearing's 0.07 • Other bearing to outer bearing's 0.05
Camshaft journal diameter standard out of round (mm)	0.005
Maximum permitted cylinder head warp (mm)	0.125

Lubrication system - Vehicles with 3.0L engine

Capacity	Liters
Engine oil with filter	6.5

Lubrication system - Vehicles with 3.5L engine

Capacity	Liters
Engine oil with filter	6.8

Lubrication system - Vehicles with 4.2L engine without supercharger

Capacity	Liters
Engine oil with filter	6.8

Lubrication system - Vehicles with 4.2L engine with supercharger

Capacity	Liters
Engine oil with filter	7.6

Bearing Inspection

1. Inspect bearings for the following defects.
 1. Cratering - fatigue failure
 2. Spot polishing - incorrect seating.
 3. Imbedded dirt engine oil.
 4. Scratching - dirty engine oil.
 5. Base exposed - poor lubrication.
 6. Both edges worn - journal damaged.
 7. One edge worn - journal tapered or bearing not seated.

Camshaft Bearing Journal Clearance

1. NOTE:

Make sure that the following stages are followed exactly. The tappets or followers must be removed to carry out this measurement.

NOTE:

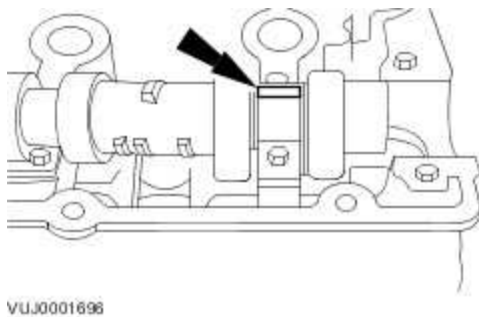
Make sure that the camshaft is to specification.

NOTE:

The bearing caps and journals should be free from engine oil and dirt.

Position on a length of plastigage on the bearing cap.

- Insert the camshaft, without lubrication, into the cylinder head.
- Position a plastigage strip, which should be equal to the width of the bearing cap, on the bearing journal.



2. Install the camshaft bearing caps.

- Follow the relevant tightening sequence.

3. NOTE:

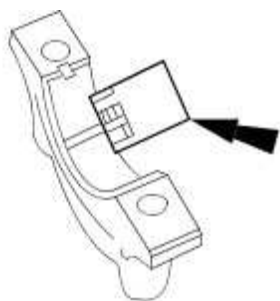
Do not strike the bearing caps.

Remove the camshaft bearing caps.

- Follow the relevant loosening sequence.

4. Using the special tool, read off the measurement.

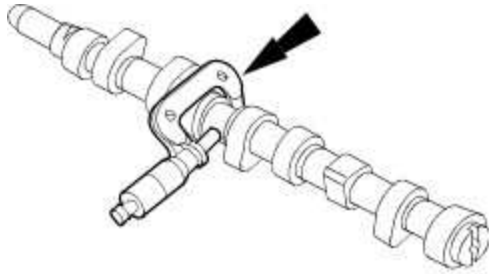
- Compare the width of plastigage with the plastigage scale.
- The value that is read off is the bearing clearance.
- If the values are not to specification install a new camshaft.



VUJ0001697

Camshaft Bearing Journal Diameter

1. Determine the diameter of the camshaft journals.
 - Using a micrometer measure the diameter at 90 degrees intervals to determine if the journals are out-of-round.
 - Measure at two different points on the journal to determine if there is any tapering.
 - If the measurements are out of the specified range, install a new camshaft.



VUJ0001695

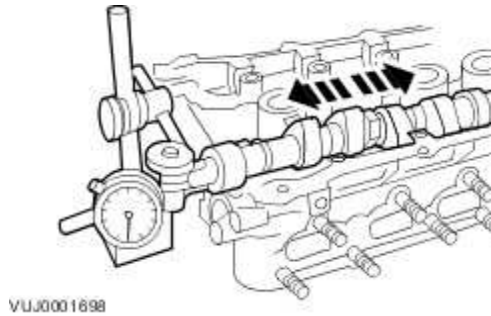
Camshaft End Play

1. NOTE:

Make sure that the camshaft is to specification.

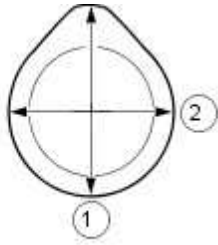
Using the special tool, measure the end play.

- Slide the camshaft in both directions. Read and note the maximum and minimum values on the dial indicator gauge.
End play = maximum value minus minimum value.
- If the measurement is out of specification, install new components.



Camshaft Lobe Lift

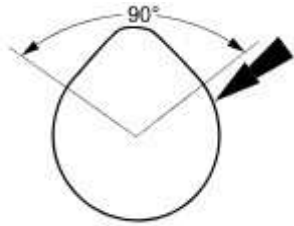
1. Measure the diameter (1) and diameter (2) with a vernier caliper. The difference in measurements is the lobe lift.



VUJ0001699

Camshaft Surface Inspection

1. Inspect camshaft lobes for pitting or damage in the active area. Minor pitting is acceptable outside the active area.



VUJ0001700

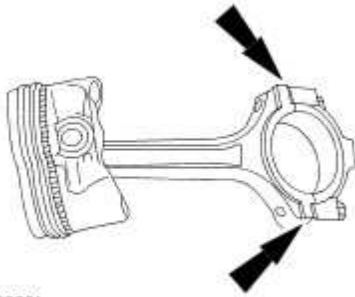
Connecting Rod Cleaning

1.



CAUTION: Do not use a caustic cleaning solution or damage to connecting rods may occur.

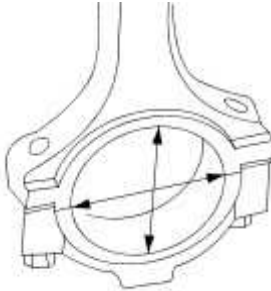
Mark and separate the parts and clean with solvent. Clean the oil passages.



VUJ0002224

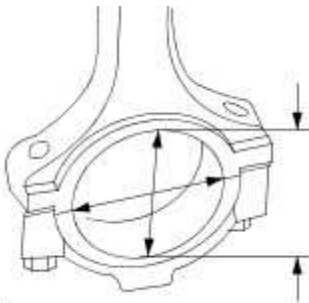
Connecting Rod Large End Bore

1. Measure the bearing bore in two directions. The difference is the connecting rod bore out-of-round. Verify the out-of-round is within specification.



VUJ0002223

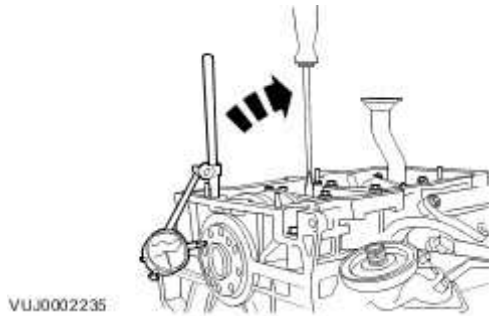
2. Measure the bearing bore diameter in two directions. Verify the bearing bore is within specification.



VUJ0002222

Crankshaft End Play

1. Using the Dial Indicator Gauge with Brackets, measure the end play.
 - Measure the end play by lifting the crankshaft using a lever.
 - If the value is out of the specification, install new thrust half rings to take up the end float and repeat the measurement.



Crankshaft Main Bearing Journal Clearance - 3.0L

1. The main bearing machine codes are displayed on the crankshaft (1) and the cylinder block (2)

2. **NOTE:**

Main bearing number 1 relates to the front of the engine.

Read the identification numbers from the crankshaft (1).

- The first two numbers represent the code for main bearing number 1.
- The second pair of numbers represents the code for main bearing number 2.
- The third pair of numbers represents the code for main bearing number 3.
- The last pair of numbers represents the code for main bearing number 4.

3. **NOTE:**

Main bearing number 1 relates to the front of the engine.

Read the identification numbers on the cylinder block (2).

- The first two numbers represent the code for main bearing number 1.
- The second pair of numbers represents the code for main bearing number 2.
- The third pair of numbers represents the code for main bearing number 3.
- The last pair of numbers represents the code for main bearing number 4.

4. Using the select fit chart, for each main bearing match the crankshaft code (1) and the block code (2) with it's corresponding column or row. By reading across the crankshaft code row (1) and down the block code column (2) select the correct grade bearing for each main.

- 1 Crankshaft code.
- 2 Block code.

5. E.g. if the crankshaft code is *8580*8082* and the Block code is *0609*0711*, main bearing 1 should be assembled with a grade 1 bearing, as determined by the intersection of the number 06 block column (2) and the number 85 crankshaft row (1).

- Main bearing 2, 3 and 4 would all be assemble with a grade 2.

Crankshaft Main Bearing Journal Clearance - 3.5L/4.2L



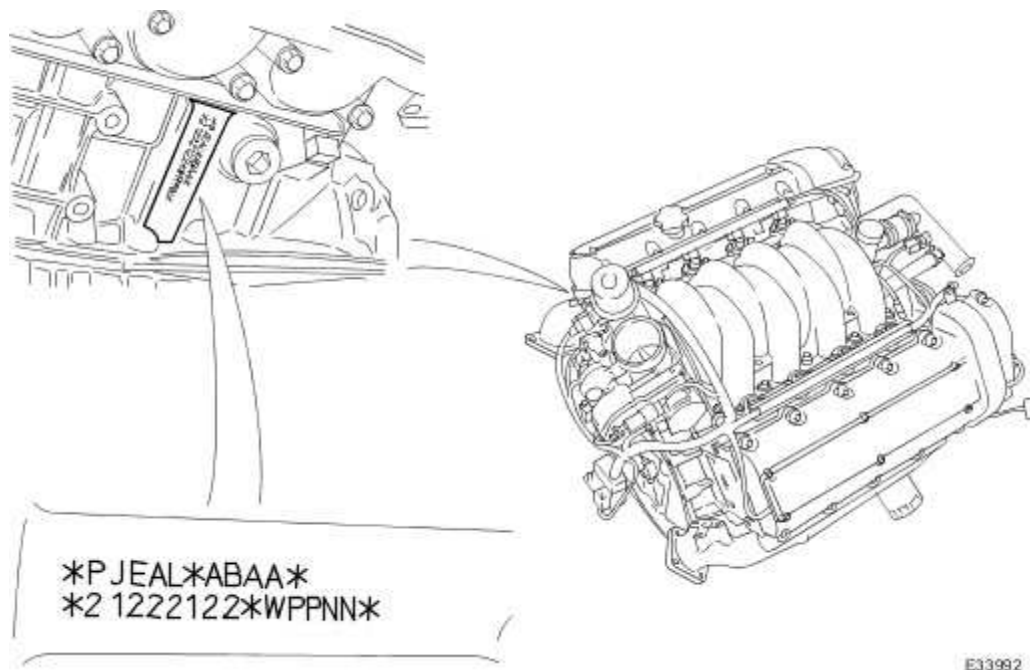
CAUTION: THESES PROCEDURES SHOULD NOT BE CARRIED OUT DURING THE MANUFACTURERS WARRANTY PERIOD.

1. NOTE:

Example - *PJEAL* - Crankshaft Main Journal Diameter.

Read the grade letters from LEFT to RIGHT = FRONT to REAR of engine eg. for this example engine, the crank journal at the front of the engine is grade P, and at the rear is grade L.

- The selection of main bearing shells is described in the following chart.



2. NOTE:

Example - *ABAA* - Crankshaft (Big End Bearing) Crankpin Diameter

NOTE:

For vehicles built up to 2002 MY.

NOTE:

If the crankshaft main bearing carrier retaining bolts have been marked with a center punch dot, they must be discarded and new bolts installed.

Read the grade letters from LEFT to RIGHT = FRONT to REAR of engine eg. for this

example engine, the crankpin at the front of the engine is grade A and at the rear is also grade A.

- Grade A = 56,000 to 55,994 mm (Bearing Shell Color Code - Blue).
- Grade B = 55,994 to 55,988 mm (Bearing Shell Color Code - Green).
- Grade C = 55,988 to 55,982 mm (Bearing Shell Color Code - Yellow).

3. NOTE:

Example - *ABAA* - Crankshaft (Big End Bearing) Crankpin Diameter

NOTE:

For vehicles built from 2002 MY.

NOTE:

If the crankshaft main bearing carrier retaining bolts have been marked with a center punch dot, they must be discarded and new bolts installed.

Read the grade letters from LEFT to RIGHT = FRONT to REAR of engine eg. for this example engine, the crankpin at the front of the engine is grade A and at the rear is also grade A.

- Grade A = 53,000 to 52,994 mm (Bearing Shell Color Code - Blue).
- Grade B = 52,994 to 52,988 mm (Bearing Shell Color Code - Green).
- Grade C = 52,988 to 52,982 mm (Bearing Shell Color Code - Yellow).

4. NOTE:

Example - *21222122* - Cylinder Bore and Piston

The cylinder bore grades read from LEFT to RIGHT as follows:

- Bank 2 - Cylinder 1, Bank 2 - Cylinder 2, Bank 2 - Cylinder 3, Bank 2 - Cylinder 4, Bank 1 - Cylinder 4,
- Bank 1 - Cylinder 3, Bank 1 - Cylinder 2, Bank 1 - Cylinder 1.
- (Note, in earlier publications Bank 1 was described as A-Bank and Bank 2 as B-Bank)
- Grade 1 Bore = 85,990 to 86,000 mm.
- Grade 2 Bore = 86,000 to 86,010 mm.
- Grade 3 Bore = 86,010 to 86,020 mm.

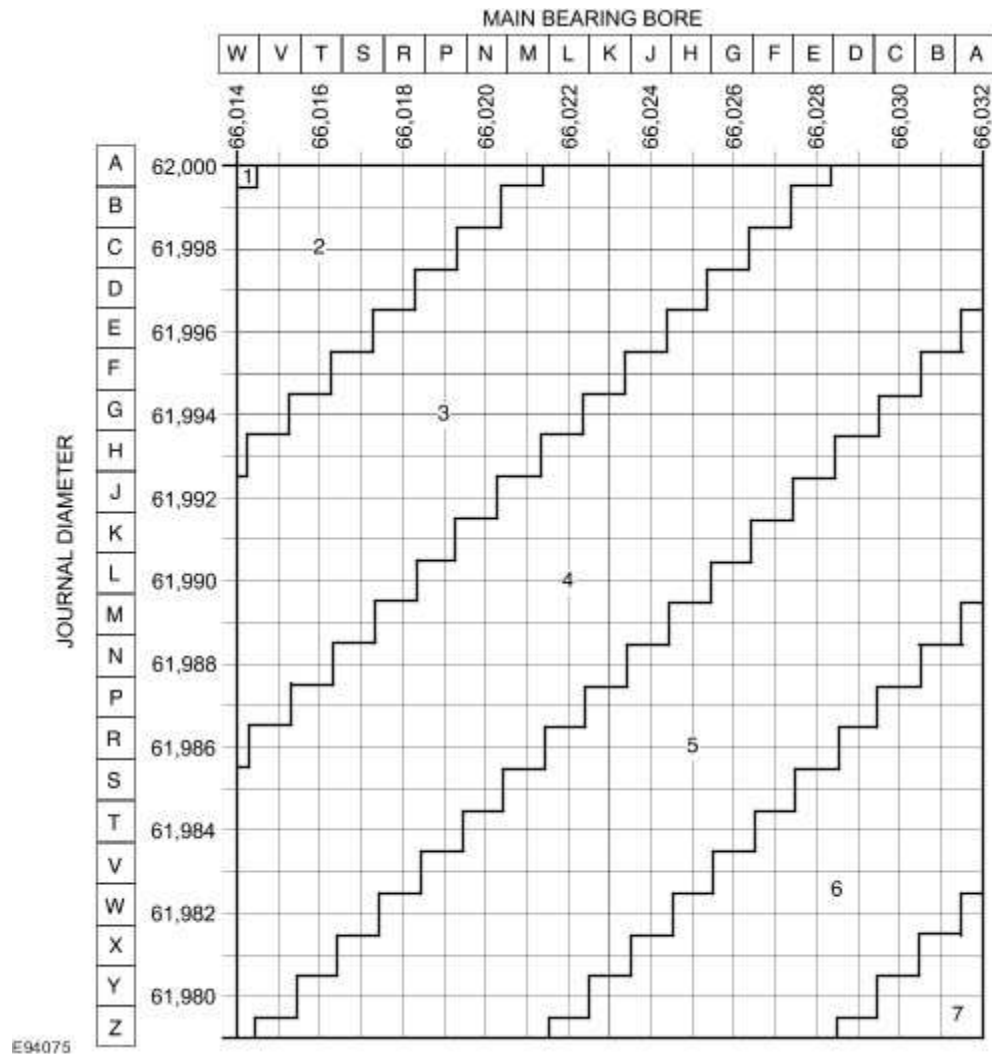
5. NOTE:

Example - *WPPNN* - Crankshaft Main Bearing Bore in Cylinder Block

Read the grade letters from LEFT to RIGHT = FRONT to REAR of engine eg. for this example engine, the crank journal bore at the front of the engine is grade W, and at the rear is grade N.

- The selection of main bearing shells is described in the following JOURNAL DIAMETER AND MAIN BEARING BORE CHART.

6. JOURNAL DIAMETER AND MAIN BEARING BORE CHART



7. NOTE:

THIS PROCEDURE SHOULD ONLY BE CARRIED OUT WHEN REPLACING MAIN BEARING SHELLS.

NOTE:

Refer to the JOURNAL DIAMETER AND MAIN BEARING BORE CHART in step 6 for tolerance and bearing information.

The number in each diagonal band represents a PAIR of color coded main bearing shells which must be used with a specific journal, depending on the combination of journal diameter and crankshaft bore diameter. The color codes for each band are as follows:

1. Blue / Green and Blue / Green
- Blue / Green and Blue

- Blue and Blue
- Blue and Green
- Green and Green
- Green and Yellow
- Yellow and Yellow
- Consider crankshaft journal 5 (from the example grade markings on the cylinder block) - the cylinder block bore is Grade N and the crankshaft journal diameter is Grade L. From the chart, it will be seen that the point of intersection is in Band 4 which equates to one Blue shell and one Green shell.
- When the appropriate pair of color codes have been selected for a journal, either color may be installed to the cylinder block or to the bedplate, but, the shell which is to be installed to the cylinder block must have an oil groove and the shell which is to be installed to the bedplate must be plain.

8. NOTE:

THIS PROCEDURE SHOULD ONLY BE CARRIED OUT WHEN A REPLACEMENT CRANKSHAFT OR CYLINDER BLOCK HAS BEEN FITTED.

NOTE:

Refer to the JOURNAL DIAMETER AND MAIN BEARING BORE CHART in step 6 for tolerance and bearing information.

The thickness grade of all main bearing shells are to be selected to give a total running clearance of not less than 0.022 mm or greater than 0.040 mm.

- Each bearing bore in the block/bedplate assembly should be measured at two mutually perpendicular diameters 45° to the vertical in the middle of the bearing.
- The minimum diameter of the two is to be used.
- Each crankshaft main bearing journal should be measured dynamically at a point in line with the middle of each bearing.
- When the appropriate pair of color codes have been selected for a journal, either color may be installed to the cylinder block or to the bedplate, but, the shell which is to be installed to the cylinder block must have an oil groove and the shell which is to be installed to the bedplate must be plain.

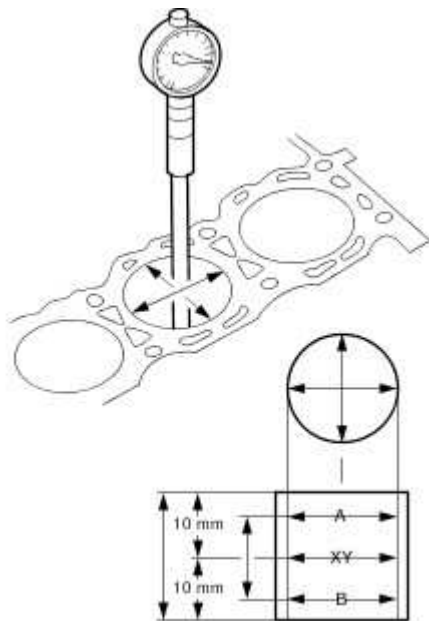
Cylinder Bore Out-of-Round

1. NOTE:

The main bearing caps or lower crankcase must be in place and tightened to the specified torque; however, the bearing shells should not be installed.

Measure the cylinder bore with an internal micrometer.

- Carry out the measurements in different directions and at different heights to determine if there is any out-of-roundness or tapering.
- If the measurement is out of the specified range, hone out the cylinder block or install a new block.



VUJ0002234

Cylinder Head Distortion

1. Measure the cylinder block/cylinder head distortion.
 - Using the special tool, measure the mating face distortion.
 - If the value is not to specification rework the mating face.

Exhaust Manifold Cleaning and Inspection

1. Inspect the cylinder head joining flanges of the exhaust manifold for evidence of exhaust gas leaks.
2. Inspect the exhaust manifold for cracks, damaged gasket surfaces, or other damage that would make it unfit for further use.

Piston Inspection

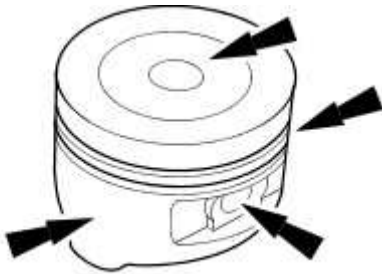
1.



CAUTION: Do not use any aggressive cleaning fluid or a wire brush to clean the piston.

Carry out a visual inspection.

- Clean the piston skirt, pin bush, ring grooves and crown and check for wear or cracks.
- If there are signs of wear on the piston skirt, check whether the connecting rod is twisted or bent.



VUJ0002233

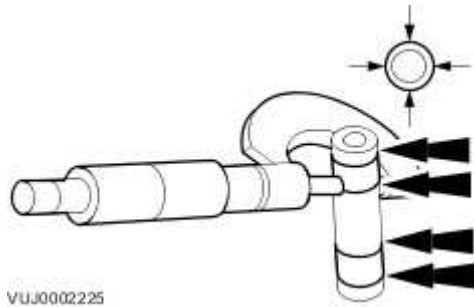
Piston Pin Diameter

1. NOTE:

The piston and piston pin are a matched pair. Do not mix up the components.

Measure the piston pin diameter.

- Measure the diameter in two directions.
- If the values are not to specification, install a new piston and a new piston pin.



VUJ0002225

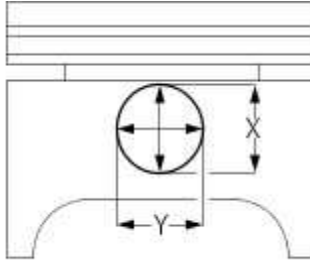
Piston Pin to Bore Diameter

1. NOTE:

The piston and piston pin form a matched pair. Do not mix up the components.

Measure the diameter of the piston pin bore.

- Measure the diameter in two directions.
- If the values are not to specification, install both a new piston and a new piston pin.



VUJ0002232

Piston Ring End Gap

1.



CAUTION: Do not mix up the piston rings. Install the piston rings in the same position and location.

Using the Feeler Gauge, measure the piston ring gap.

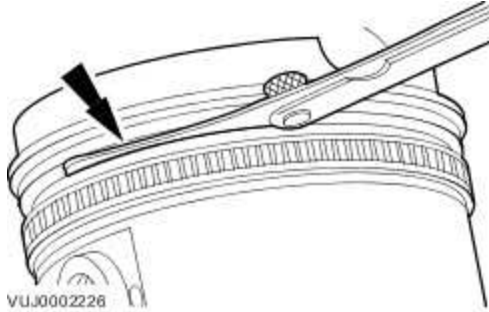
- The values given in the specification refer to a gauge ring used during production.

Piston Ring-to-Groove Clearance

1. NOTE:

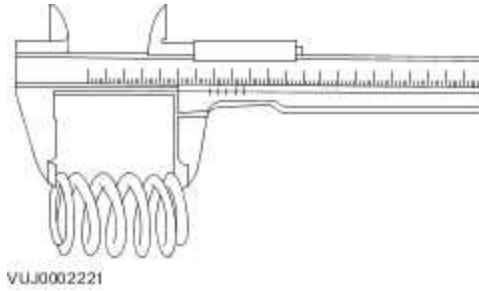
The piston ring must protrude from the piston groove. To determine the piston ring clearance, insert the Feeler Gauge right to the back of the groove, behind the wear ridge.

Using the Feeler Gauge, measure the piston ring clearance.



Valve Spring Free Length

1. Using a vernier gauge, measure the free length of each valve spring. Verify the length is within specification.



Valve Stem Diameter

1. Using a micrometer measure the diameter of the valve stems.
 - If the measurements are not to specification, install a new valve.

Engine

Vehicles with 3.0L engine

The 3.0L engine consists of:

- a six cylinder 60 degree 'V' configuration liquid cooled aluminium cylinder block with dry cast liners
- aluminium pistons with cut-outs in the piston crown to clear the valve heads for any available combination of camshaft profile and valve phasing
- two aluminium cylinder heads with square squish chambers
- two steel overhead camshafts per bank
- four valves per cylinder
- mechanical tappets and top mounted phosphate coated cast iron shims
- continuous variable camshaft timing (VCT) of the inlet camshafts
- two silent timing chains with one hydraulic tensioner per chain
- magnesium alloy valve covers with rubber seals
- a variable intake system containing two electrically controlled intake manifold tuning valves
- plastic lower intake manifold with integral fuel rail and injectors
- engine front cover manufactured from aluminium which accommodates the crankshaft front oil seal
- an oil pump located at the front of the crankshaft
- an aluminium bed plate
- an aluminium oil pan
- a steel crankshaft
- fracture-split connecting rods in sintered-forged steel
- cast iron exhaust manifolds
- a single, multi-vee belt which drives the front end accessories
- an advanced engine management system incorporating electronic throttle control
- the requirements of the CARB OBDII USA legislation

The engine code and serial number are located on the engine front cover as well as the left-hand side of the bed plate adjacent to the oil cooler assembly.

Vehicles with 3.5L or 4.2L engine

The 3.5L or 4.2L engine without supercharger consists of:

- an eight cylinder 90 degree 'Enclosed V' configuration liquid cooled aluminium cylinder block with dry cast liners
- pistons of open-ended skirt design, with two compression rings and a three piece oil control ring
- two aluminium cylinder heads, each incorporating two hollow camshafts manufactured in chilled cast iron
- four valves per cylinder
- aluminium tappets and top mounted shims
- continuous variable camshaft timing (VCT) of the inlet camshafts
- valve covers manufactured from Thermoplastic

- fuel injectors each with twelve holes
- engine front cover manufactured from aluminium which accommodates the crankshaft front oil seal
- multi row primary and single row secondary chains drive the camshafts of each cylinder bank
- an aluminium bed plate
- a cast iron crankshaft
- fracture-split connecting rods in sintered-forged steel
- brackets bolted to the front of the cylinder block which are used to mount all accessories
- a single, multi-vee belt which drives the front end accessories
- stainless steel exhaust manifolds
- an advanced engine management system incorporating electronic throttle control
- the requirements of the CARB OBDII USA legislation

The engine number is stamped onto the engine block adjacent to the thermostat housing.

Vehicles with 4.2L engine

Engines with supercharger

The 4.2L engine with supercharger consists of:

- an eight cylinder 90 degree 'Enclosed V' configuration liquid cooled aluminium cylinder block with dry cast liners
- pistons of open-ended skirt design, with two compression rings and a compact two piece oil control ring
- two aluminium cylinder heads, each incorporating two hollow camshafts manufactured in chilled cast iron
- four valves per cylinder
- aluminium tappets and top mounted shims
- valve covers manufactured from Thermoplastic
- fuel injectors each with twelve holes
- engine front cover manufactured from aluminium which accommodates the crankshaft front oil seal
- multi row primary and single row secondary chains drive the camshafts of each cylinder bank
- an aluminium bed plate
- oil spray jets in each cylinder bore
- a cast iron crankshaft
- fracture-split connecting rods in sintered-forged steel
- brackets bolted to the front of the cylinder block which are used to mount all accessories
- a single, multi-vee belt which drives the front end accessories
- stainless steel exhaust manifolds
- an advanced engine management system incorporating electronic throttle control.
- the requirements of the CARB OBDII USA legislation.

The engine number is stamped onto the engine block adjacent to the thermostat housing.

Engine - 3.0L/3.5L/4.2L

Inspection and Verification

Since diagnosis and testing actually begins when repairs are taken on, the following procedure is recommended.

- 1 . Verify the customer concern by operating the system.
- 2 . Visually inspect for obvious signs of mechanical damage or electrical damage. If the concern cannot be reproduced, carry out a road test and/or visual check with the aid of the following table.

Mechanical
<ul style="list-style-type: none">• Coolant leaks• Oil leaks• Leaks in the fuel system• Visibly damaged or worn parts• Loose or missing nuts or bolts

- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 4 . If the concern is not visually evident, verify the symptom and refer to the Symptom Chart.

Symptom Chart

Difficult to start during hot or cold start

Possible Source(s):

- Piston ring(s) worn, damaged, sticking or worn piston/cylinder.

Action(s) to take:

- INSTALL a new engine.

Possible Source(s):

- Head gasket damaged.

Action(s) to take:

- INSPECT the head gasket.

Possible Source(s):

- Fuel system damaged or inoperative.

Action(s) to take:

- <<303-04A>> Or <<303-04B>>

Possible Source(s):

- Ignition system inoperative.

Action(s) to take:

- <<303-07A>> Or <<303-07B>>

Poor Idling

Possible Source(s):

- Restricted exhaust system.

Action(s) to take:

- INSPECT the exhaust system. <<309-00>>

Possible Source(s):

- Vacuum leak.

Action(s) to take:

- CARRY out the Intake Manifold Vacuum Test in this section. REPAIR and INSTALL new components as necessary.

Possible Source(s):

- Burned valve(s).

Action(s) to take:

- INSPECT the valve(s).

Possible Source(s):

- Incorrect valve to valve seat contact.

Action(s) to take:

- INSPECT the valve and valve seat.

Possible Source(s):

- Head gasket damaged.

Action(s) to take:

- INSPECT the head gasket.

Possible Source(s):

- Fuel system damaged or inoperative.

Action(s) to take:

- <<303-04A>> Or <<303-04B>>

Insufficient power

Possible Source(s):

- Compression leakage from valve seat.

Action(s) to take:

- INSPECT the valve or valve seat.

Possible Source(s):

- Valve sticking.

Action(s) to take:

- INSPECT valve stem to valve guide clearance or carbon accumulation.

Possible Source(s):

- Valve spring weak or broken.

Action(s) to take:

- INSPECT the valve spring.

Possible Source(s):

- Head gasket damaged.

Action(s) to take:

- INSPECT the head gasket.

Possible Source(s):

- Cylinder head cracked or distorted.

Action(s) to take:

- INSPECT the cylinder head.

Possible Source(s):

- Piston ring(s) worn, damaged or sticking.

Action(s) to take:

- INSTALL a new engine.

Possible Source(s):

- Fuel system damaged or inoperative.

Action(s) to take:

- <<303-04A>> Or <<303-04B>>

Possible Source(s):

- Brakes dragging.

Action(s) to take:

- <<206-00>>

Possible Source(s):

- Restricted exhaust system.

Action(s) to take:

- INSPECT the exhaust system. <<309-00>>

Excessive or insufficient compression.

Possible Source(s):

- Valve(s) burnt or sticking.

Action(s) to take:

- INSPECT the valve(s).

Possible Source(s):

- Valve spring(s) weak or broken.

Action(s) to take:

- INSPECT the valve spring(s).

Possible Source(s):

- Piston ring(s) worn, damaged, sticking or worn piston/cylinder.

Action(s) to take:

- INSTALL a new engine.

Possible Source(s):

- Head gasket damaged.

Action(s) to take:

- INSPECT the head gasket.

Possible Source(s):

- Carbon accumulation in combustion chamber.

Action(s) to take:

- ELIMINATE carbon build up.

Possible Source(s):

- Fuel system damaged or inoperative.

Action(s) to take:

- <<303-04A>> Or <<303-04B>>

Excessive oil consumption

Possible Source(s):

- Piston ring(s) worn, damaged, sticking or worn piston/cylinder.

Action(s) to take:

- INSTALL a new engine.

Possible Source(s):

- Valve stem seal worn or missing.

Action(s) to take:

- INSPECT the valve or valve stem seal.

Possible Source(s):

- Oil leakage.

Action(s) to take:

- REPAIR oil leakage.

Possible Source(s):

- Valve stem or valve guide worn.

Action(s) to take:

- INSPECT the valve stem or valve guide.

Possible Source(s):

- Incorrect oil viscosity.

Action(s) to take:

- DRAIN and FILL with new oil.

Possible Source(s):

- Diluted oil.

Action(s) to take:

- CHECK oil dilution. DRAIN and FILL as necessary.

Possible Source(s):

- Crankcase overfilled.

Action(s) to take:

- CHECK and adjust the oil level.

Possible Source(s):

- Incorrect oil pressure.

Action(s) to take:

- CHECK the oil pressure. REPAIR as necessary.

Engine noise

Possible Source(s):

- Excessive crankshaft main bearing clearance.

Action(s) to take:

- INSTALL a new engine.

Possible Source(s):

- Excessive crankshaft end play.

Action(s) to take:

- INSTALL a new engine.

Possible Source(s):

- Excessive connecting rod bearing oil clearance.

Action(s) to take:

- INSTALL a new engine.

Possible Source(s):

- Piston/cylinder worn.

Action(s) to take:

- INSTALL a new engine.

Possible Source(s):

- Piston ring damaged.

Action(s) to take:

- INSTALL a new engine.

Possible Source(s):

- Connecting rod bent.

Action(s) to take:

- INSTALL a new engine.

Possible Source(s):

- Valve spring(s) broken.

Action(s) to take:

- INSPECT the valve spring(s).

Possible Source(s):

- Excessive valve guide clearance.

Action(s) to take:

- INSPECT the valve guide or valve.

Possible Source(s):

- Cooling system inoperative (water pump, vibration of radiator),

Action(s) to take:

- Refer to <<303-03>>

Possible Source(s):

- Fuel system inoperative.

Action(s) to take:

- <<303-04A>> Or <<303-04B>>

Possible Source(s):

- Excessive carbon buildup.

Action(s) to take:

- ELIMINATE carbon buildup.

Possible Source(s):

- Exhaust gas leakage.

Action(s) to take:

- REPAIR leakage. <<309-00>>

Possible Source(s):

- Incorrect drive belt tension.

Action(s) to take:

- INSPECT the drive belt tension. <<303-05>>

Possible Source(s):

- Generator front bearing worn.

Action(s) to take:

- <<414-02>>

Tappet noise, engine running

Possible Source(s):

- Incorrect tappet clearance.

Action(s) to take:

- CHECK and ADJUST the tappet clearance as necessary.

Component Tests

Engine Oil Leaks

NOTE:

Before installing new gaskets or oil seals, make sure that the fault is clearly established.

If the oil leak cannot be identified clearly by a visual inspection, carry out an UV test:

Fluorescent Oil Additive Method

- 1 . Clean the engine with a suitable cleaning fluid (brake cleaner).
- 2 . Drain the engine oil and refill with recommended oil, premixed with Diesel Engine Oil Dye or equivalent. Use a minimum 14.8 ml (0.5 ounce) to a maximum 29.6 ml (1 ounce) of fluorescent additive to all engines. If oil is not premixed, fluorescent additive must first be added to the crankcase.
- 3 . Run engine for 15 minutes. Stop the engine and inspect all seal and gasket areas for leaks using a 12 Volt Master UV Diagnostic Inspection Kit or equivalent. A clear bright yellow or orange area will identify leak. For extremely small leaks, several hours may be required for the leak to appear.
- 4 . As necessary, pressurize the main oil gallery system to locate leaks due to incorrectly sealed, loose or cocked plugs. If the flywheel bolts leak oil, look for sealer on the threads.
- 5 . Repair all leaks as necessary.

Compression Test

General Remarks

NOTE:

Removing fuses and disconnecting electrical components causes the powertrain control module (PCM) to log an error message. After the measurements have been carried out this error message should be cleared from memory by connecting to the Jaguar Approved Diagnostic System.

NOTE:

Only check the compression pressure with the valves set to the prescribed clearance (if this can be adjusted).

The compression pressure should be checked with the engine at operating temperature.

Check The Compression Pressure



WARNING: On manual transmissions shift the transmission into neutral. On automatic transmission vehicles, select "P". Failure to follow these instructions may result in personal injury.

- 1 . Remove the fuel pump relay.
- 2 . Start the engine - the engine will start, run for a few seconds then stall.
- 3 . Remove the spark plugs.
- 4 . Install the compression tester.
- 5 . Install an auxiliary starter switch in the starting circuit. With the ignition switch OFF, using the auxiliary starter switch, crank the engine a minimum of five compression strokes and record the highest reading. Note the approximate number of compression strokes required to obtain the highest reading.
- 6 . Repeat the test on each cylinder, cranking the engine approximately the same number of compression strokes.
- 7 . Install the components in reverse order, observing the specified tightening torques.
- 8 . Reset the PCM fault memory.

Interpretation of the Results

The indicated compression pressure are considered within specification if the lowest reading cylinder is within 75% of the highest reading.



CAUTION: If engine oil is sprayed into the combustion chamber, after carrying out the measurement run the engine at 2000 rpm for about 15 minutes, in order to burn the oil and prevent damage to the catalytic converter.

If the measurement on one or more cylinders is much lower than the specified value, spray some engine oil into the combustion chamber and repeat the compression measurement.

If the reading greatly improves then the piston rings are damaged.

If the reading stays the same then the cause is either damaged valve seats or valve stem seals.

If the measurements for two cylinders next to each other are both too low then it is very likely that the cylinder head gasket between them is burnt through. This can also be recognized by traces of engine oil in the coolant and/or coolant in the engine oil.

Excessive Engine Oil Consumption

The amount of oil an engine uses will vary with the way the vehicle is driven in addition to normal engine-to-engine variation. This is especially true during the first 16,100 km (10,000 miles) when a new engine is being broken in or until certain internal components become conditioned. Vehicles used in heavy-duty operation may use more oil. The following are examples of heavy-duty operation:

- Trailer towing applications.
- Severe loading applications.
- Sustained high speed operation.

Engines need oil to lubricate the following internal components:

- Cylinder block cylinder walls.
- Pistons and piston rings.
- Intake and exhaust valve stems.
- Intake and exhaust valve guides.
- All internal engine components.

When the pistons move downward, a thin film of oil is left on the cylinder walls. As the vehicle is operated, some oil is also drawn into the combustion chambers past the intake and exhaust valve stem seals and burned.

The following is a partial list of conditions that can affect oil consumption rates:

- Engine size.
- Operator driving habits.

- Ambient temperatures.
- Quality and viscosity of oil.

Operation under varying conditions can frequently be misleading. A vehicle that has been run for several thousand miles on short trips or in below-freezing ambient temperatures may have consumed a "normal" amount of oil. However, when checking the engine oil level, it may measure up to the full mark on the oil level indicator due to dilution (condensation and fuel) in the engine crankcase. The vehicle then might be driven at high speeds on the highway where the condensation and fuel boil off. The next time the engine oil is checked it may appear that a liter of oil was used in about 160 km (100 miles) per liter oil consumption rate is about 2,400 km (1,500 miles) per liter.


Make sure the selected engine oil meets Jaguar specification and the recommended API performance category "SG" and SAE viscosity grade as shown in the vehicle Owner's Guide. It is also important that the engine oil is changed at the intervals specified for the typical operating conditions.

Oil Consumption Test

The following diagnostic procedure is used to determine the source of excessive oil consumption.

NOTE:

Oil use is normally greater during the first 16,100 km (10,000 miles) of service. As mileage increases, oil use decreases. Vehicles in normal service should get a least 16,000 km (10,000 miles) per liter. High speed driving, towing, high ambient temperature and other factors may result in greater oil use.

- 1 . Define excessive consumption, such as the number of miles driven per liter of oil used. Also determine customers's driving habits, such as sustained high speed operation, towing, extended idle and other considerations.
- 2 . Verify that the engine has no external oil leaks as described under Engine Oil Leaks.
- 3 . Verify that the engine has the correct oil level.
- 4 . Verify that the engine is not being run in an overfilled condition. Check the oil level at least five minutes after a hot shutdown with the vehicle parked on a level surface. In no case should the level be above the top of the cross-hatched area and the letter "F" in FULL. If significantly overfilled, carry out step 5, sub steps 1 through 4.
- 5 . Carry out an oil consumption test:
 -  Drain engine oil and fill with one liter less than the recommended amount.

- ▶ Run the engine for three minutes (10 minutes if cold), and allow oil to drain back for at least five minutes with vehicle parked on level surface.

Remove the oil level indicator and wipe clean. (Do not wipe with anything contaminated with silicone compounds.) Install the oil level indicator making sure to seat the oil level indicator

- ▶ firmly in the oil level indicator tube. Remove the oil level indicator and draw a mark on the back (unmarked) surface at the indicated oil level. (This level should be about the same as the ADD mark on the face of the oil level indicator.)

Add one liter of oil. Start the engine and allow to idle for at least two minutes. Shut off the

- ▶ engine and allow the engine oil to drain back for at least five minutes. Mark the oil level dipstick, using the procedure above. (This level may range from slightly below the top of the cross-hatched area to slightly below the letter "F" in FULL.

- ▶ Record the vehicles mileage.

- ▶ Instruct the customer to drive the vehicle as usual and:

- ▶ Check the oil level regularly at intervals of 160-240 km (100-150 miles).

- ▶ Return to the service point when the oil level drops below the lower (ADD) mark on the oil level indicator.

- ▶ Add only full liters of the same oil in an emergency. Note the mileage at which the oil is added.

- ▶ Check the oil level under the same conditions and at the same location as in steps 3 and 4.

- ▶ Measure the distance from the oil level to the UPPER mark on the oil level indicator and record.

- ▶ Measure the distance between the two scribe marks and record.

- ▶ Divide the first measurement by the second.

- ▶ Divide the distance driven during the oil test by the result. This quantity is the approximate oil consumption rate in kilometers per liter or in mile per quart.

- ▶ If the oil consumption rate is unacceptable go to Step 6.

6 . Check the positive crankcase ventilation (PCV) system. Make sure the system is not plugged.

7 . Check for plugged oil drain-back holes in the cylinder head and cylinder block.

8 . If the condition still exists after carrying out the above tests go to step 9.

9 . Carry out a cylinder compression test. Refer to the procedure in this section : Compression Test. This can help determine the source of oil consumption such as valves, piston rings or other areas.

10 . Check valve guides for excessive guide clearance. Install new valve stem seals after verifying valve guide clearance.

11 . Worn or damaged internal engine components can cause excessive oil consumption. Small deposits of oil on the tips of the spark plugs can be a clue to internal oil consumption.

Intake Manifold Vacuum Test

Bring the engine to normal operating temperature. Connect a vacuum gauge or equivalent to the intake manifold. Run the engine at the specified idle speed.

The vacuum gauge should read between 51-74 kPa (15-22 in-Hg) depending upon the engine condition and the altitude at which the test is performed. Subtract 4.0193 kPa (1 in-Hg) from the specified reading for every 304.8 m (1,000 feet) of elevation above sea level.

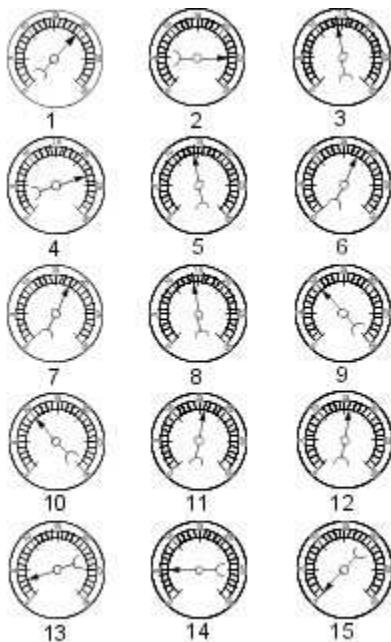
The reading should be steady. As necessary, adjust the gauge damper control (where used) if the needle is fluttering rapidly. Adjust damper until needle moves easily without excessive flutter.

Interpreting Vacuum Gauge Readings

A careful study of the vacuum gauge reading while the engine is idling will help pinpoint trouble areas. Always conduct other appropriate tests before arriving at a final diagnostic decision. Vacuum gauge readings, although helpful, must be interpreted carefully.

Most vacuum gauges have a normal band indicated on the gauge face.

The following are potential gauge readings. Some are normal; others should be investigated further.



1 . NORMAL READING: Needle between 51-74 kPa (15-22 in-Hg) and holding steady.

2 . NORMAL READING DURING RAPID ACCELERATION : When the engine is rapidly accelerated (dotted needle), the needle will drop to a low (not to zero) reading . When the throttle is suddenly released, the needle will snap back up to a higher than normal figure.

3 . NORMAL FOR HIGH-LIFT CAMSHAFT WITH LARGE OVERLAP: The needle will register as low as 51 kPa (15 in-Hg) but will be relatively steady. Some oscillation is normal.

4 . WORN RINGS OR DILUTED OIL: When the engine is accelerated (dotted needle), the needle drops to 0 kPa (0 in-Hg). Upon deceleration, the needle runs slightly above 74 kPa (22 in-Hg).

5 . STICKING VALVES: When the needle (dotted) remains steady at a normal vacuum but occasionally flicks (sharp, fast movement) down and back about 13 kPa (4 in-Hg), one or more valves may be sticking.

6 . BURNED OR BENT VALVES: A regular, evenly-spaced, downscale flicking of the needle indicates one or more burned or damaged valves. Insufficient hydraulic valve tappet or hydraulic lash adjuster clearance will also cause this reaction.

7 . POOR VALVE SEATING: A small but regular downscale flicking can mean one or more valves are not seating correctly.

8 . WORN VALVE GUIDES: When the needle oscillates over about a 13 kPa (4 in-Hg) range at idle speed, the valve guides could be worn. As engine speed increases, the needle will become steady if guides are responsible.

9 . WEAK VALVE SPRINGS: When the needle oscillation becomes more violent as engine RPM is increased, weak valve springs are indicated. The reading at idle could be relatively steady.

10 . LATE VALVE TIMING: A steady but low reading could be caused by late valve timing.

11 . IGNITION TIMING RETARDING: Retarded ignition timing will produce a steady but somewhat low reading.

12 . INSUFFICIENT SPARK PLUG GAP: When spark plugs are gapped too close, a regular, small pulsation of the needle can occur.

13 . INTAKE LEAK: A low, steady reading can be caused by an intake manifold or throttle body gasket leak.

14 . BLOWN HEAD GASKET: A regular drop of fair magnitude can be caused by a blown head gasket or warped cylinder head to cylinder block surface.

15 . RESTRICTED EXHAUST SYSTEM: When the engine is first started and is idled, the reading may be normal, but as the engine RPM is increased, the back pressure caused by a clogged muffler, kinked tail pipe or other concerns will cause the needle to slowly drop to 0 kPa (0 in-Hg). The needle then may slowly rise. Excessive exhaust clogging will cause the needle to drop to a low point even if the engine is only idling.

When vacuum leaks are indicated, search out and correct the cause. Excess air leaking into the system will upset the fuel mixture and cause concerns such as rough idle, missing on acceleration or burned valves. If the leak exists in an accessory such as the power brake booster, the unit will not function correctly. Always repair vacuum leaks.

303-01A : Engine – 3.0L

Specifications

Specifications

Lubricants, Fluids, Sealers and Adhesives

Description	Specification
Engine oil (EUROPE), SAE 5W-30	WSS-M2C-913A or B
Engine oil (US), SAE 5W-30	ILSAC GF3, API SJ
Engine assembly lubricant	SQM-2C9003 AA EP90
Sealant	WSS M4G 320-A3
Hose assembly surfactant	ESE-M99 B144-B

Capacities

Description	Liters
Engine oil, initial fill	7.0
Engine oil, service fill with oil filter change	6.5

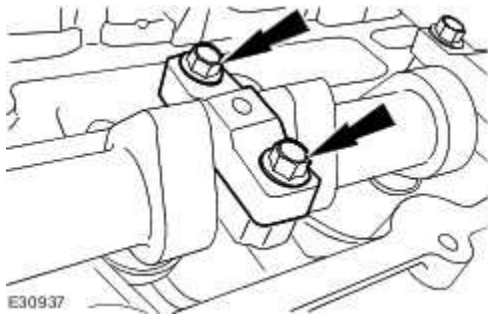
Torque Specifications

Description	Nm	lb-ft	lb-in
Accessory drive belt idler pulley retaining bolt	25	18	-
Accessory drive belt tensioner retaining bolt	48	35	
Air conditioning (A/C) compressor retaining bolts	25	18	-
A/C compressor mounting bracket retaining bolts	25	18	-
A/C compressor lines retaining bolts	9	-	80
Camshaft bearing caps retaining bolts	A	-	-
Camshaft position sensor retaining bolt	7	-	62
Connecting rod cap retaining bolts	A	-	-
Coolant by-pass tube to cylinder head retaining bolts	10	7	-
Crankshaft position sensor retaining bolt	10	7	-
Crankshaft pulley retaining bolt	A	-	-
Cylinder head retaining bolts	A	-	-

Engine ground strap retaining bolt	10	7	-
Engine front cover retaining bolts	A	-	-
Engine mounting bracket retaining bolts	40	30	-
Engine mount bracket to engine mount retaining nuts	55	40	-
Engine mount retaining bolts to crossmember retaining nuts	63	46	-
Engine mount/oil filter housing retaining bolts	A	-	-
Engine wiring harness retaining bracket	7	-	62
Exhaust manifold heat shield retaining bolts	10	7	-
Exhaust manifold retaining studs	9	-	80
Exhaust manifold retaining nuts	A	-	-
Flywheel retaining bolts	80	59	-
Flexplate retaining bolts	80	59	-
Generator retaining bolts	48	35	-
Ignition coils retaining bolts	7	-	62
Knock sensor retaining bolts	25	18	-
Lower cylinder block retaining bolts	A	-	-
Lower intake manifold retaining bolts	A	-	-
Oil level indicator tube retaining bolt	10	7	-
Oil pan retaining bolts	A	-	-
Oil pan drain plug	24	18	-
Oil pressure sensor	16	12	-
Oil pump to engine block retaining bolts	10	7	-
Oil separator blanking plate	10	7	-
Oil temperature sensor	14	10	-
Power steering pump retaining bolts	25	18	-
Spark plugs	15	11	-
Timing chain guide retaining bolts	A	-	-
Timing chain tensioner retaining bolts	25	18	-
Upper intake manifold retaining bolts	A	-	-
Upper intake manifold support retaining bolts	10	7	-
Variable camshaft timing oil control unit retaining bolt	40 + 90°	30 + 90°	-
Valve cover studs and retaining bolts	A	-	-
Water pump retaining bolts	25	18	-
Wiring harness to valve cover retaining nuts	10	7	-
A = refer to the procedure for correct torque sequence	-	-	-

Valve Clearance Adjustment (12.29.48)

1. Remove the left-hand valve cover.
2. Remove the right-hand valve cover.
Valve Cover RH (12.29.44)
3. Turn the crankshaft pulley clockwise to position the relevant camshaft lobe 180 degrees to the shim being replaced.
4. Remove the camshaft bearing cap.



5. Install the special tool.
 - Making sure the legs of the tool are in contact with the edge of the valve bucket, compress the bucket.



6. Use compressed air to remove the shims that require replacing.
 - Blow compressed air between the shim edge and bucket to dislodge the shim.
7. Use the following formula to calculate the required shim thickness.
 - $\text{Original shim thickness} + \text{measured clearance} - \text{desired clearance} = \text{required shim}$

thickness.

8. Apply a light coat of engine oil to the replacement shim(s) and install.

9. Install the left-hand valve cover.

10. Install the right-hand valve cover.

Valve Cover RH (12.29.44)

Valve Clearance Check (12.29.47)

1. Remove the left-hand valve cover. For additional information, refer to .

2. Remove the right-hand valve cover. For additional information, refer to .

3.



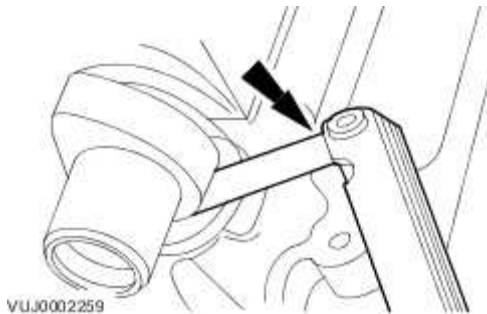
CAUTION: Rotating the crankshaft in a counterclockwise direction may cause engine damage. Crankshaft journals are directionally machined. Rotating the crankshaft counterclockwise Can raise burrs on bearing surfaces, reducing engine life.



CAUTION: Camshaft lobes must be 180 degrees away from each valve tappet or valve clearance will be incorrect.

Rotate the engine clockwise to position the camshaft lobe away from the shim surface.

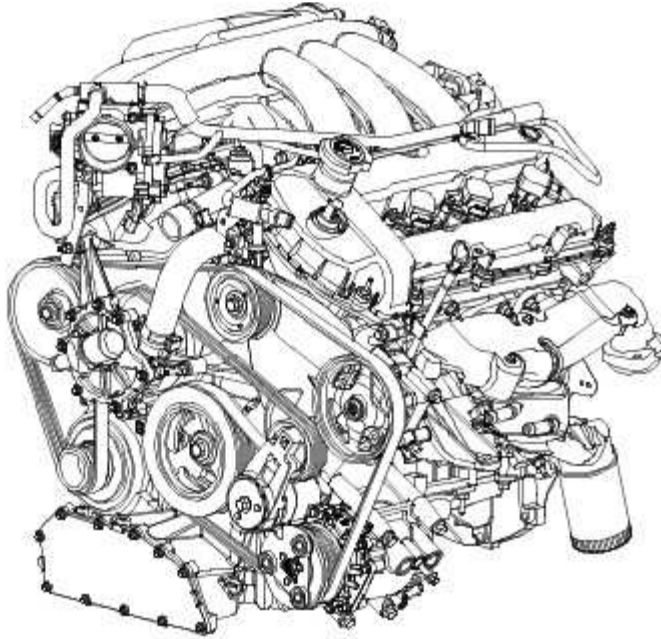
4. Using the feeler gauge set, measure the clearance between the camshaft and the shim surface. Record and check the readings. For additional information, refer to <<303-00>>. Adjust the clearances as necessary. For additional information, refer to.



5. Install the right-hand valve cover. For additional information, refer to .

6. Install the left-hand valve cover. For additional information, refer to .

Engine



E30898

The 3.0 litre 24 valve V6 engine has four overhead camshafts and are driven by two timing chains. The engine incorporates electronic engine management with distributorless ignition system, sequential electronic fuel injection. It also has two catalytic converters in the exhaust system which includes two oxygen sensors and two catalytic monitor sensors.

Viewed from the driving position, the right-hand cylinder bank is numbered 1 to 3, from the front of the vehicle and the left-hand cylinder bank are numbered 4 to 6, from the front of the vehicle.

The engine includes the following:

- Compression ratio of 10.5:1.
- 3 Stage variable geometry intake manifold.
- Lightweight valve gear.
- Unique camshaft lift and duration.
- Twin knock sensor engine management control.
- Fully variable camshaft timing (VCT) system.

Variable Intake System (V.I.S).

The variable intake system consists of a three stage upper intake manifold assembly, two position electronically driven gate valves and an engine management powertrain control system.

The engine control module (ECM) switches the intake manifold tuning valves between fully open and fully closed at calibrated engine speeds.

The intake manifold efficiency is therefore increased which will also increase the engine torque and engine performance.

Variable Camshaft Timing (VCT)

Oil is supplied to the front of each VCT actuator via the spider bracket assembly which contains the VCT actuator solenoid, supply oil galleries and timing chain guide. Oil pressure advances and retards the camshaft timing which is controlled by the engine management system via a solenoid valve mounted on top of the oil feed spider assembly. Camshaft timing, dependant on engine speed, load and oil temperature can be optimized over the adjustment range of 30 degrees.

Engine Lubrication System

The engine lubrication system is of the force-feed type in which oil is supplied under full pressure to the:

- crankshaft main bearings.
- crankshaft thrust main bearing.
- connecting rod bearings.
- valve shims.
- camshaft bearings.
- variable camshaft timing.

All other parts are lubricated by gravity flow or splash of the oil.

Oil Pump

The rotary oil pump develops the oil pressure:

- The oil pump is located at the front of the crankshaft.
- The oil pump is driven by the crankshaft.
- A full flow oil filter is externally mounted on the oil filter housing.

If the filter element should become blocked a spring-loaded bypass valve will open and allow an uninterrupted flow of oil to the engine.

Engine

For additional information, refer to<<303-00>>.

Engine (12.41.01)

Special Service Tools



Engine Lifting Bracket
303-661



303-021

Engine Support Bracket
303-021



418-535

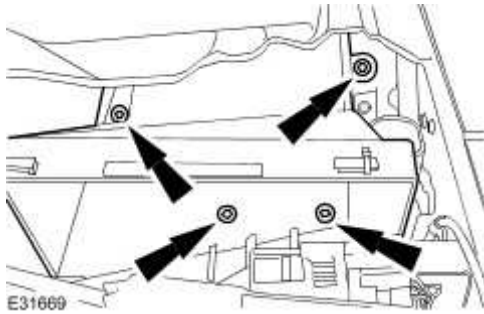
5 point security torx bit
418-535

Removal

- 1 . Remove the automatic transmission assembly. <<307-01>>
- 2 . Lower the vehicle.
- 3 . Remove the hood assembly. <<501-03>>

4 . Remove the air cleaner assembly. <<303-12A>>

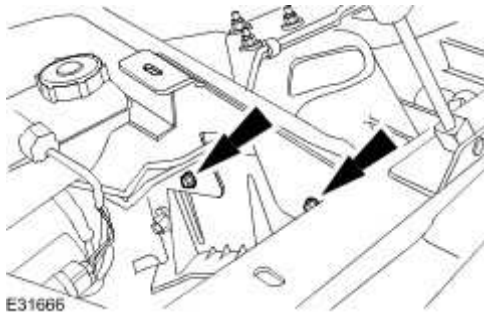
5 . Remove the cabin air filter housing.



6 . **NOTE:**

Left-hand shown, right-hand similar.

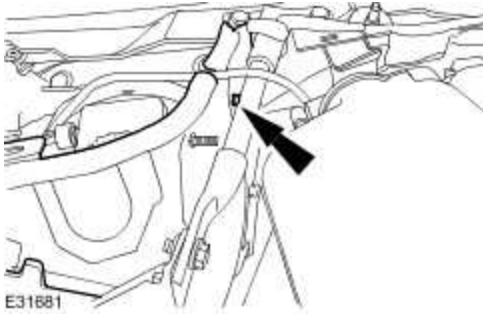
Remove the engine compartment panel retaining bolts.



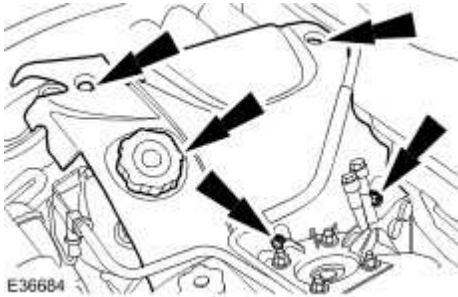
7 . **NOTE:**

Left-hand shown, right-hand similar.

Remove the engine compartment panel.



8 . Remove the engine cover.



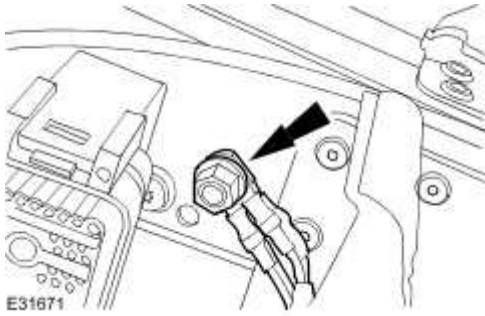
9 . Raise the vehicle.

10 . Remove the passenger side front wheel and tire assembly. <<204-04>>



11 . Lower the vehicle.

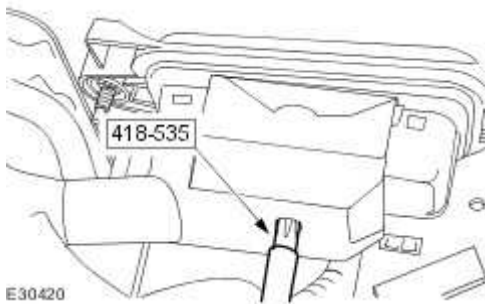
12 . Disconnect the engine harness ground strap.



13 NOTE:

The engine control module (ECM) electrical connector retaining bolt remains captive in the electrical connector

Disconnect the ECM electrical connector.

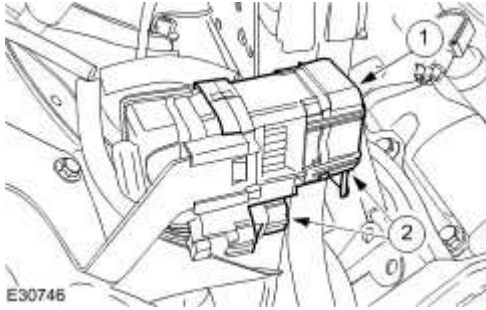


14 NOTE:

The main engine harness electrical connector retaining bolt remains captive in the electrical connector.

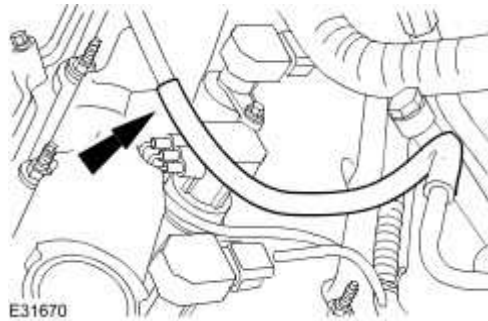
Disconnect the engine wiring harness electrical connectors.

- 1) Loosen the engine harness main electrical connector retaining bolt.
- 2) Disconnect the engine wiring harness electrical connectors.

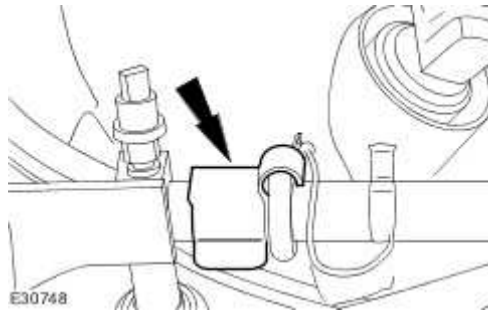


15 . Reposition the engine wiring harness from the vehicle body.

16 . Disconnect the evaporative emission canister purge valve to intake manifold hose.

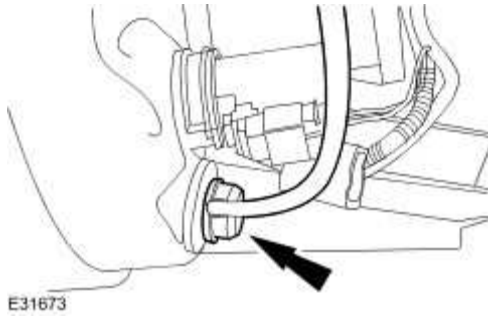


17 . Disconnect the fuel supply manifold spring lock coupling. <<310-00>>



18 . Remove the cooling module. <<303-03A>>

19 . Detach the brake booster vacuum hose from the brake booster.



20



CAUTION: Cap the power steering line to prevent losses of fluid and dirt ingress.

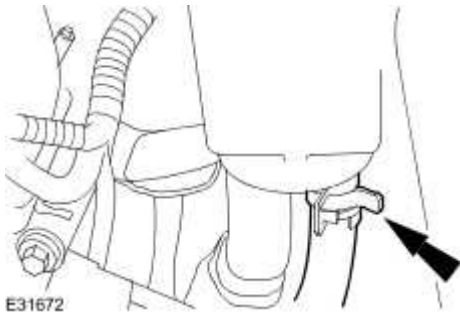


CAUTION: If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.

NOTE:

Drain the fluid into a suitable container.

Disconnect the power steering reservoir to power steering pump supply line.



21



CAUTION: Cap the power steering lines to prevent losses of fluid and dirt ingress.



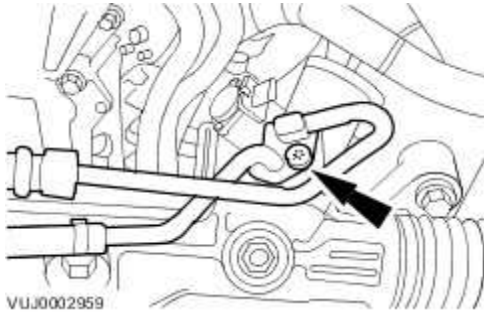
CAUTION: If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.

NOTE:

Drain the fluid into a suitable container.

Disconnect the power steering pump to steering gear supply line.

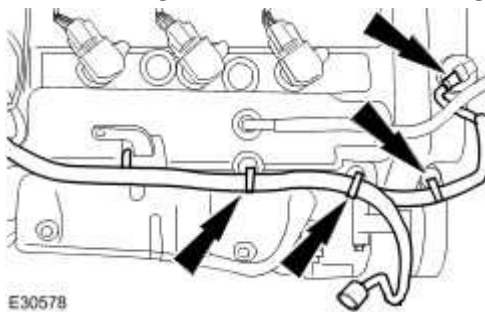
▶ Remove and discard the O-ring seal.



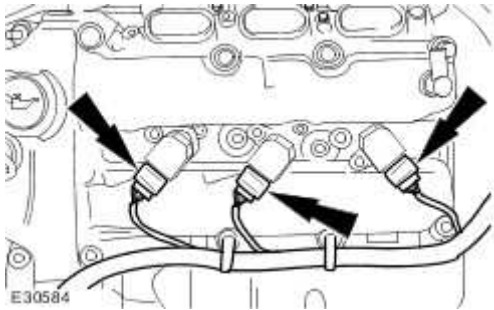
22 . NOTE:

Inlet manifold shown removed for clarity.

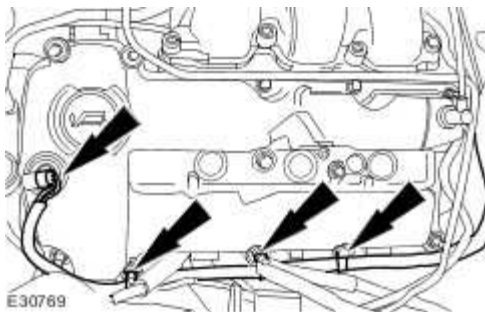
Detach the right-hand valve cover wiring harness.



23 . Disconnect the left-hand ignition coils electrical connectors.

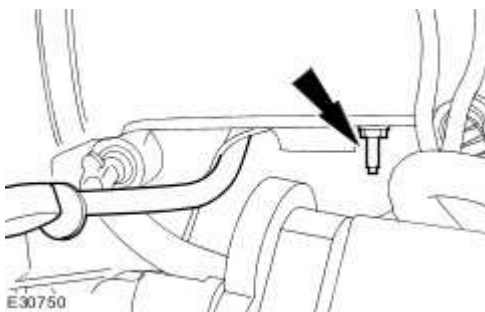


24 . Detach the left-hand valve cover wiring harness.



25 . Remove the dipstick tube retaining bolt.

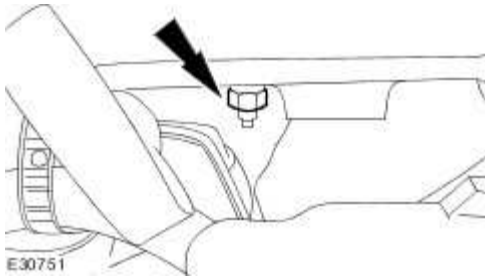
▶ Reposition the dipstick tube.



26 . **NOTE:**

Left-hand shown, right-hand similar.

Loosen the exhaust manifold retaining nut.

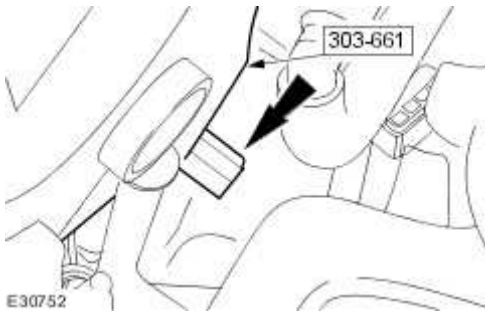


27 . NOTE:

Left-hand shown, right-hand similar.

Install the special tool to the exhaust manifold.

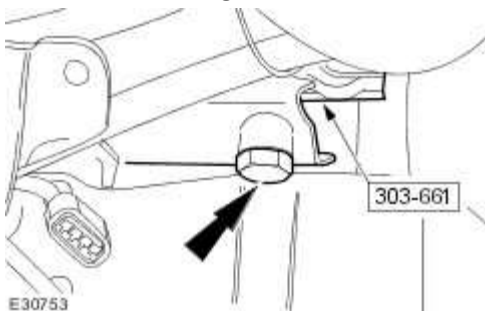
▶ Install the retaining bolt.



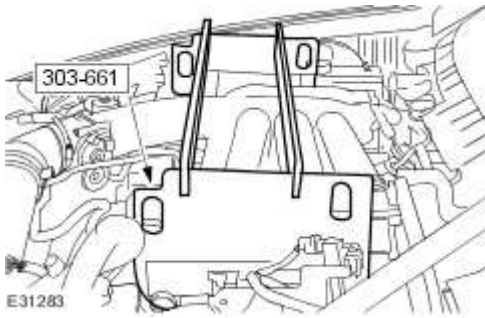
28 . NOTE:

Left-hand shown, right-hand similar.

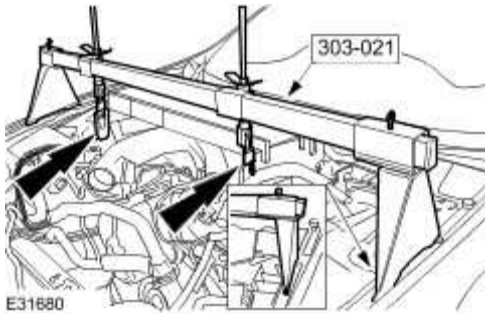
Install the retaining bolt.



29 . Install the special tool support bars to the special tool.



30 . Install the special tool.



31 . Raise the vehicle.

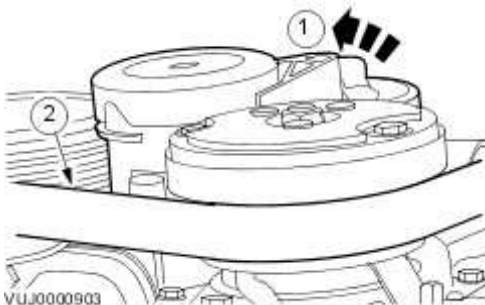
32 Detach the accessory drive belt.

1) Rotate the accessory drive belt tensioner counter-clockwise.



Use a 3/8 inch square drive bar to rotate the accessory drive belt tensioner.

2) Detach the accessory drive belt.



33 . Detach the generator battery positive cable protective cover.

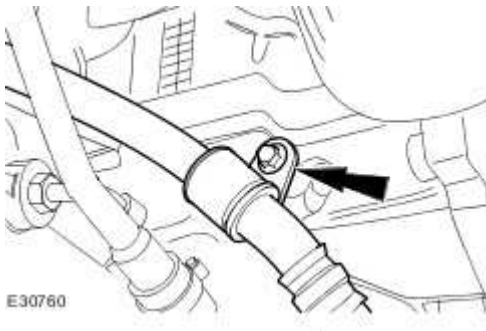


34 . Remove the generator battery positive cable retaining nut.



35 . Remove the air conditioning compressor. <<412-03>>

36 . Detach the power steering hose.

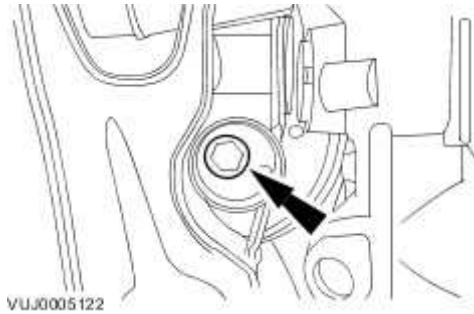


37 . Reposition the power steering hose away from the engine.

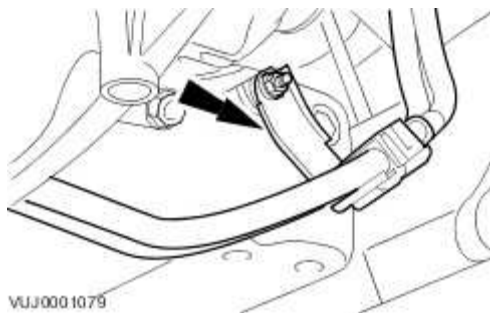
38 . **NOTE:**

Left-hand shown, right-hand similar.

Remove the engine mounts lower retaining bolts.



39 . Detach the automatic transmission oil cooler tubes bracket.

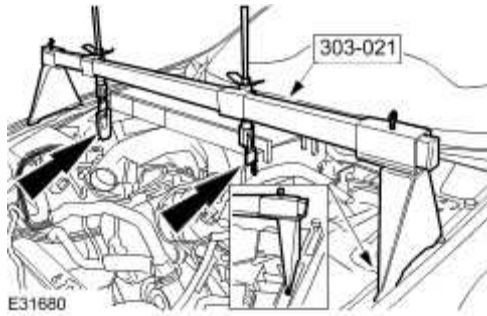


40 . Reposition the automatic transmission oil cooler tubes away from the engine.

41 . Reposition the automatic transmission wiring harness away from the engine.

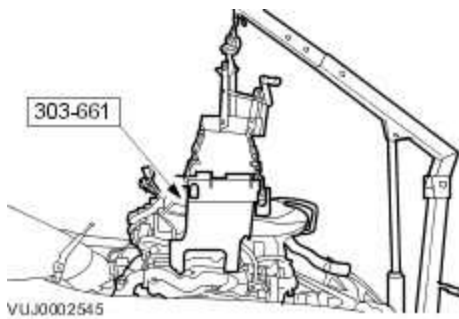
42 . Lower the vehicle.

43 . Remove the special tool.



44 . Remove the engine assembly.

► Using the special tools, install a suitable floor crane.



Engine (12.41.01)

Special Service Tools



Engine Lifting Bracket
303-661



303-021

Engine Support Bracket
303-021



418-535

5 point security torx bit
418-535

Installation

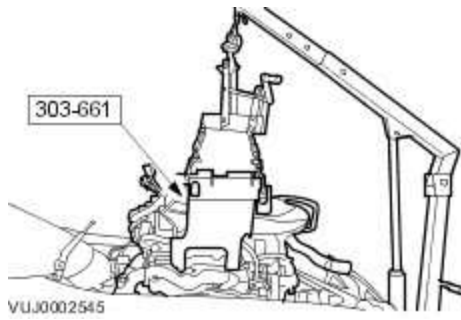
1 NOTE:

Make sure all wiring harnesses and oil pipes are suitably positioned for engine installation.

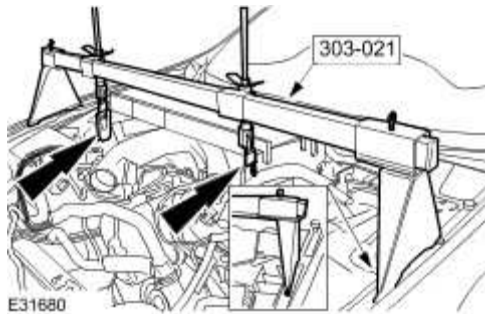
Install the engine assembly.

► Make sure engine mounts are correctly located

► Remove the floor Crane.



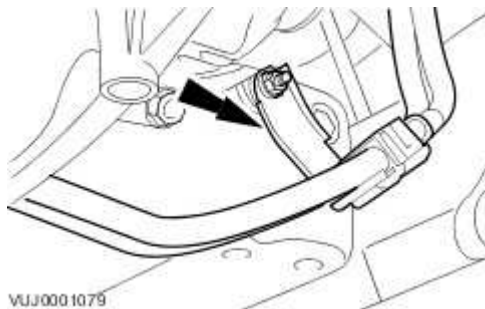
2 . Install the special tool.



3 . Raise the vehicle.

4 . Attach the automatic transmission oil cooler tubes bracket.

► Tighten to 10 Nm.

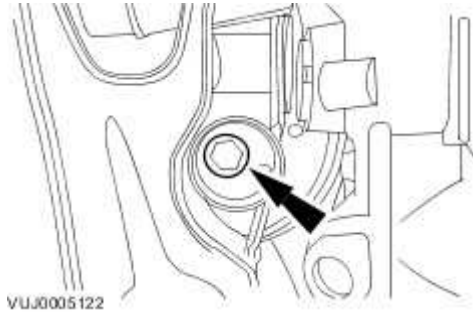


5 . **NOTE:**

Left-hand shown, right hand similar.

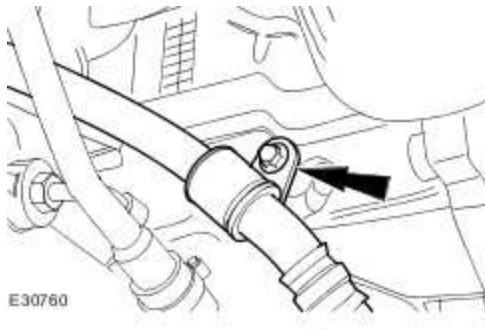
Install the engine mounts lower retaining bolts.

▶ Tighten to 63 Nm.



6 . Attach the power steering hose.

▶ Tighten to 10 Nm.



7 . Install the air conditioning compressor. <<412-03>>

8 . Install the generator battery positive cable retaining nut.

▶ Tighten to 12 Nm.



9 . Attach the generator battery positive cable protective cover.

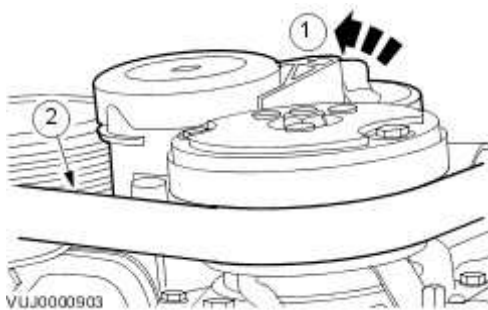


10 Attach the accessory drive belt.

1) Rotate the accessory drive belt tensioner counter-clockwise.

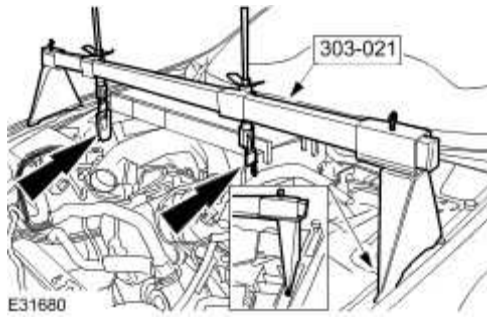
▶ Use a 3/8 inch square drive bar to rotate the accessory drive belt tensioner.

2) Attach the accessory drive belt.

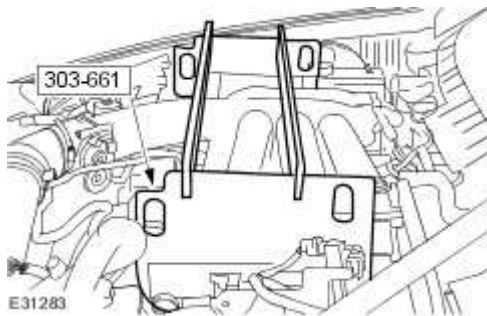


11 . Lower the vehicle.

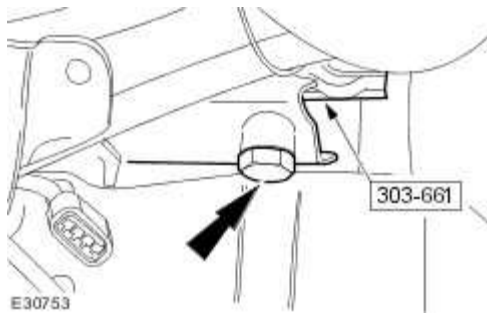
12 . Remove the special tool.



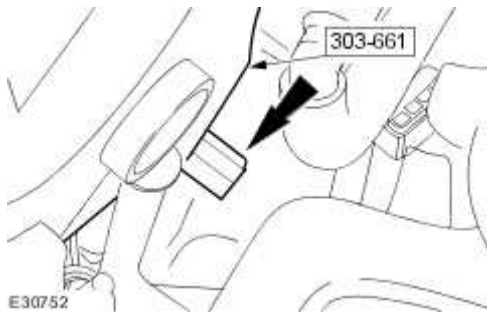
13 . Remove the special tool.



14 . Remove the special tool.



15 . Remove the special tool.

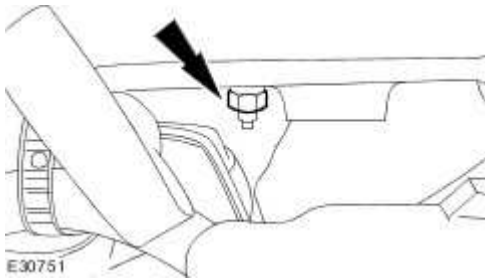


16 . **NOTE:**

Left-hand shown, right-hand similar.

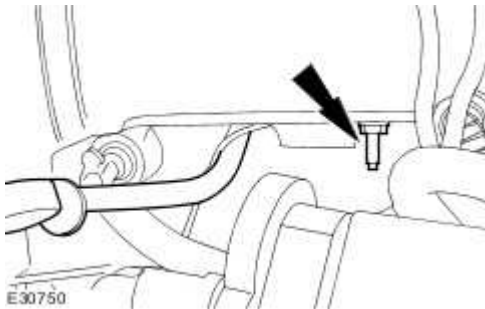
Tighten the exhaust manifold retaining nut.

▶ Tighten to 25 Nm.

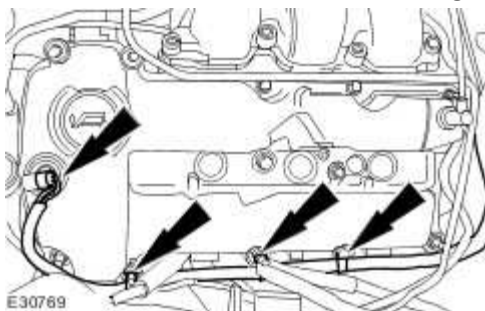


17 . Install the dipstick tube retaining bolt.

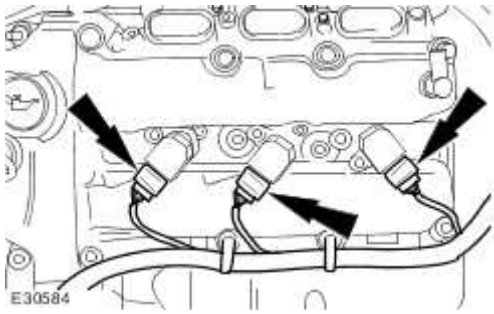
▶ Tighten to 10 Nm.



18 . Attach the left-hand valve cover wiring harness.



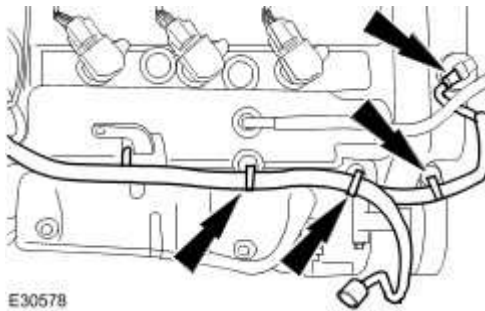
19 . Connect the left-hand ignition coils electrical connectors.



20 . **NOTE:**

Intake manifold shown removed for clarity.

Attach the right-hand valve cover wiring harness.



21 . **NOTE:**

Un-cap the power steering pump exposed ports.

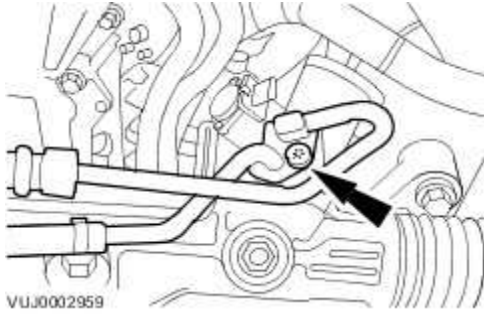
Install new power steering pump supply line O-ring seal.

22



CAUTION: If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.

Connect the power steering pump to steering gear supply line.

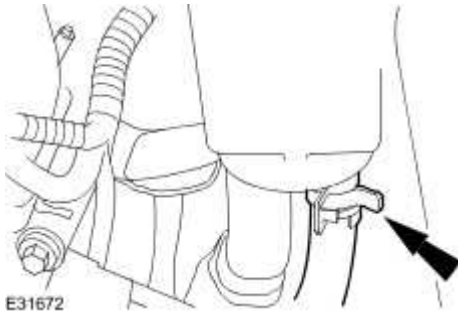


23

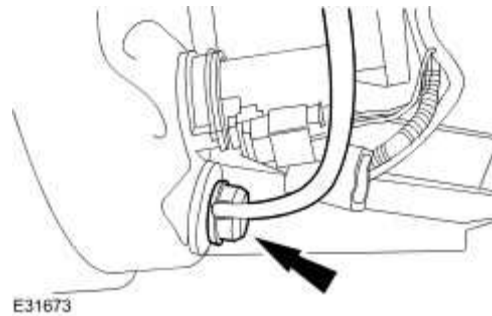


- CAUTION: If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.

Connect the power steering reservoir to power steering pump supply line.



24 . Attach the brake booster vacuum hose from the brake booster.

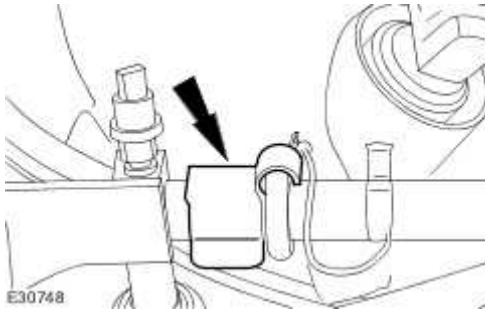


25 . Install the cooling module. <<303-03A>>

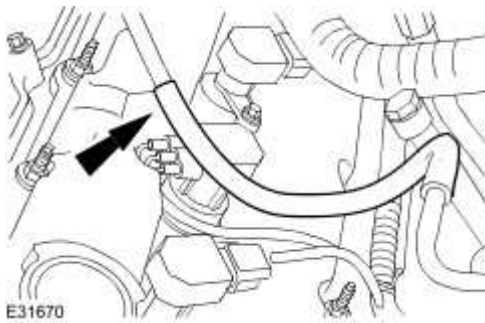
26 . **NOTE:**

Install new O-ring seals.

Connect the fuel supply manifold spring lock coupling. <<310-00>>



27 . Connect the evaporative emission canister purge valve to intake manifold hose.



28 . Connect the engine wiring harness electrical connectors.

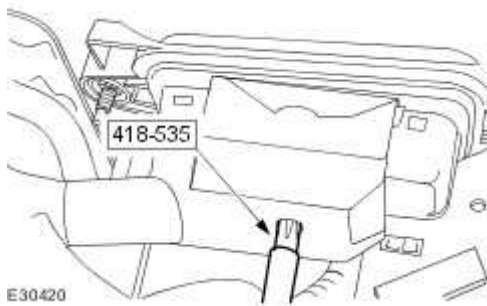
1) Align the engine harness main electrical connector retaining bolt.

2) Connect the engine wiring harness electrical connectors.

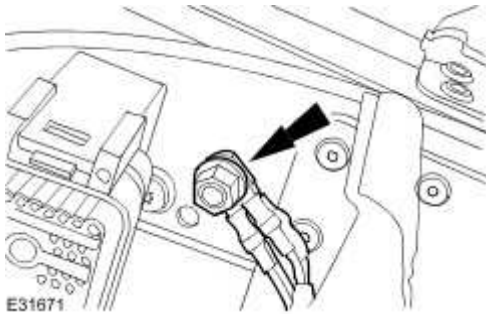


29 . Connect the engine control module (ECM) electrical connector.

► Tighten to 6 Nm.



30 . Connect the engine harness ground strap.



31 . Raise the vehicle.

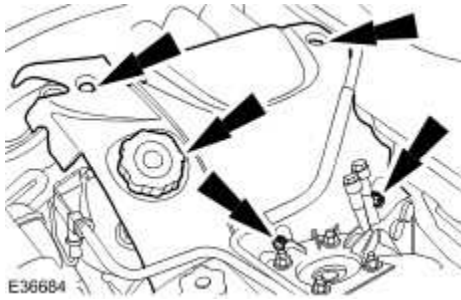
32 . Install the passenger side front wheel and tire assembly.

► Tighten to 128 Nm.



33 . Lower the vehicle.

34 . Install the engine cover.

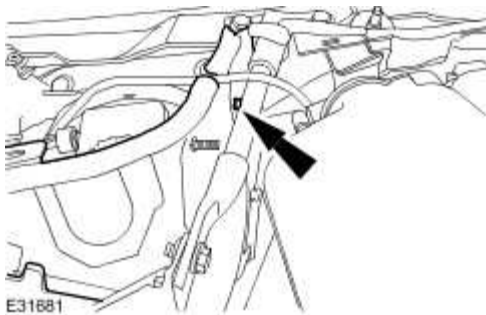


35 . **NOTE:**

Left-hand shown, right-hand similar.

Install the engine compartment panels.

► Tighten to 10 Nm.

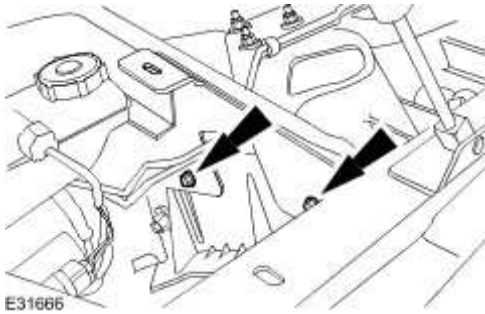


36 . **NOTE:**

Left-hand shown, right-hand similar.

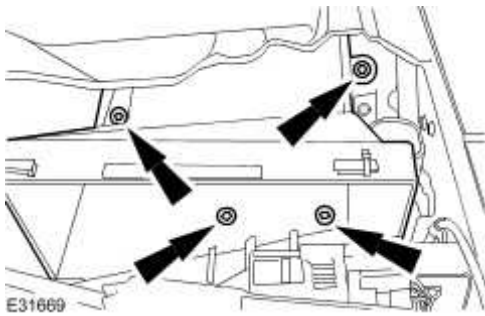
Install the engine compartment panels retaining bolts.

► Tighten to 10 Nm.



37 . Install the cabin air filter housing.

► Tighten to 10 Nm.



38 . Install the air cleaner assembly. <<303-12A>>

39 . Install the hood assembly. <<501-03>>

40 . Raise the vehicle.

41 . Install the automatic transmission assembly. <<307-01>>

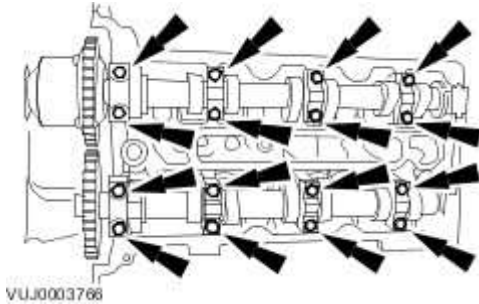
Camshafts LH (12.13.19)

Removal

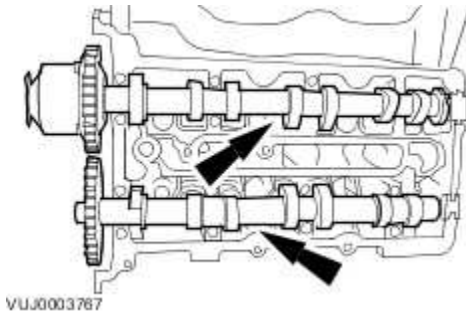
- 1 . Remove the timing drive components.

For additional information, refer to Timing Drive Components (12.65.13)

- 2 . Remove the camshaft bearing caps evenly.



- 3 . Remove the camshafts.

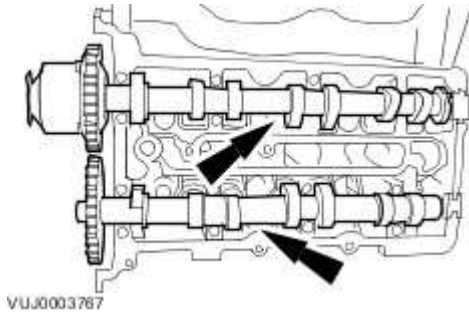


Installation

- 1 **NOTE:**

Lubricate the camshafts and the camshaft bearing caps with oil meeting Jaguar specification prior to installation.

Install the camshafts.



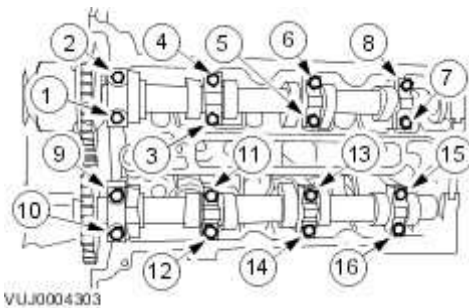
2



CAUTION: Do not install the cylinder head camshaft journal thrust caps until the camshaft journal caps are installed or damage to the thrust caps may occur.

Install the camshaft bearing caps in their original position.

- ▶ Install the camshaft bearing cap retaining bolts evenly.
- ▶ Tighten the retaining bolts in the sequence shown to 10 Nm.



- 3 . Carry out a valve clearance check. For additional information, refer to
For additional information, refer to .
- 4 . Install the timing drive components.
For additional information, refer to Timing Drive Components (12.65.13)

Crankshaft Front Seal (12.21.14)

Special Service Tools



Crankshaft Front Seal Remover
303-700



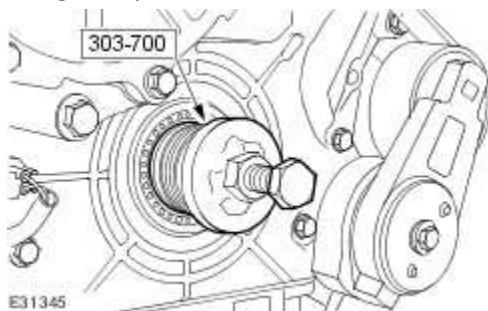
Crankshaft Front Seal Installer
303-542



Crankshaft pulley installer
303-102

Removal

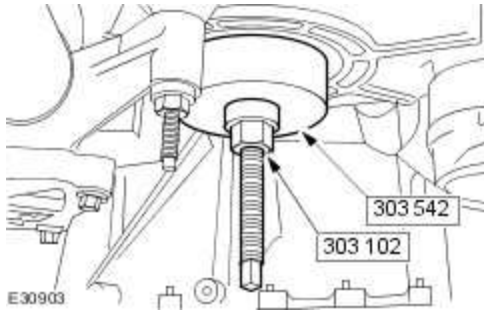
- 1 . Remove the crankshaft pulley.
For additional information, refer to
- 2 . Using the special tool, remove and discard crankshaft front seal.



Installation

- 1 . Using the special tools, install the crankshaft front oil seal.

► Lubricate the seal lip with clean engine oil.



- 2 . Install the crankshaft vibration damper.
For additional information, refer to

Crankshaft Pulley (12.21.09)

Special Service Tools



303D055

Wrench strap-universal

303-D055



303D121

Crankshaft Pulley Remover

303-D121



303 102

303 102

Crankshaft Pulley Installer

303-102



303D12101

Trust Pad

303-D121-01



303-335/2

Crankshaft pulley installer

303-335/2

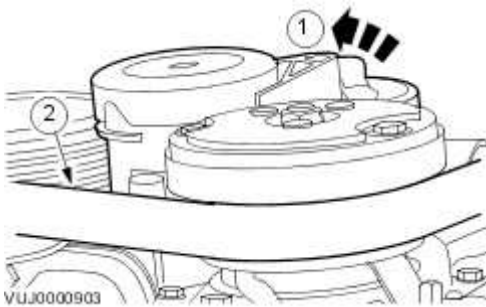
Removal

- 1 . Disconnect the battery ground cable. <<414-01>>
- 2 . Carry out the cooling system draining procedure. <<303-03A>>
- 3 . Remove the accessory drivebelt.

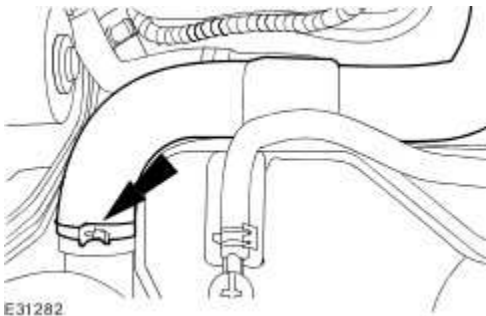
1) Rotate the belt tensioner counter-clockwise.

▶ Use a 3/8 inch square drive bar to rotate the belt tensioner.

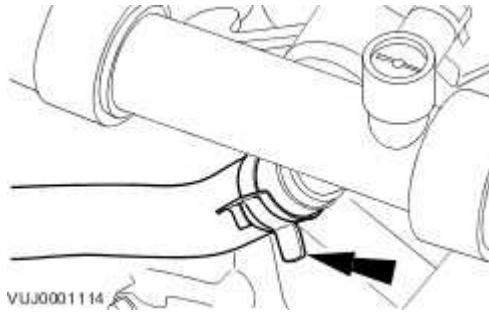
2) Remove the accessory drivebelt.



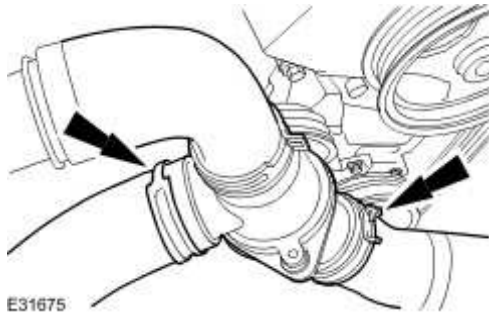
- 4 . Lower the vehicle.
- 5 . Remove the throttle body. <<303-04A>>
- 6 . Disconnect the radiator top coolant hose.



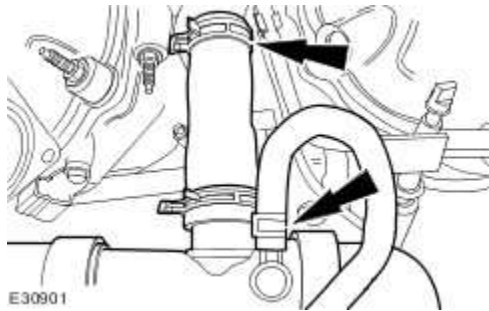
7 . Disconnect the coolant hose from the top coolant hose assembly.



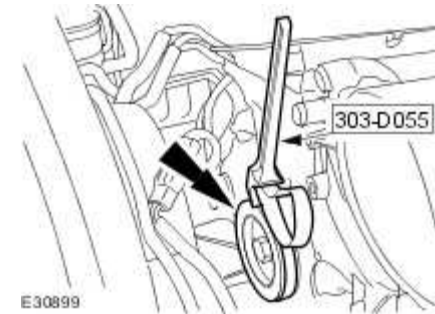
8 . Disconnect the hose assembly from the water pump and lower hose.



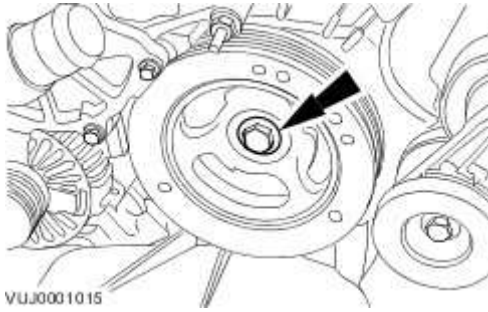
9 . Remove the hose assembly.



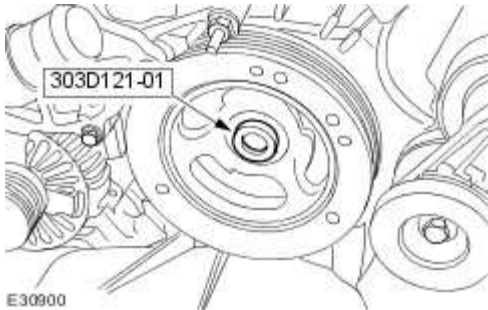
10 . Install the special tool.



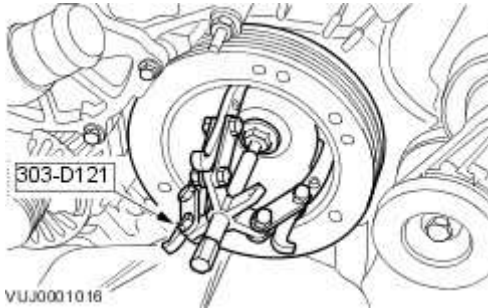
11 . Remove the crankshaft pulley retaining bolt.



12 . Install the special tool.



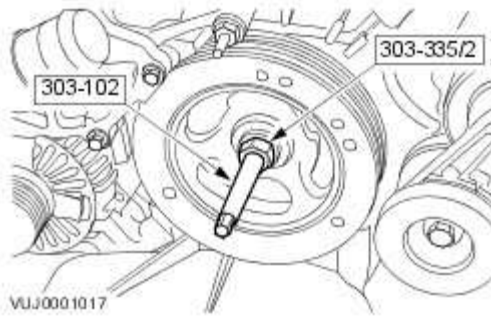
13 . Using the special tools, remove the crankshaft pulley.



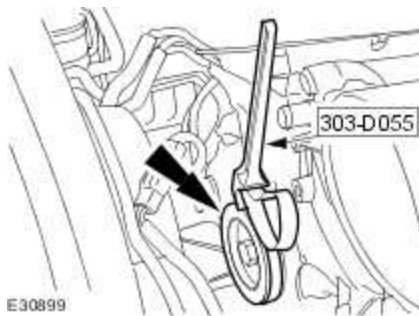
Installation

1 Using the special tools, install the crankshaft pulley.

- ▶ Coat the crankshaft pulley keyway with silicone gasket sealant meeting Jaguar specification.
- ▶ Coat the sealing surfaces of the crankshaft pulley with silicone gasket sealant meeting Jaguar specification.

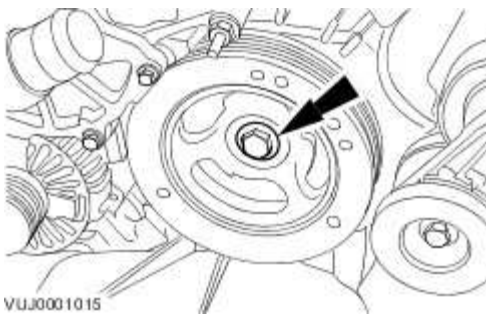


2 . Install the special tool.

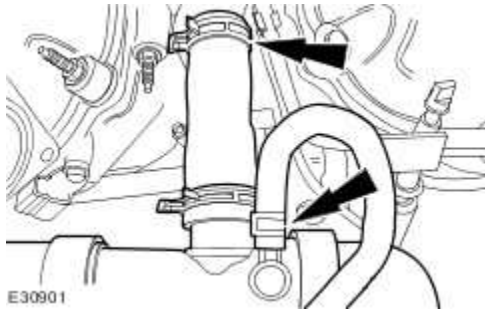


3 . Install the crankshaft pulley bolt.

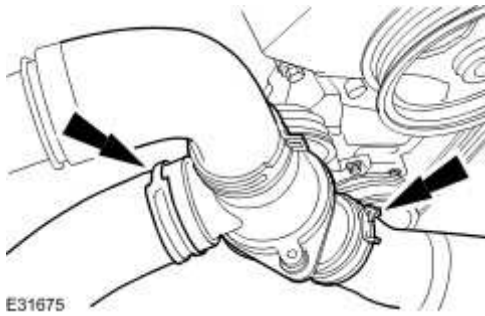
- ▶ Torque to 120 Nm.
- ▶ Loosen the bolt (minimum 1 turn).
- ▶ Torque to 50 Nm.
- ▶ Angle Torque to 90°.



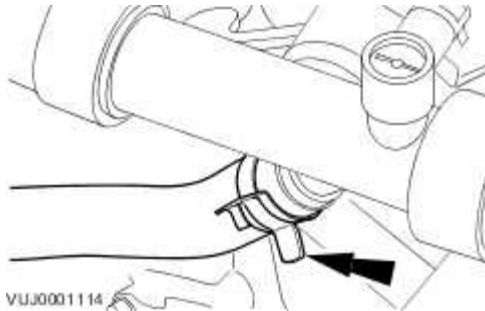
4 . Install the hose assembly.



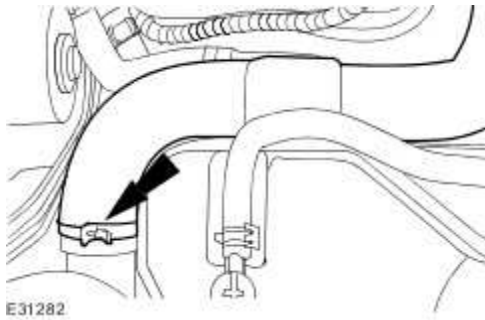
5 . Install the hose assembly to the water pump and lower hose.



6 . Install the coolant hose to the housing assembly.



7 . Connect the radiator top coolant hose.



8 . Install the throttle body. <<303-04A>>

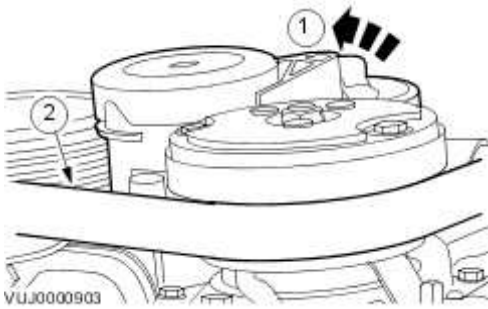
9 . Raise the vehicle.

10 . Install the accessory drivebelt.

1) Rotate the belt tensioner counter-clockwise.

► Use a 3/8 inch square drive bar to rotate the belt tensioner.

2) Install the accessory drivebelt.



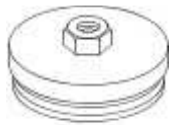
11 . Lower the vehicle.

12 . Connect the battery ground cable. <<414-01>>

13 . Carry out the cooling system filling and bleeding procedure. <<303-03A>>

Crankshaft Rear Seal (12.21.20)

Special Service Tools



303566

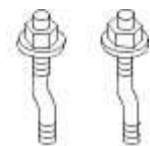
Crankshaft Rear Seal Remover

303-566



Crankshaft Rear Seal Installer

303-178



303384

Crankshaft Rear Seal Installer Adapter Bolts

303-384



Crankshaft Rear Seal Installer Draw Bolts

303-102

Removal

Vehicles With Manual Transmission

- 1 . Remove the flywheel. For additional information, refer to
For additional information, refer to .

Vehicles With Automatic Transmission

- 2 . Remove the flexplate. For additional information, refer to

For additional information, refer to .

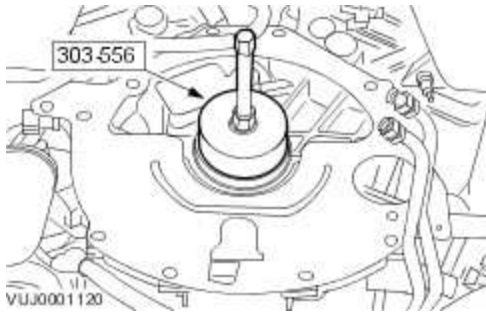
All Vehicles

3



CAUTION: Avoid scratching or damaging the oil seal sealing surfaces on the crankshaft and cylinder block.

Using the special tools, remove the crankshaft rear main oil seal.



Installation

All Vehicles

1 . Clean and inspect the crankshaft rear oil seal sealing surfaces.

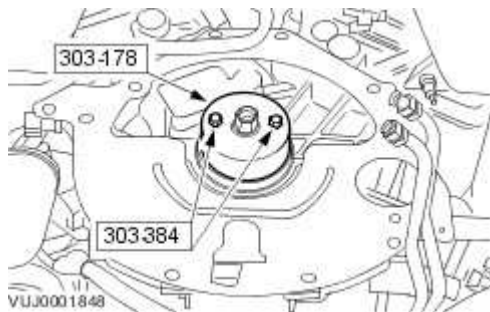
2 Lubricate the crankshaft flange, the crankshaft rear oil bore seal, and the oil seal lip.

▶ Use engine assembly lubricant or equivalent meeting Jaguar specification ESR-M99C80-A.

3 **NOTE:**

Alternate bolt tightening to correctly seat the crankshaft rear oil seal until it is flush with the cylinder block.

Using the special tools, install the crankshaft rear oil seal.



Vehicles With Automatic Transmission

- 4 . Install the flexplate. For additional information, refer to
For additional information, refer to .

Vehicles With Manual Transmission

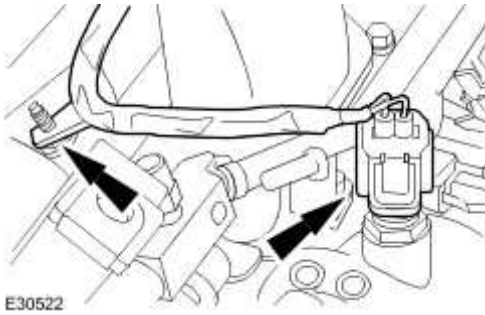
- 5 . Install the flywheel. For additional information, refer to
For additional information, refer to .

Cylinder Head (12.29.01)

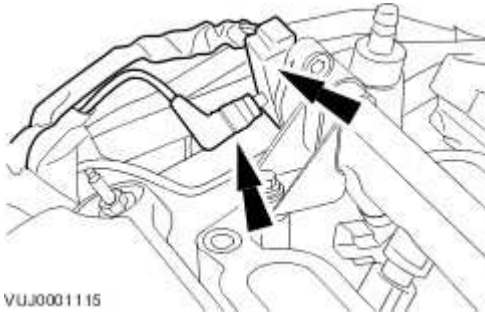
Removal

RH and LH Cylinder Heads

- 1 . Remove the right-hand valve cover.
For additional information, refer to Valve Cover RH (12.29.44)
- 2 . Remove the left-hand valve cover.
For additional information, refer to
- 3 . Disconnect the coolant temperature (ECT) electrical connector.

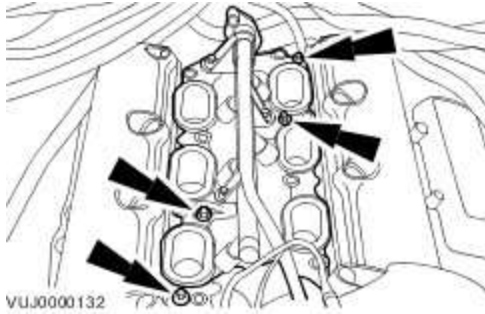


- 4 . Disconnect the fuel pressure regulator electrical connector and vacuum hose.



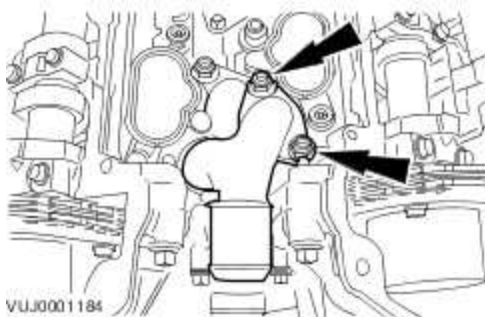
- 5 . Remove the fuel supply manifold and lower intake manifold.

▶ Remove and discard the lower intake manifold gaskets.



6 . Remove the coolant crossover tube.

▶ Discard the O-ring seals.



7 . Remove the catalytic converters. <<309-00>>

8 . Remove the camshafts.

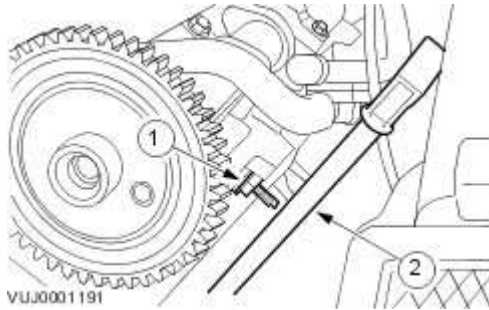
For additional information, refer to Camshafts LH (12.13.19)

Cylinder Head-LH

9 . Remove the oil level indicator tube.

1) Remove the retaining nut.

2) Remove the oil level indicator tube.



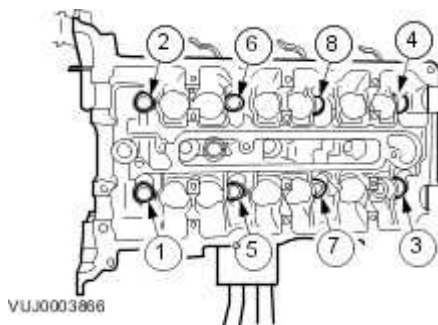
RH and LH Cylinder Heads

10 . NOTE:

Remove the retaining bolts in the indicated sequence.

Remove the cylinder head. (Left-hand shown, right-hand similar).

▶ Remove and discard the cylinder head gasket.



11 . Clean and inspect the cylinder head and cylinder block. <<303-00>>

Installation

RH and LH Cylinder Heads

1 . NOTE:

The head gaskets must be installed over the cylinder head to block dowels.

Install a new cylinder head gasket.

2



CAUTION: Use care when installing the cylinder head. Damage to the cylinder block and or the cylinder head may result.

NOTE:

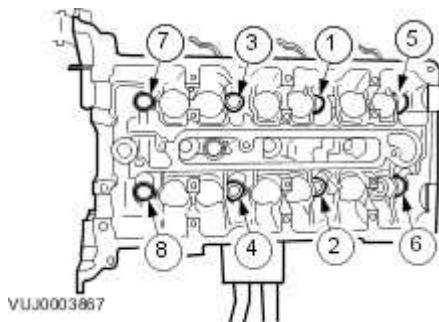
Make sure the cylinder head is installed in its original position.

NOTE:

Tighten the retaining bolts in the indicated sequence in six stages.

Install the cylinder head and install new cylinder head retaining bolts and washers.

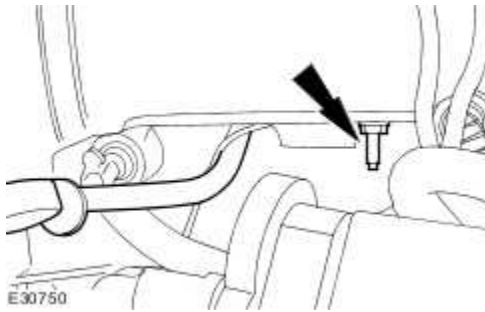
- ▶ Stage 1: tighten to 30 Nm.
- ▶ Stage 2: tighten 90 degrees.
- ▶ Stage 3: loosen 360 degrees.
- ▶ Stage 4: tighten to 30 Nm.
- ▶ Stage 5: tighten 90 degrees.
- ▶ Stage 6: tighten 90 degrees .



Cylinder Head-LH

- 3 . Install the oil level indicator tube.

▶ Tighten to 10 Nm.



RH and LH Cylinder Heads

4 . Install the camshafts.

For additional information, refer to Camshafts LH (12.13.19)

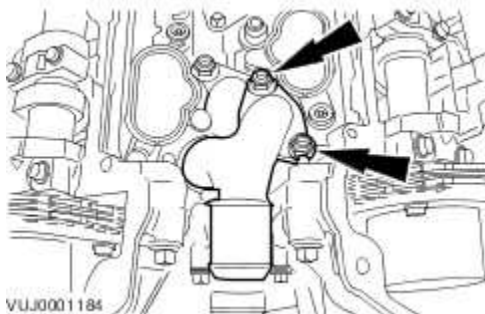
5 . Install the catalytic converters. <<309-00>>

6 . **NOTE:**

Install new O-ring seals.

Install the coolant crossover tube.

▶ Tighten to 10 Nm.

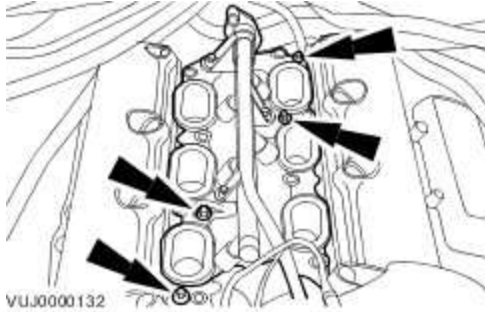


7 . **NOTE:**

Install new lower intake manifold gaskets.

Install the fuel supply manifold and lower intake manifold.

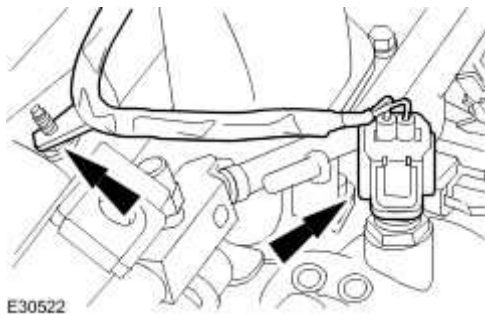
▶ Tighten to 10 Nm.



8 . Connect the fuel pressure regulator electrical connector and vacuum hose.



9 . Connect the ECT electrical connector.



10 . Install the left-hand valve cover.
For additional information, refer to

11 . Install the right-hand valve cover.

For additional information, refer to Valve Cover RH (12.29.44)

Engine Front Cover (12.65.01)

Special Service Tools



303D055

Wrench strap-universal

303-D055



303D121

Crankshaft Pulley Remover

303-D121

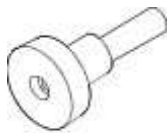


303 102

303 102

Crankshaft Pulley Installer

303-102



303D12101

Thrust Pad

303-D121-01



303-335/2

Crankshaft pulley installer

303-335/2

Removal

- 1 . Remove the left-hand valve cover.

For additional information, refer to

- 2 . Remove the right-hand valve cover.

For additional information, refer to Valve Cover RH (12.29.44)

- 3 . Remove the oil pan.

For additional information, refer to

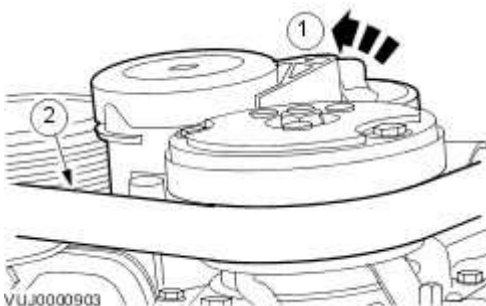
- 4 . Carry out the cooling system draining procedure. <<303-03A>>

- 5 . Remove the accessory drivebelt.

- 1) Rotate the belt tensioner counter-clockwise.

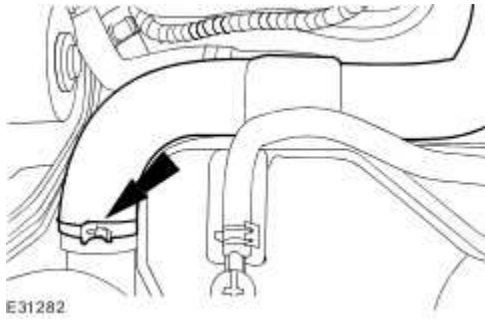
► Use a 3/8 inch square drive bar to rotate the belt tensioner.

- 2) Remove the accessory drivebelt.

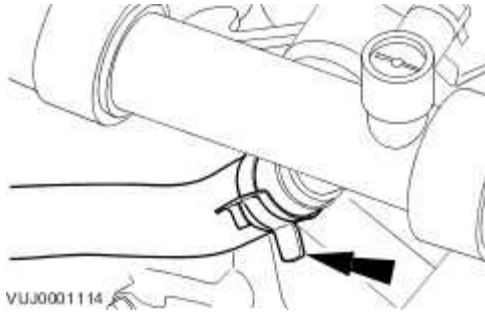


- 6 . Lower the vehicle.

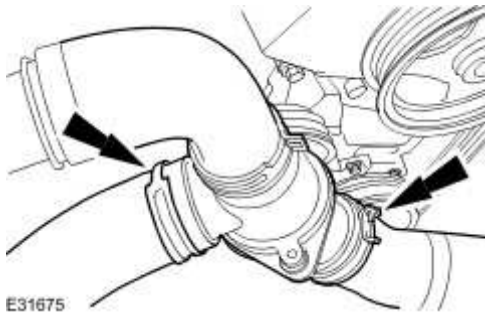
- 7 . Disconnect the radiator top coolant hose.



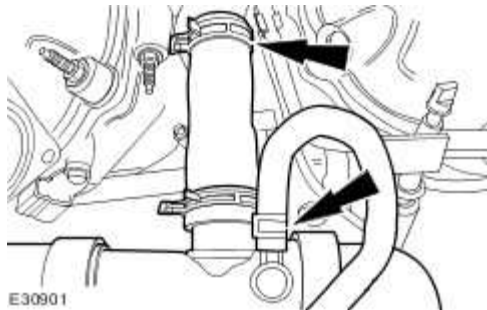
8 . Disconnect the coolant hose from the top coolant hose assembly.



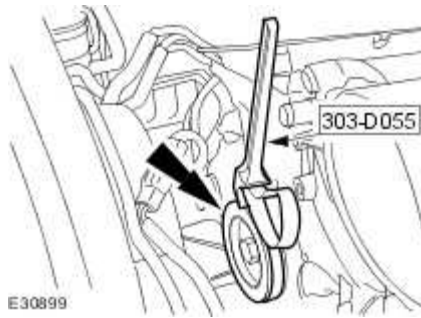
9 . Disconnect the hose assembly from the water pump and lower hose.



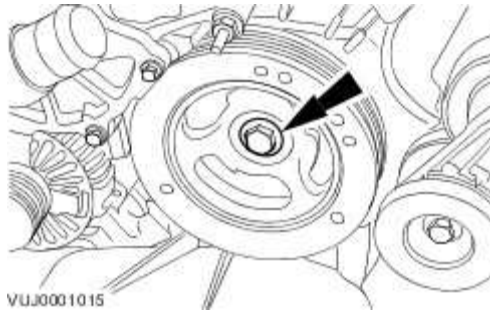
10 . Remove the hose assembly.



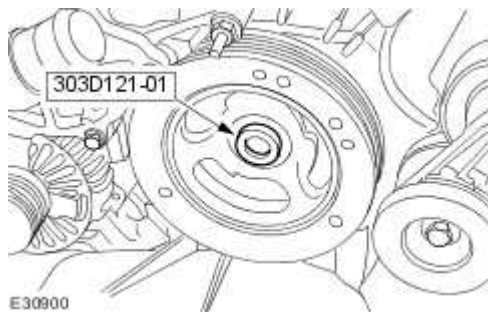
11 . Install the special tool.



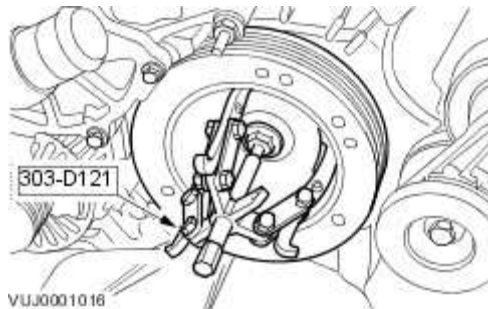
12 . Remove the crankshaft pulley retaining bolt.



13 . Install the special tool.



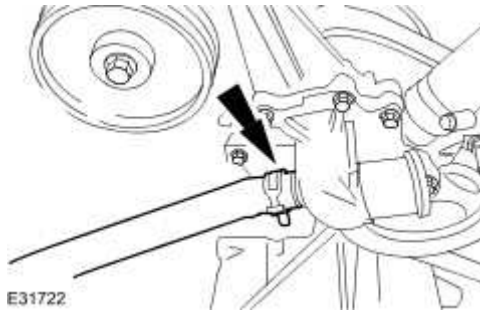
14 . Using the special tools, remove the crankshaft pulley.



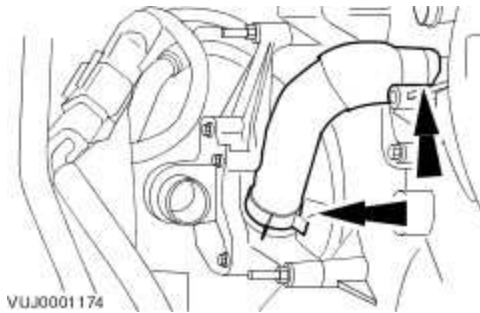
15 . Remove the crankshaft front seal.

For additional information, refer to Crankshaft Front Seal (12.21.14)

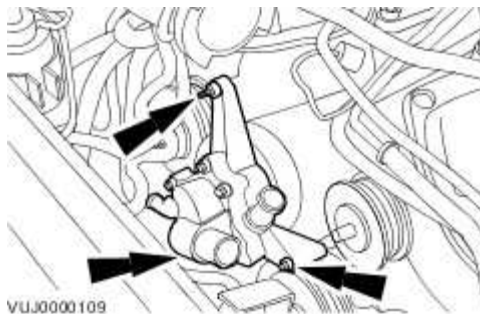
16 . Detach the coolant hose.



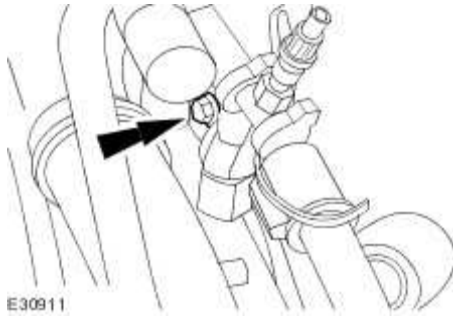
17 . Remove the coolant hose.



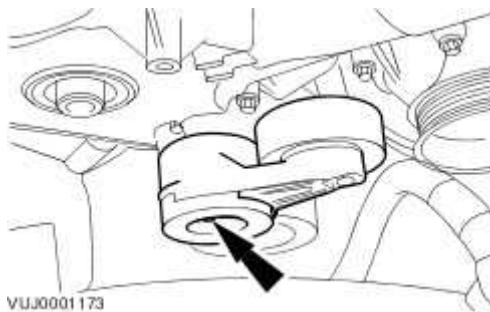
18 . Remove the water pump.



19 . Detach the fuel supply manifold retaining bolt.



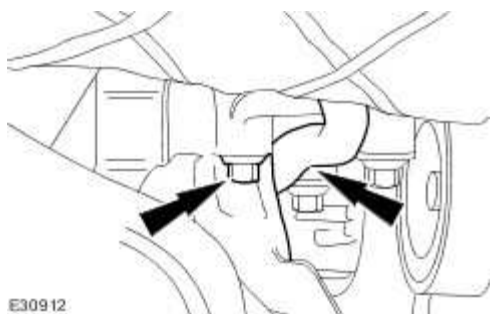
20 . Remove the accessory drive belt tensioner.



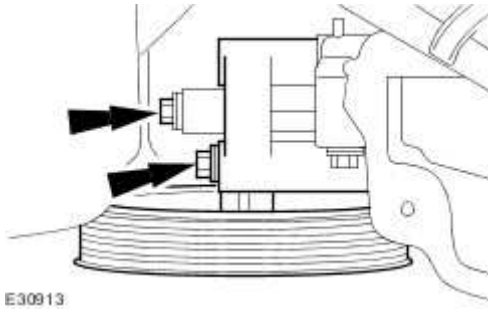
21 . Detach the engine harness from the right-hand idler pulley.

▶ Detach the splash shield.

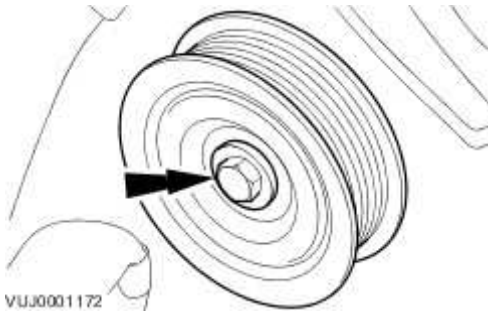
▶ Detach the engine harness from the right-hand idler pulley.



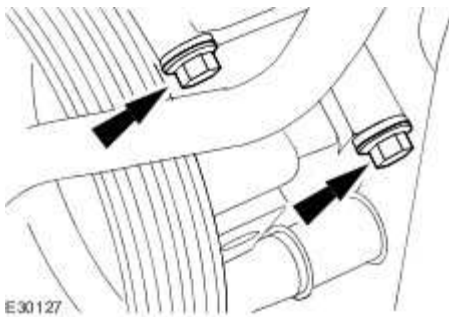
22 . Remove the right-hand idler pulley.



23 . Remove the left-hand idler pulley.

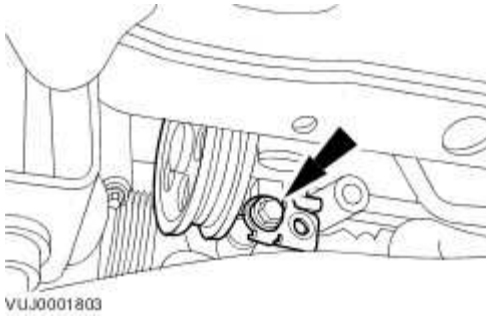


24 . Remove the power steering pump upper retaining bolts.



25 . Raise the vehicle.

26 . Detach the power steering pump.



27 . Lower the vehicle.

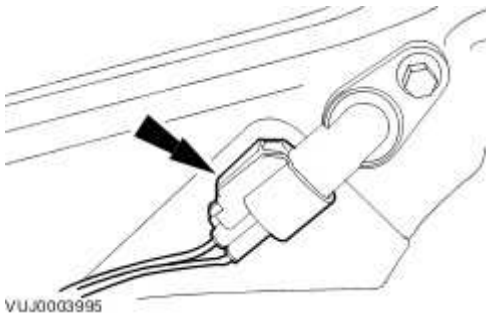
28 . Disconnect the crankshaft position (CKP) sensor electrical connector.



29 . **NOTE:**

Right-hand shown, left-hand similar.

Disconnect the camshaft position (CPS) sensors.



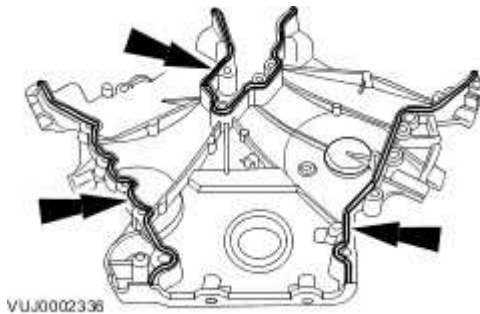
30 . Remove the engine front cover

▶ Remove and discard the engine front cover gaskets.



Installation

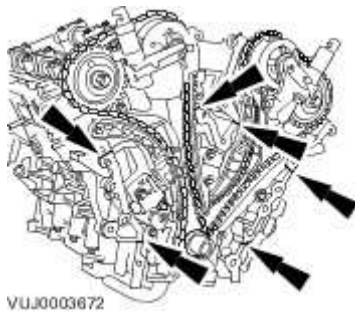
- 1 . Install new engine front cover gaskets.



2 NOTE:

Prior to applying sealer clean the front cover to engine block and cylinder head sealing surfaces with metal surface cleaner.

Apply a 6 mm diameter dot of silicone sealant meeting Jaguar specification to the indicated locations.

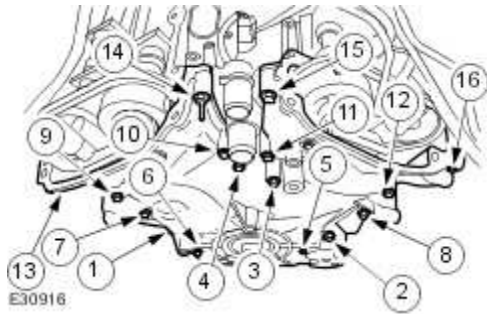


3 NOTE:

The engine front cover retaining bolts numbered 3,4,10 and 11 are longer than the retaining bolts numbered 1,2,5,6,7,8,9,12,13,15 and 16. The retaining bolt numbered 14 is a retaining bolt with a stud head.

Install the engine front cover, completing the tightening sequence.

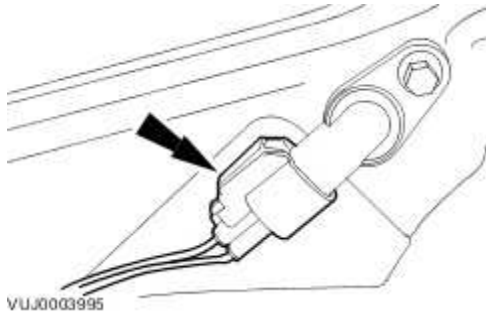
► Tighten to 25 Nm.



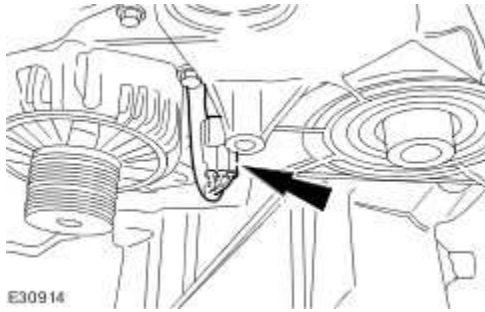
4 . **NOTE:**

Right-hand shown, left-hand similar.

Connect the camshaft position (CPS) sensors.



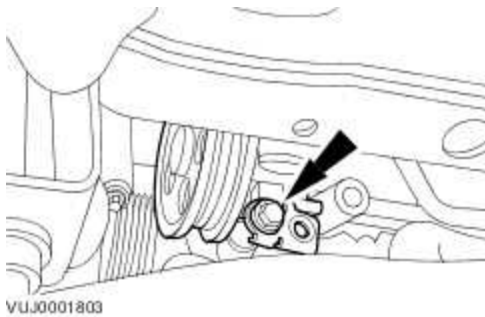
5 . Connect the crankshaft position (CKP) sensor electrical connector.



6 . Raise the vehicle.

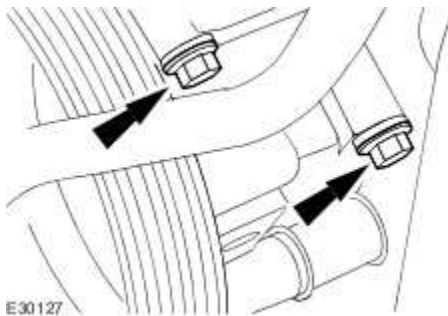
7 . Attach the power steering pump.

► Tighten to 25 Nm.



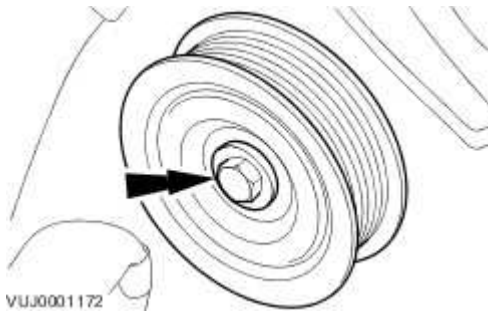
8 . Install the power steering pump upper retaining bolts.

► Tighten to 25 Nm.



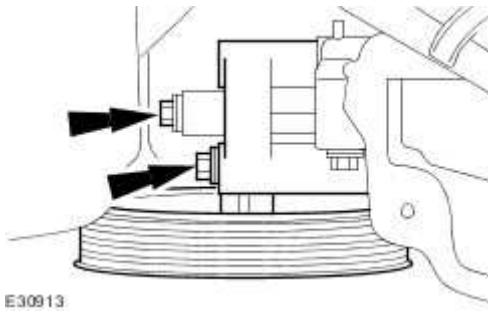
9 . Install the left-hand idler pulley.

▶ Tighten to 25 Nm.



10 . Install the right-hand idler pulley.

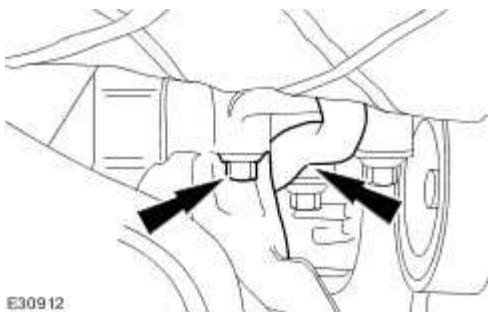
▶ Tighten to 25 Nm.



11 . Attach the engine splash shield.

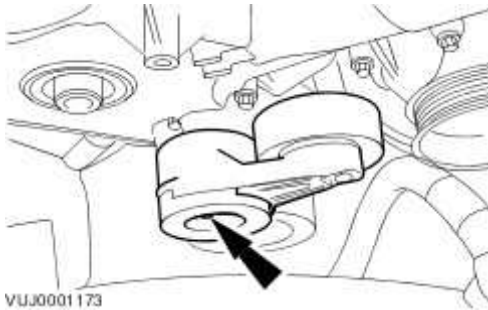
▶ Attach the engine harness to the right-hand idler pulley.

▶ Attach the engine splash shield.

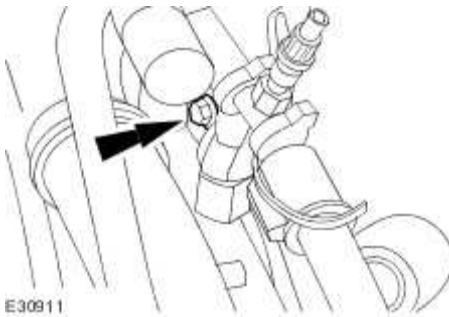


12 . Install the accessory drive belt tensioner.

► Tighten to 45 Nm.

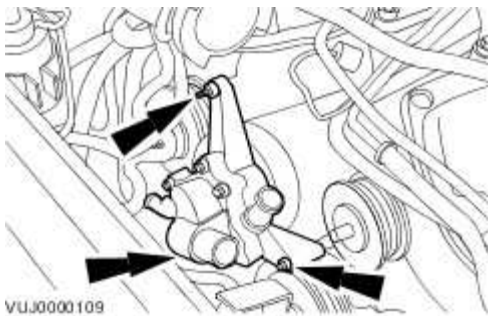


13 . Attach the fuel supply manifold retaining bolt.

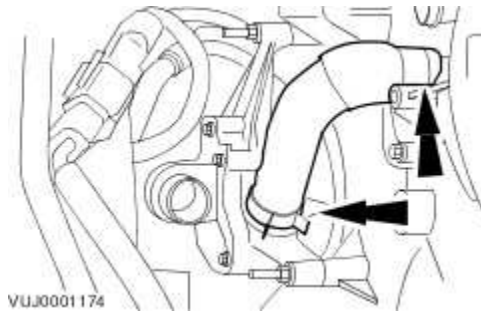


14 . Install the water pump.

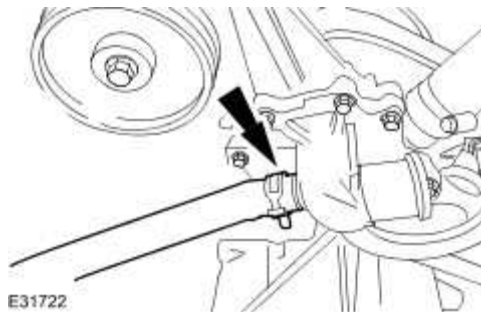
► Tighten to 25 Nm.



15 . Install the coolant hose.



16 . Attach the coolant hose.

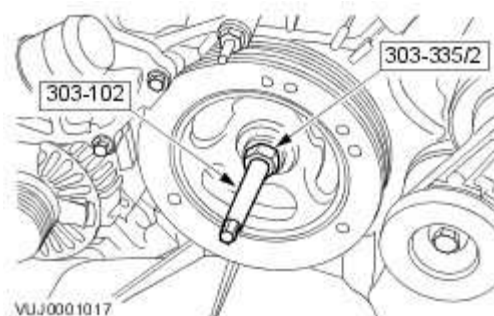


17 . Install a new crankshaft front seal.

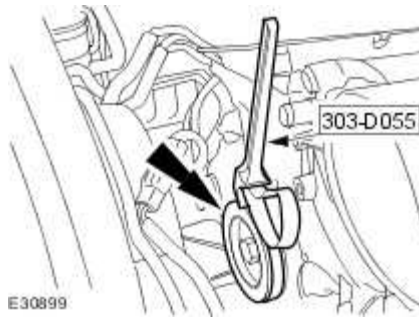
For additional information, refer to Crankshaft Front Seal (12.21.14)

18 Using the special tools, install the crankshaft pulley.

- ▶ Coat the crankshaft pulley keyway with silicone gasket sealant meeting Jaguar specification.
- ▶ Coat the sealing surfaces of the crankshaft pulley with silicone gasket sealant meeting Jaguar specification.

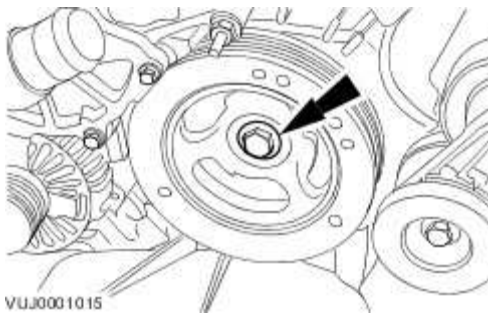


19 . Install the special tool.

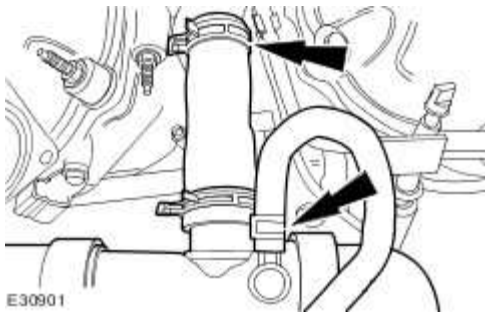


20 . Install the crankshaft pulley bolt.

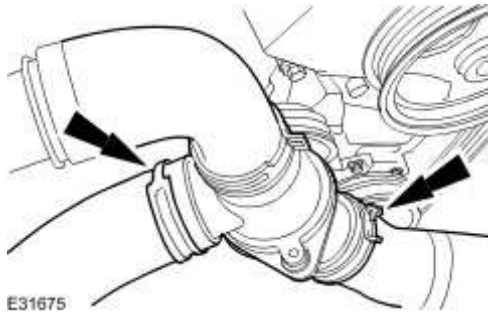
- ▶ Torque to 120 Nm.
- ▶ Loosen the bolt (minimum 1 turn).
- ▶ Torque to 50 Nm.
- ▶ Angle Torque to 90°.



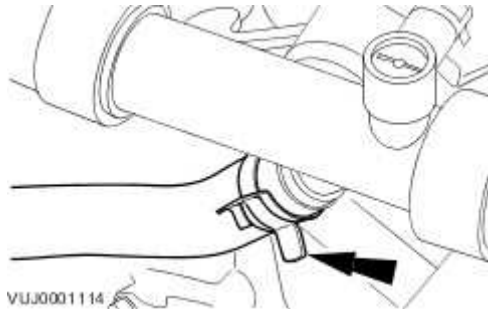
21 . Install the hose assembly.



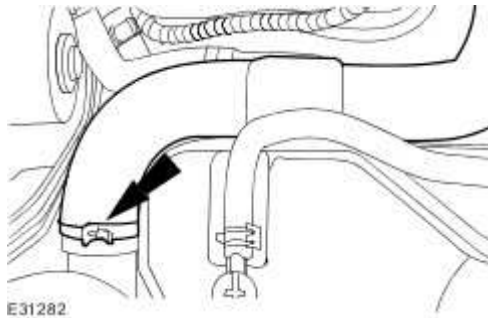
22 . Install the hose assembly to the water pump and lower hose.



23 . Install the coolant hose to the housing assembly.



24 . Connect the radiator top coolant hose.



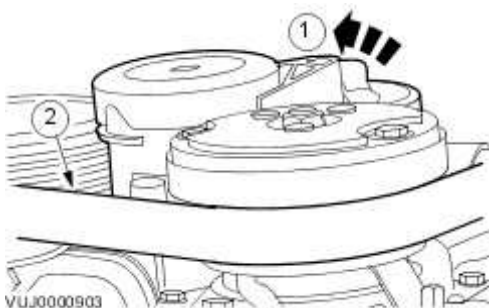
25 . Raise vehicle.

26 . Install the accessory drivebelt.

1) Rotate the belt tensioner counter-clockwise.

► Use a 3/8 inch square drive bar to rotate the belt tensioner.

2) Install the accessory drivebelt.



27 . Install the oil pan.

For additional information, refer to

28 . Lower the vehicle.

29 . Install the left-hand valve cover.

For additional information, refer to

30 . Install the right-hand valve cover.

For additional information, refer to Valve Cover RH (12.29.44)

31 . Carry out the cooling system feeling and bleeding procedure. <<303-03A>>

32 . Refill the engine with oil.

Engine Mount (12.45.13)

Special Service Tools



Engine lifting Bracket

303-661

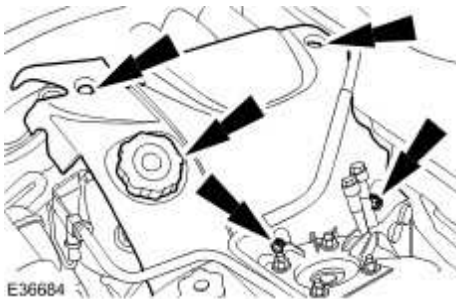


Engine Support Bracket

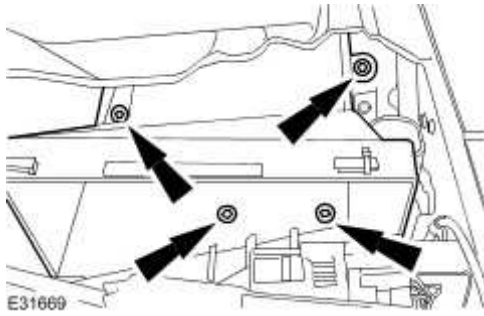
303-021

Removal

- 1 . Disconnect the battery ground cable. <<414-01>>
- 2 . Remove the engine cover.



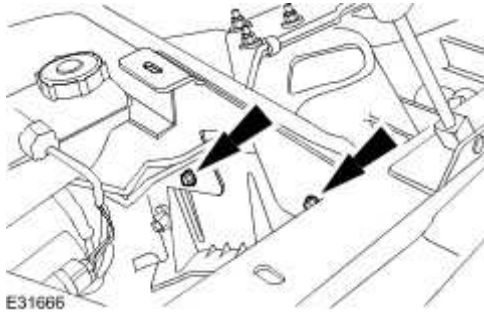
- 3 . Remove the cowl vent screen. <<501-02>>
- 4 . Remove the cabin air filter housing.



5 . NOTE:

Left-hand shown, right-hand similar.

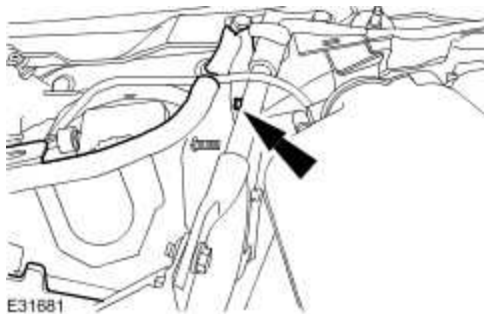
Remove the engine compartment panel retaining bolts.



6 . NOTE:

Left-hand shown, right-hand similar.

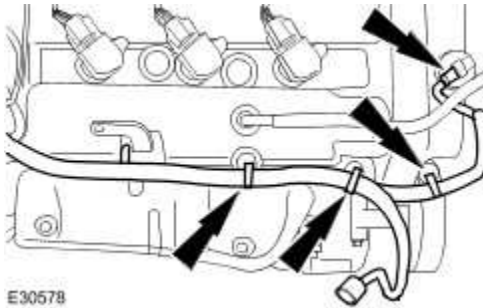
Remove the engine compartment panel.



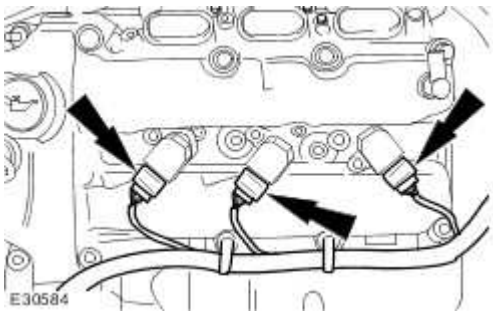
7 . NOTE:

Intake manifold shown removed for clarity.

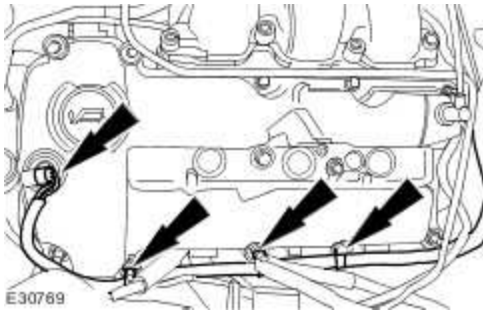
Detach the right-hand valve cover wiring harness.



8 . Disconnect the left-hand ignition coil electrical connectors.

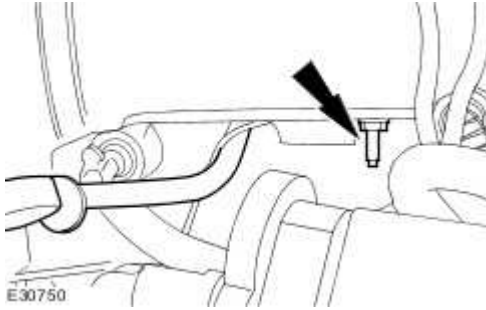


9 . Detach the left-hand valve cover wiring harness.



10 . Remove the dipstick tube retaining bolt.

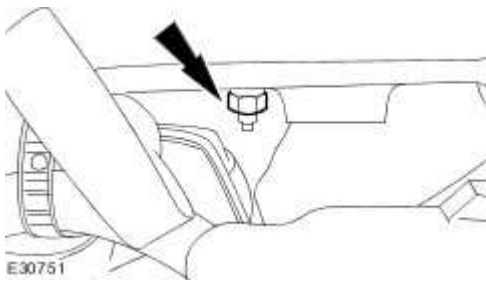
➡ Reposition the dipstick tube.



11 . NOTE:

Left-hand shown, right-hand similar.

Loosen the exhaust manifold retaining nut.

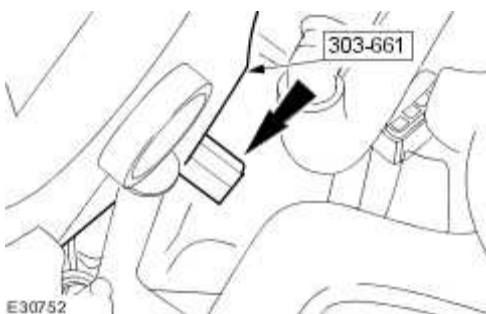


12 . NOTE:

Left-hand shown, right-hand similar.

Install the special tool to the exhaust manifold.

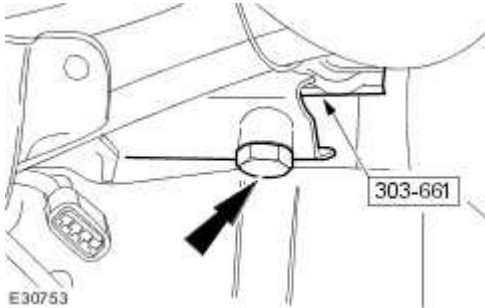
▶ Install the retaining bolt.



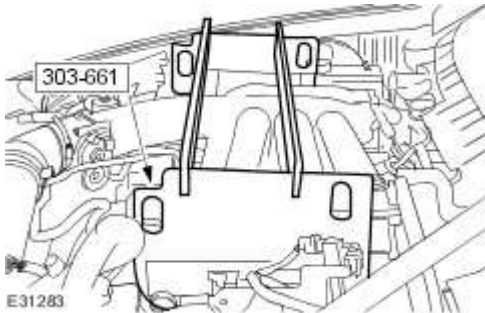
13 . **NOTE:**

Left-hand shown, right-hand similar.

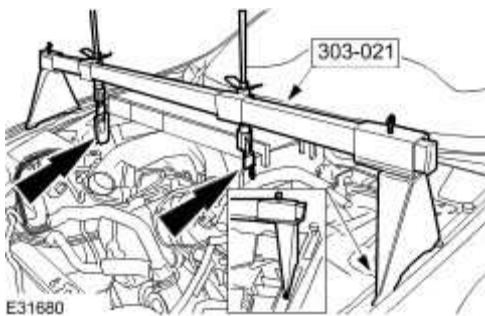
Install the retaining bolt.



14 . Install the special tool support bars to the special tool.

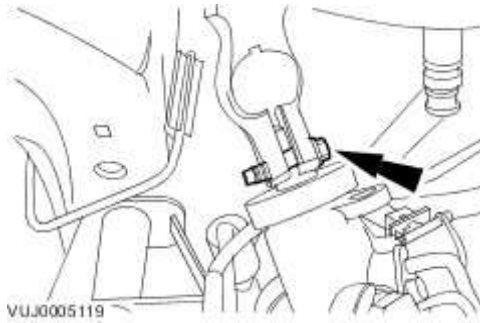


15 . Install the special tool.

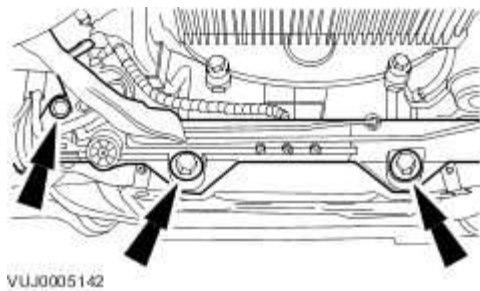


16 . Remove the left-hand catalytic converter. <<309-00>>

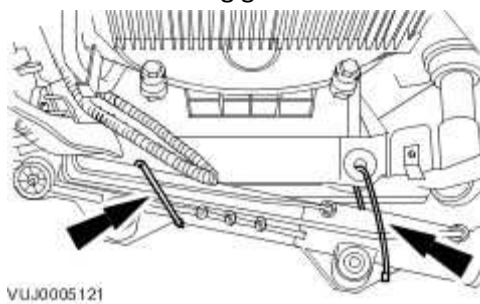
17 . Remove the steering gear shaft pinch bolt.



18 . Detach the steering gear.



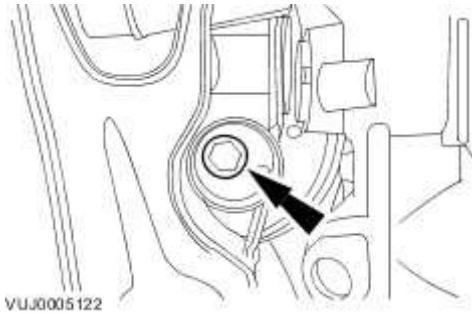
19 . Secure the steering gear.



20 . **NOTE:**

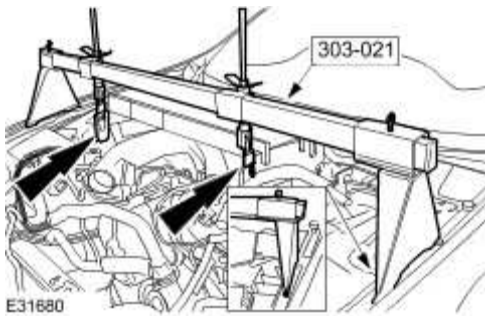
Left-hand shown, right-hand similar.

Remove the engine mount lower retaining bolts.



21 . Lower the vehicle.

22 . Using the special tools, raise the engine to a suitable height.



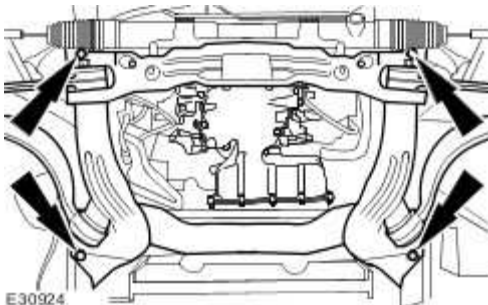
23 . Raise the vehicle.

24



· **WARNING: Do not remove the front subframe retaining bolts. Failure to follow this procedure may result in personal injury.**

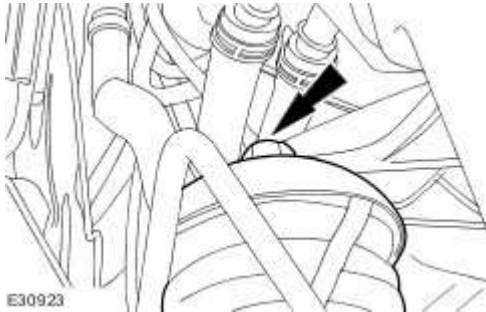
Loosen the front subframe retaining bolts to enable the engine mount to be removed.



25 . **NOTE:**

Left-hand shown, right-hand similar.

Remove the engine mount.



Installation

1




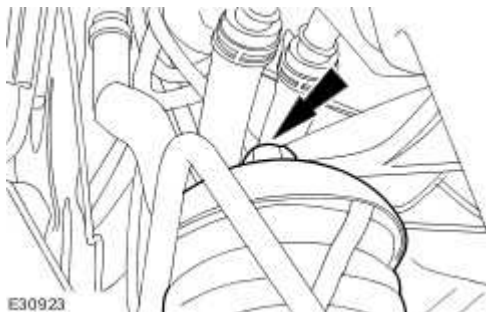
CAUTION: Make sure the engine mount locators are correctly aligned on installation.

NOTE:

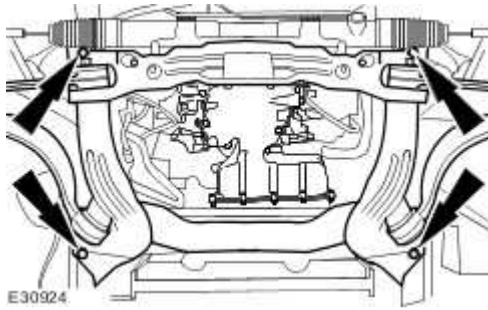
Left-hand shown, right-hand similar.

Install the engine mount.


 Tighten to 63 Nm.



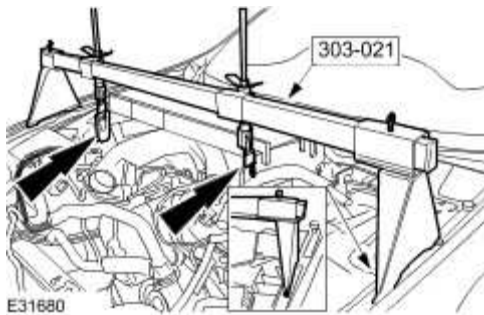
2 . Carry out the front subframe alignment procedure. <<204-01>>



3 . Lower the vehicle.

- 4 .  **CAUTION:** Make sure the engine mounts locate into the correct position when the engine is repositioned.

Using the special tools, reposition the engine.




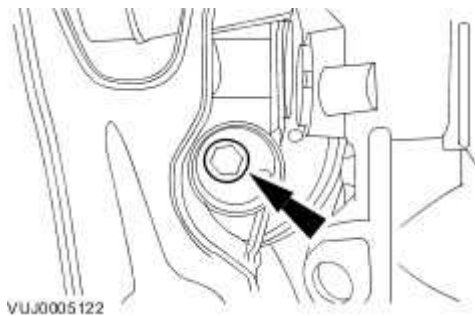
5 . Raise the vehicle.

6 . **NOTE:**

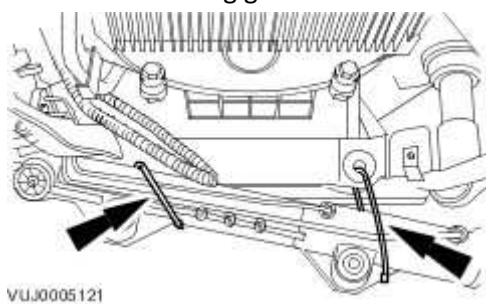
Left-hand shown, right-hand similar.

Install the engine mount lower retaining bolts.

 Tighten to 63 Nm.

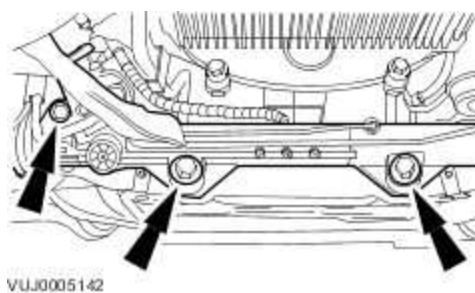


7 . Detach the steering gear.



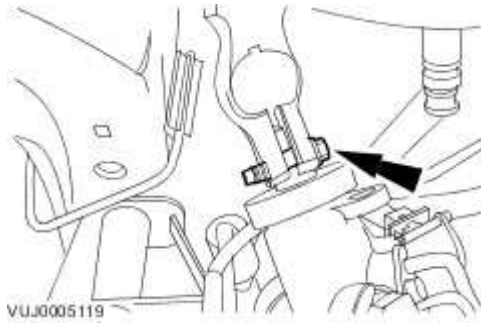
8 . Attach the steering gear.

► Tighten to 100 Nm.



9 . Install the steering gear shaft pinch bolt.

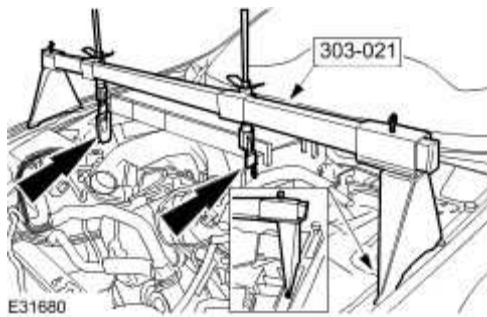
► Tighten to 35 Nm.



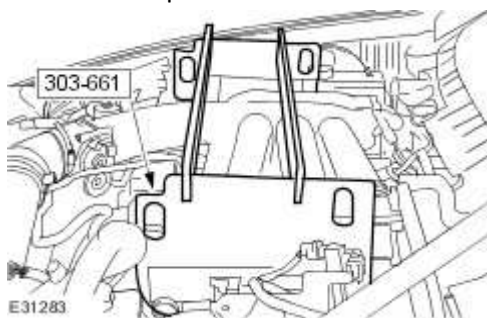
10 . Install the left-hand catalytic converter. <<309-00>>

11 . Lower the vehicle.

12 . Remove the special tool.



13 . Remove the special tool.

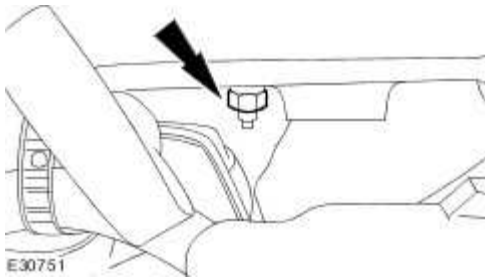


14 . **NOTE:**

Left-hand shown, right-hand similar.

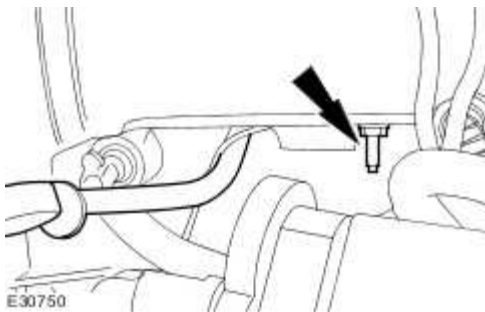
Install the exhaust manifold retaining nut.

▶ Tighten to 25 Nm.

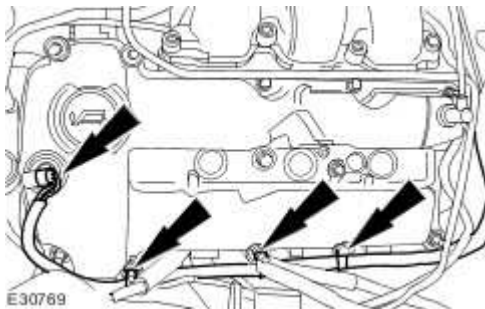


15 . Install the dipstick tube retaining bolt.

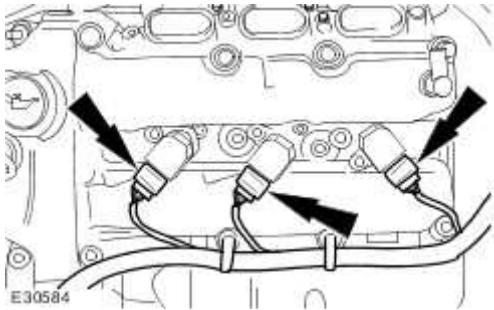
▶ Tighten to 10 Nm.



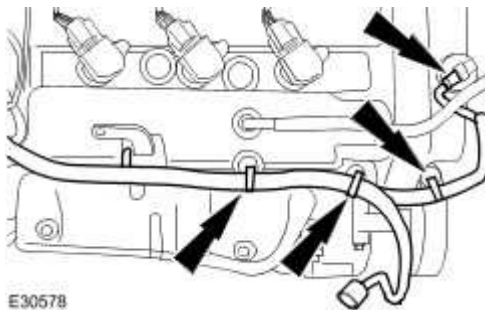
16 . Attach the left-hand valve cover wiring harness.



17 . Connect the left-hand ignition coil electrical connectors.



18 . Attach the right-hand valve cover wiring harness.

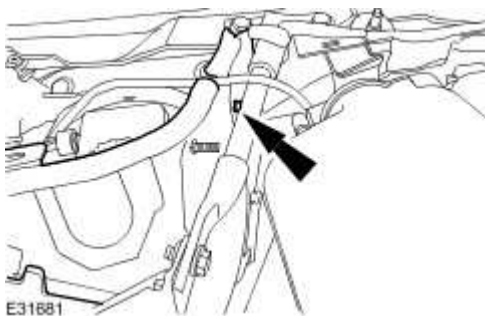


19 . **NOTE:**

Left-hand shown, right-hand similar.

Install the engine compartment panel.

▶ Tighten to 10 Nm.

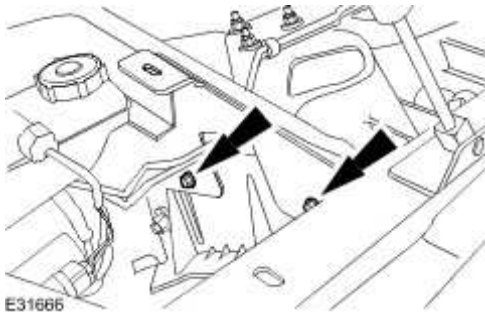


20 . **NOTE:**

Left-hand shown, right-hand similar.

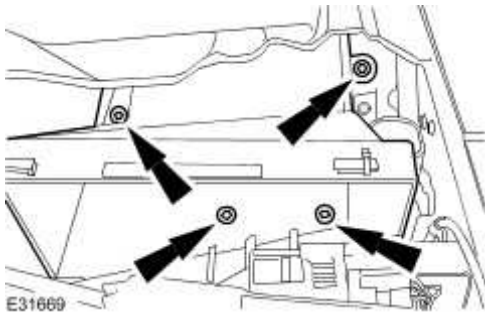
Install the engine compartment panel retaining bolts.

▶ Tighten to 10 Nm.



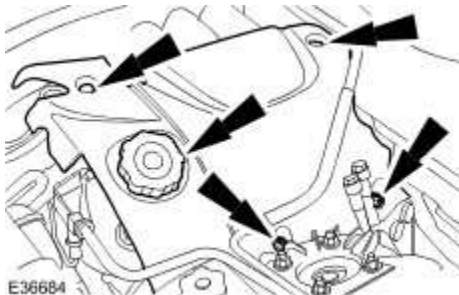
21 . Install the cabin air filter housing.

▶ Tighten to 10 Nm.



22 . Install the cowl vent screen. <<501-02>>

23 . Install the engine cover.



24 . Connect the battery ground cable. <<414-01>>

Exhaust Manifold LH - VIN Range: G004442->G45703 (30.15.55)

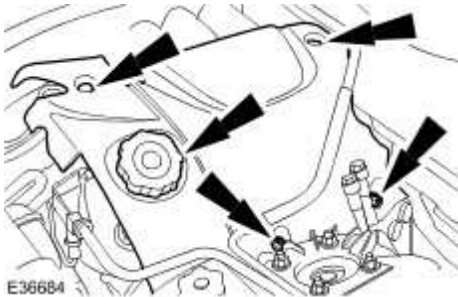
Removal

- 1 . Remove the left-hand catalytic converter.

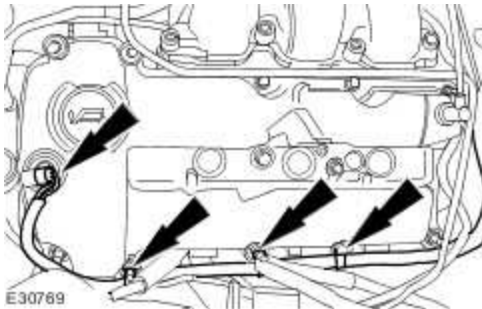
For additional information, refer to Catalytic Converter - 3.0L/3.5L/4.2L (17.50.05)

- 2 . Lower the vehicle.

- 3 . Remove the engine cover.

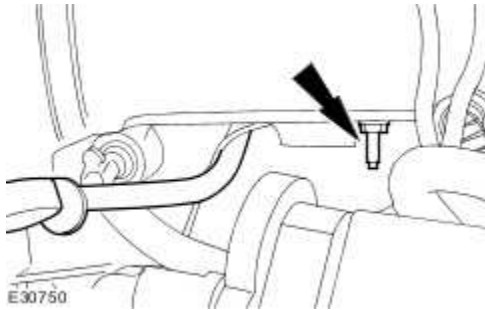


- 4 . Detach the left-hand valve cover wiring harness.

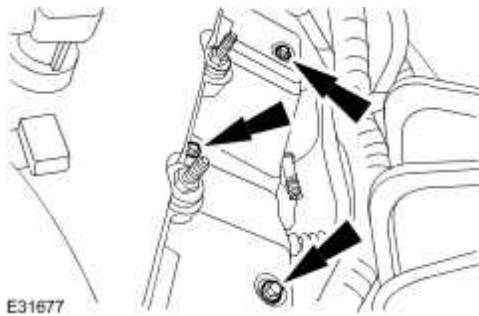


- 5 . Remove the dipstick tube retaining bolt.

➤ Reposition the dipstick tube.



6 . Remove the left-hand exhaust manifold heat shield.



7 . Raise the vehicle.

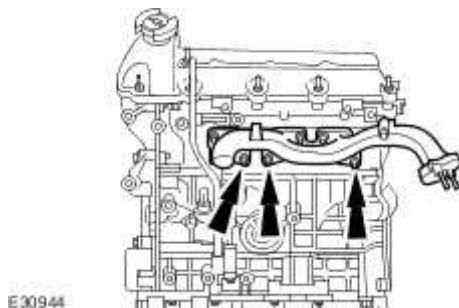
8 **NOTE:**

Engine shown removed for clarity.

NOTE:

When an exhaust manifold retaining stud is removed, it must be replaced with a new retaining stud and nut.

Remove the left-hand exhaust manifold lower retaining nuts.



9 . Lower the vehicle.

10 NOTE:

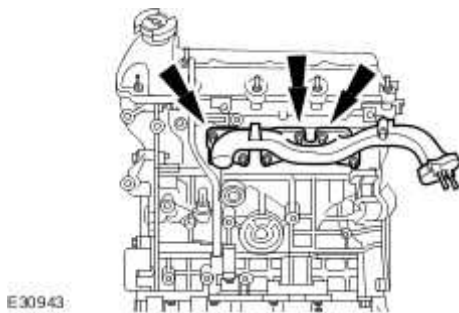
Engine shown removed for clarity.

NOTE:

When an exhaust manifold retaining stud is removed, it must be replaced with a new retaining stud and nut.

Remove the left-hand exhaust manifold.

► Remove and discard the left-hand exhaust manifold gasket.



Installation

1 . NOTE:

Engine shown removed for clarity.

NOTE:

When a new exhaust manifold retaining stud is installed, tighten to 9 Nm.

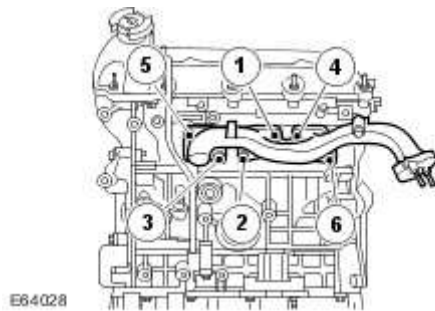
NOTE:

Tighten the exhaust manifold retaining nuts in the sequence shown.

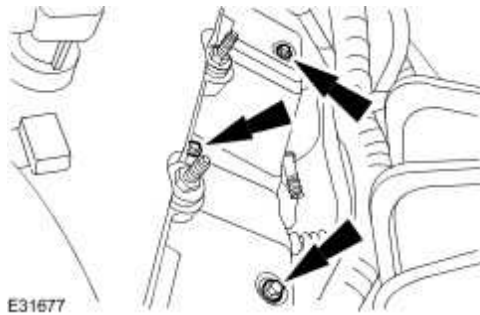
To install, reverse the removal procedure.

▶ Install a new left-hand exhaust manifold gasket.

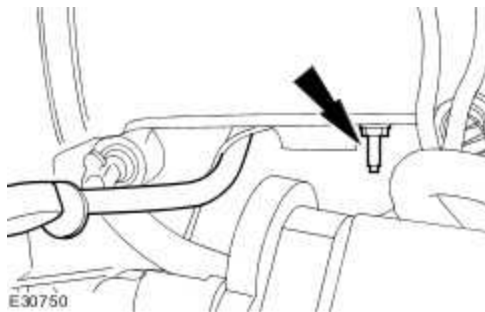
▶ Tighten to 20 Nm.



2 . Tighten to 10 Nm.



3 . Tighten to 10 Nm.

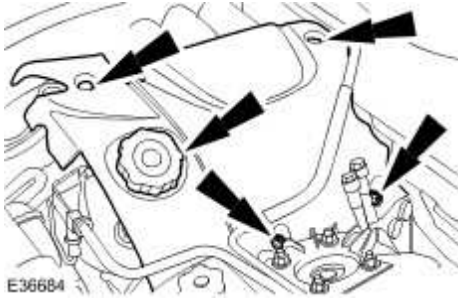


Exhaust Manifold LH - VIN Range: G45704->G99999 (30.15.55)

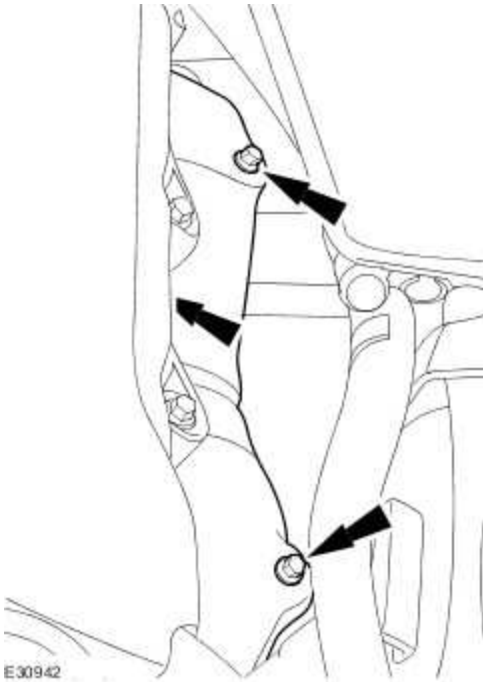
Removal

All vehicles

- 1 . Remove the engine cover.

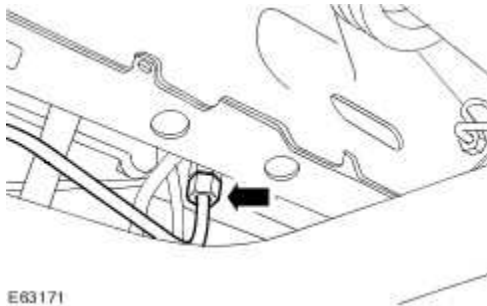


- 2 . Remove the left-hand exhaust manifold heat shield.



Vehicles with secondary air injection (AIR)

- 3 . Disconnect the secondary air injection (AIR) control valve to exhaust manifold tube.



All vehicles

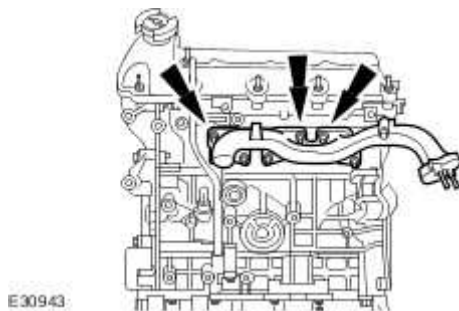
4 NOTE:

Engine shown removed for clarity.

NOTE:

When an exhaust manifold retaining stud is removed, it must be replaced with a new retaining stud and nut.

Remove the left-hand exhaust manifold upper retaining nuts.



5 . Remove the left-hand catalytic converter.

For additional information, refer to

6 NOTE:

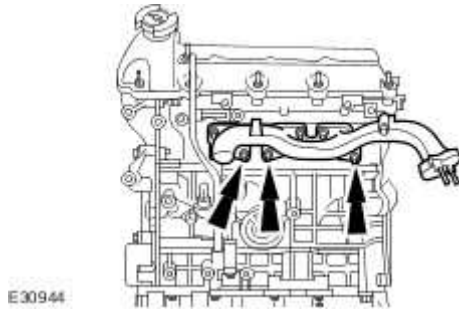
Engine shown removed for clarity.

NOTE:

When an exhaust manifold retaining stud is removed, it must be replaced with a new retaining stud and nut.

Remove the left-hand exhaust manifold.

▶ Remove and discard the left-hand exhaust manifold gasket.



Installation

All vehicles

1 . NOTE:

Engine shown removed for clarity.

NOTE:

When a new exhaust manifold retaining stud is installed, tighten to 9 Nm.

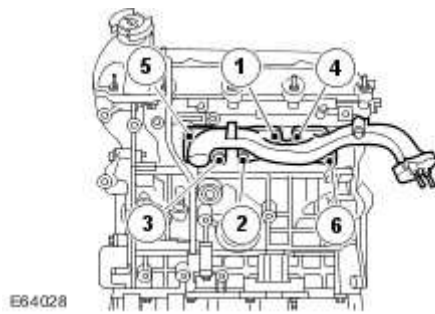
NOTE:

Tighten the exhaust manifold retaining nuts in the sequence shown.

To install, reverse the removal procedure.

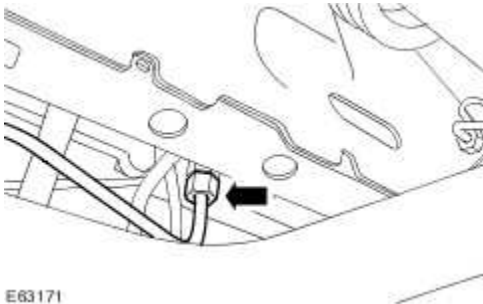
▶ Install a new left-hand exhaust manifold gasket.

▶ Tighten to 20 Nm.



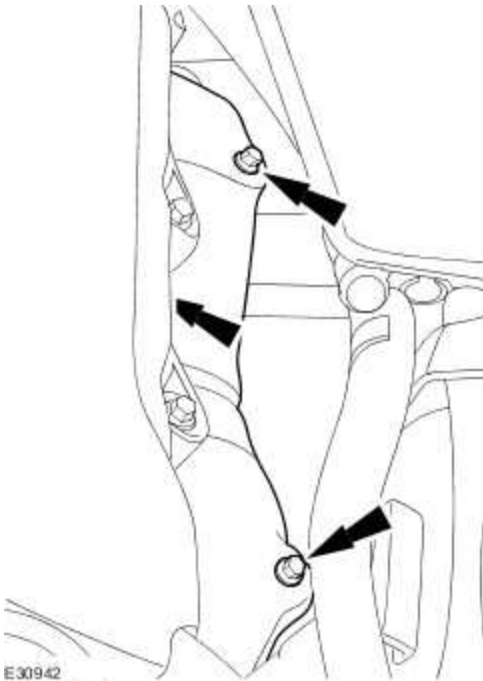
Vehicles with secondary air injection (AIR)

2 . Tighten to 35 Nm.



All vehicles

3 . Tighten to 10 Nm.



Flexplate (12.53.13)

Removal

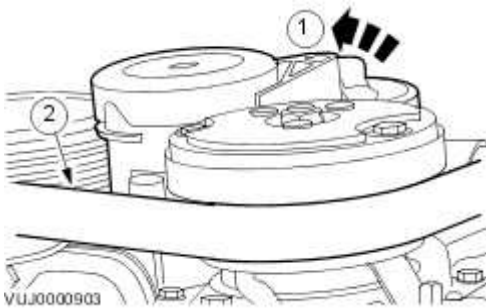
1 . Remove the automatic transmission. <<307-01>>

2 . Detach the accessory drivebelt.

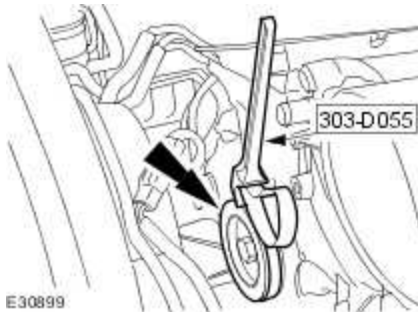
1) Rotate the belt tensioner counter-clockwise.

▶ Use a 3/8 inch square drive bar to rotate the belt tensioner.

2) Detach the accessory drivebelt.



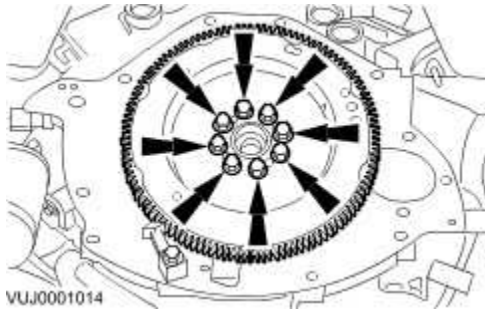
3 . Install the special tool.



4 . **NOTE:**

Prevent the flexplate from rotating.

Remove the flexplate.



Installation

1 . NOTE:

Make sure the crankshaft and flexplate mating faces are clean before installation.

NOTE:

The flexplate will only locate in one position.

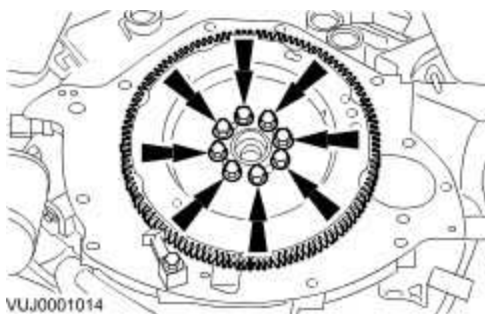
NOTE:

Tighten the retaining bolts working diagonally.

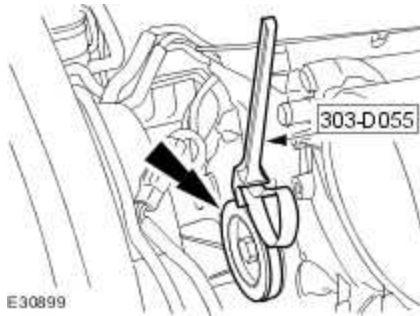
Install the flexplate.

▶ Prevent the flexplate from rotating.

▶ Tighten to 80 Nm.



2 . Remove the special tool.

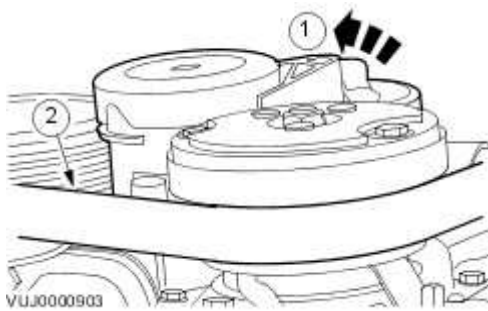


3 . Attach the accessory drivebelt.

1) Rotate the belt tensioner counter-clockwise.

► Use a 3/8 inch square drive bar to rotate the belt tensioner.

2) Attach the accessory drivebelt.



4 . Install the automatic transmission. <<307-01>>

Intake Manifold (30.15.01)

Removal

1



WARNING: Never remove the coolant expansion tank pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury.



WARNING: To avoid hot coolant or steam blowing out of the cooling system, use extreme care when removing the coolant expansion tank pressure cap. Wait until the engine has cooled down, then insulate the coolant pressure cap with a suitable cloth and slowly loosen the coolant expansion tank pressure cap until the cooling system pressure is released. Do not remove the coolant expansion tank pressure cap. Step back while the pressure is released from the system. When all of the pressure has been released slowly remove the coolant expansion tank pressure cap (still with the suitable cloth in position) from the coolant expansion tank. Failure to follow this instruction may result in personal injury.

Release the cooling system pressure.

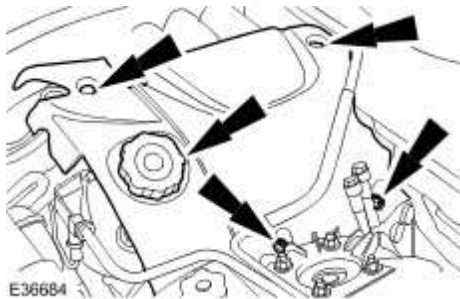


Remove the coolant expansion tank pressure cap.

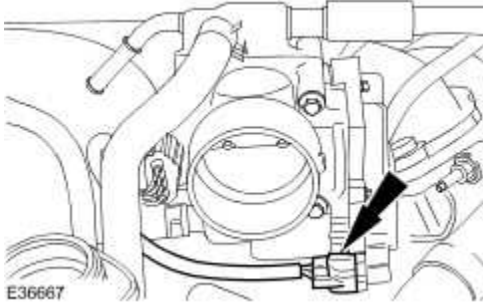
2 . Remove the air cleaner outlet pipe.

For additional information, refer to

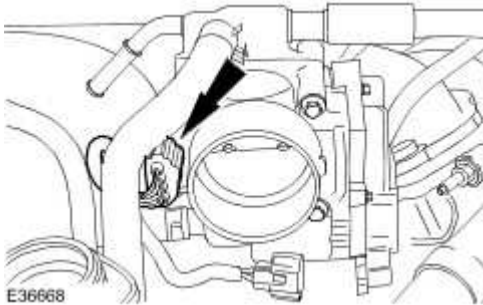
3 . Remove the engine cover.



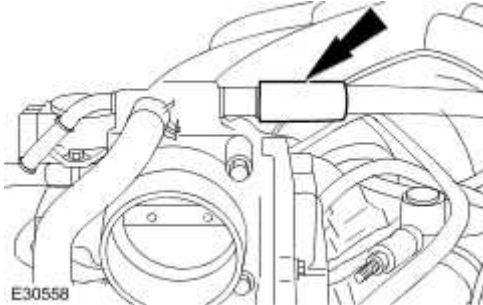
4 . Disconnect the throttle motor electrical connector.



5 . Disconnect the throttle position sensor (TPS) electrical connector.



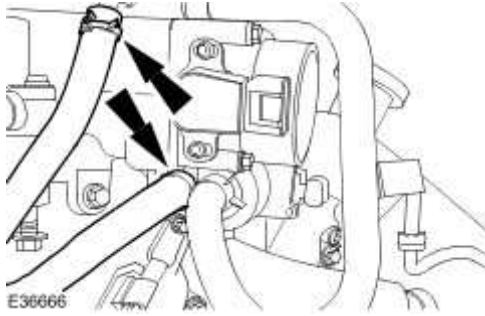
6 . Disconnect the positive crankcase ventilation (PCV) hose.



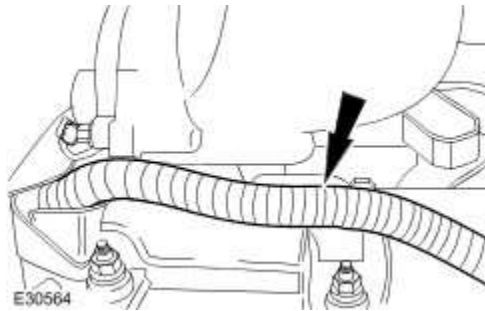
7 . **NOTE:**

Cap the coolant hoses to minimize coolant loss.

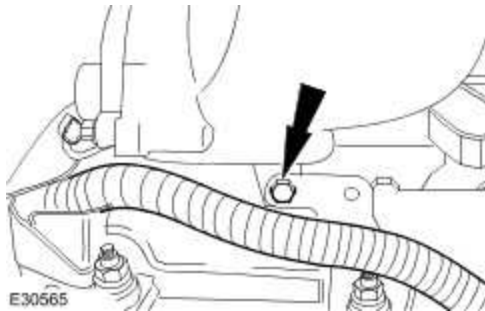
Detach the coolant hoses from the throttle body.



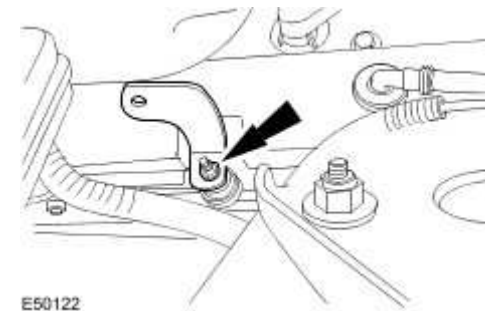
8 . Detach the engine wiring harness from the intake manifold side retaining bracket.



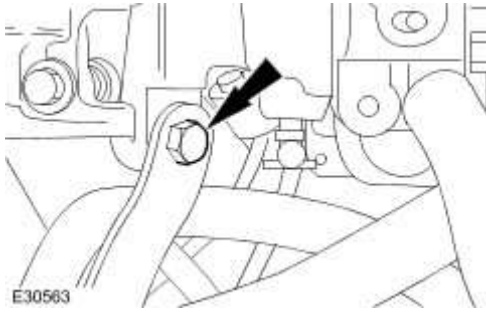
9 . Detach the intake manifold right-hand side retaining bracket.



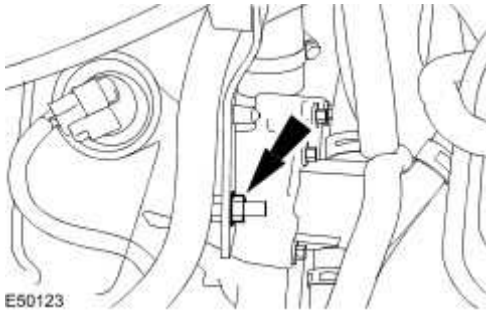
10 . Loosen the intake manifold right-hand side retaining bracket.



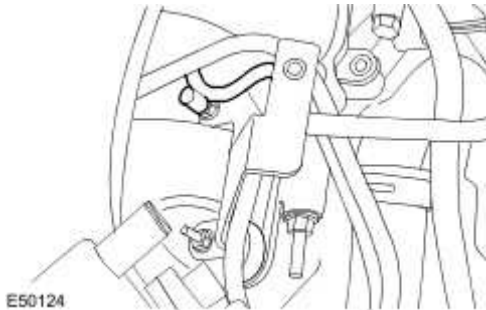
11 . Detach the intake manifold front retaining bracket.



12 . Loosen the intake manifold front retaining bracket.



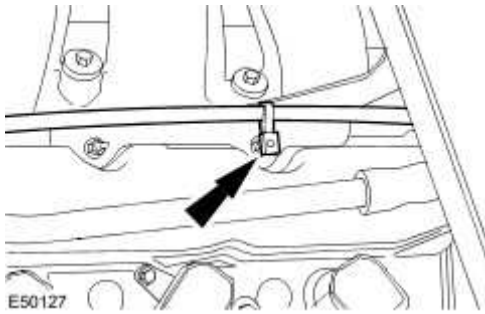
13 . Detach the coolant temperature sensor wiring harness.



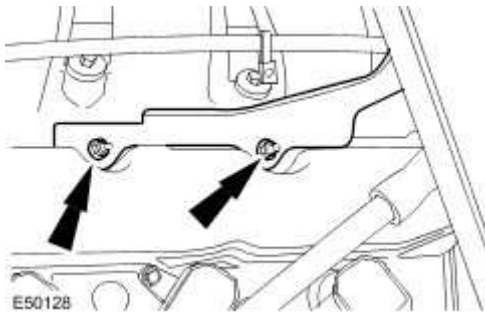
14 . Remove the engine cover front retaining bracket.



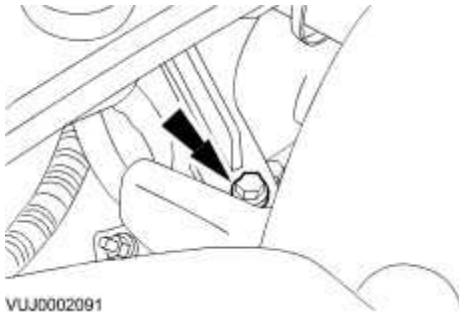
15 . Detach the evaporative emission canister purge valve transfer pipe.



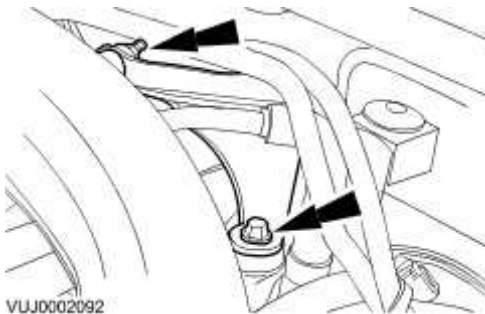
16 . Remove the engine cover left-hand side retaining bracket.



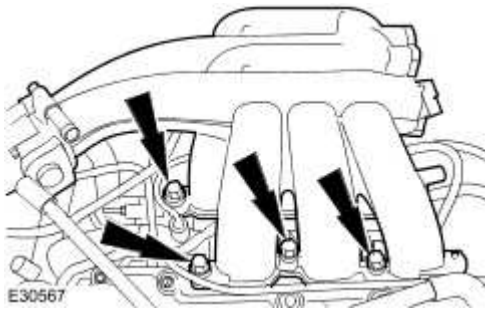
17 . Remove the fuel pressure sensor bracket retaining bolt.



18 . Detach the fuel pressure sensor bracket.



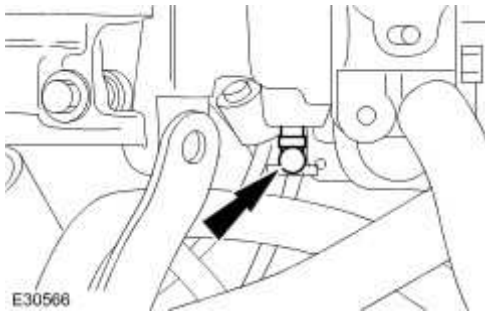
19 . Detach the intake manifold.



20 **NOTE:**

The evaporative emission canister purge valve transfer pipe is attached to the induction manifold by a quick release coupling.

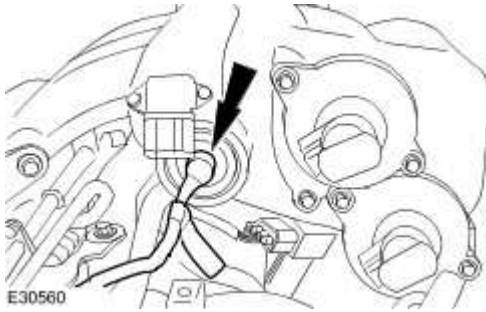
Disconnect the evaporative emission canister purge valve transfer pipe.



21 . Disconnect the manifold absolute pressure (MAP) sensor electrical connector.



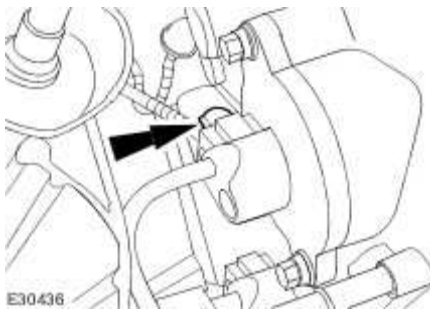
22 . Disconnect the fuel pressure sensor vacuum hose.



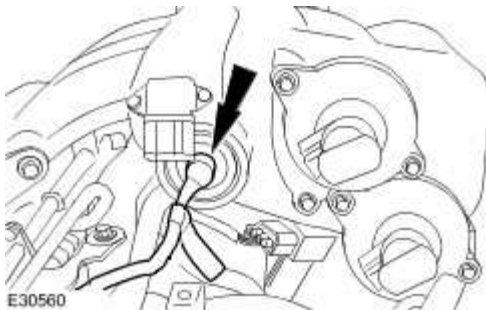
23 . NOTE:

Left-hand intake manifold tuning (IMT) valve shown, right-hand (IMT) valve similar.

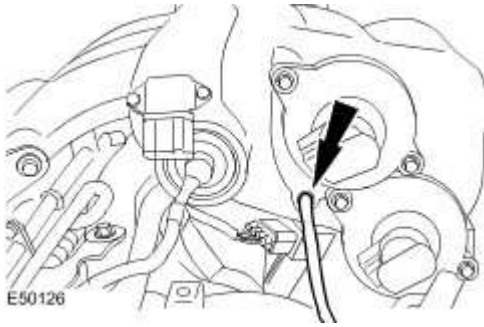
Disconnect the IMT valves electrical connectors.



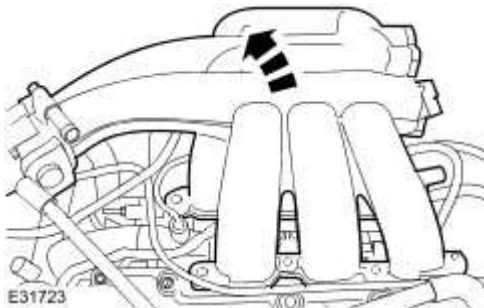
24 . Disconnect the fuel pressure regulator vacuum hose.



25 . Disconnect the brake booster vacuum hose.



26 . Remove the intake manifold.



Installation

1 NOTE:

Install new intake manifold gaskets.

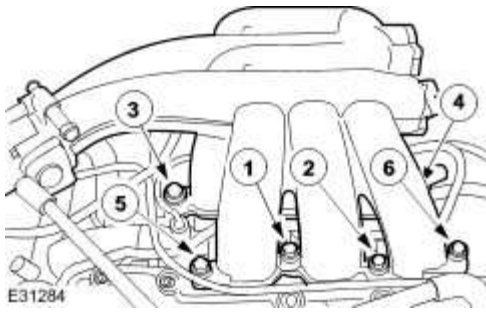
NOTE:

The intake manifold retaining bolts in position 1, 4 and 5 are longer than the retaining bolts in position 2, 3 and 6.

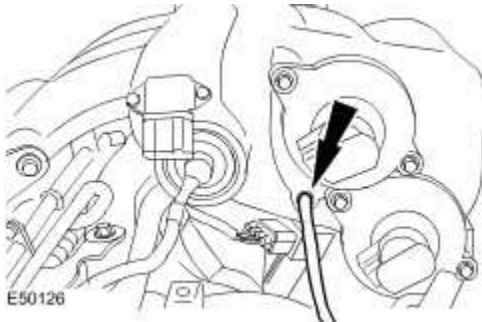
NOTE:

Do not fully tighten the retaining bolts.

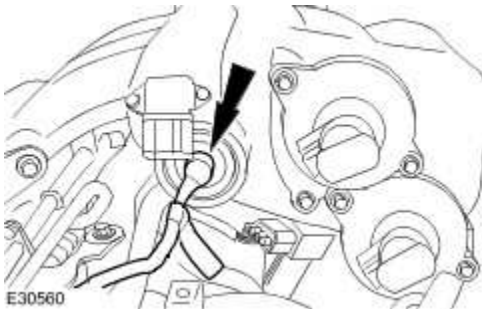
Install the intake manifold.



2 . Connect the brake booster vacuum hose.



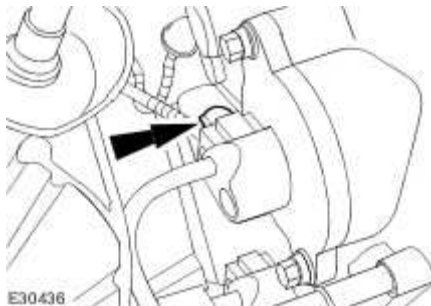
3 . Connect the fuel pressure regulator vacuum hose.



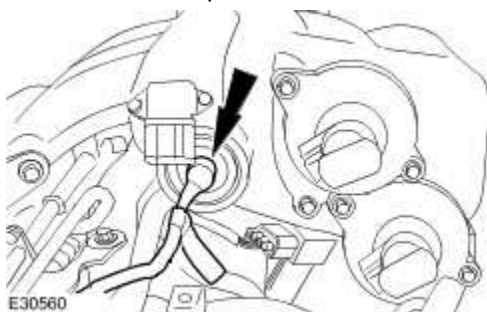
4 . **NOTE:**

Left-hand intake manifold tuning (IMT) valve shown, right-hand (IMT) valve similar.

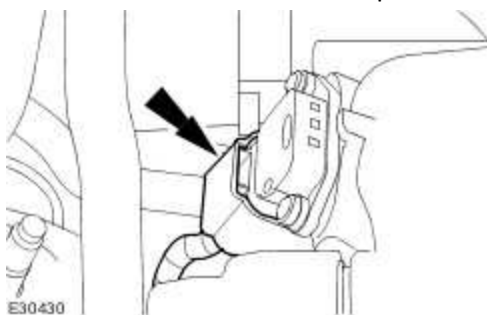
Connect the IMT valves electrical connectors.



5 . Connect the fuel pressure sensor vacuum hose



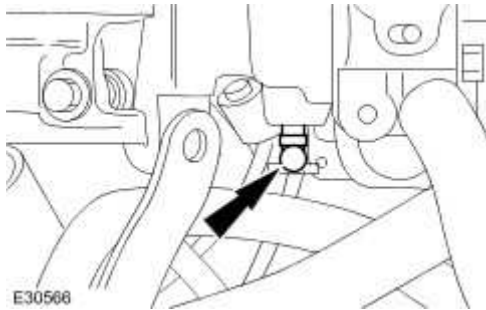
6 . Connect the manifold absolute pressure (MAP) sensor electrical connector.



7 NOTE:

The evaporative emission canister purge valve transfer pipe is attached to the induction manifold by a quick release coupling.

Connect the evaporative emission canister purge valve transfer pipe.



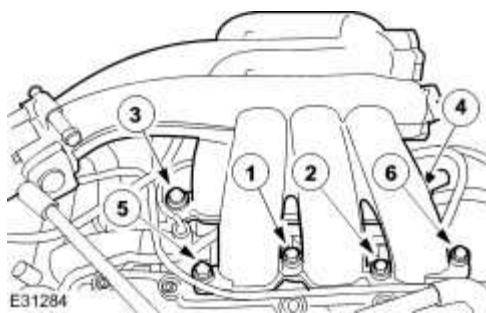
8 NOTE:

The intake manifold retaining bolts in position 1, 4 and 5 are longer than the retaining bolts in position 2, 3 and 6.

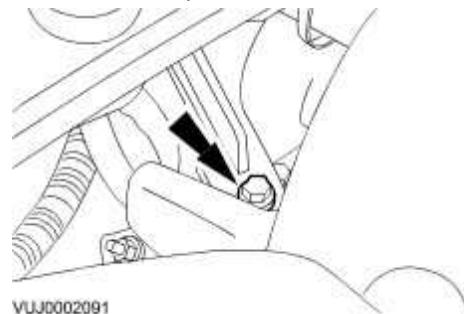
Reposition the intake manifold.

➤ Tighten to 10 Nm.

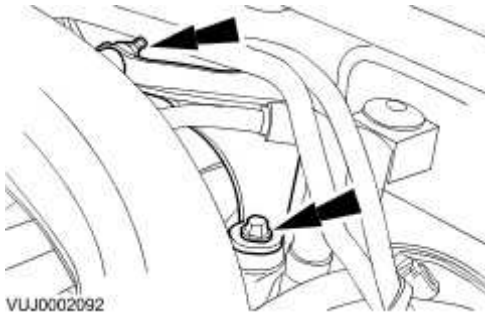
➤ Complete the tightening sequence.



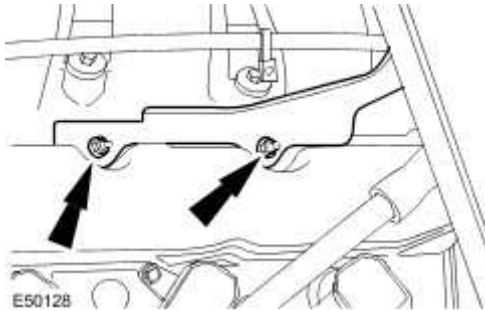
9 . Install the fuel pressure sensor bracket retaining bolt.



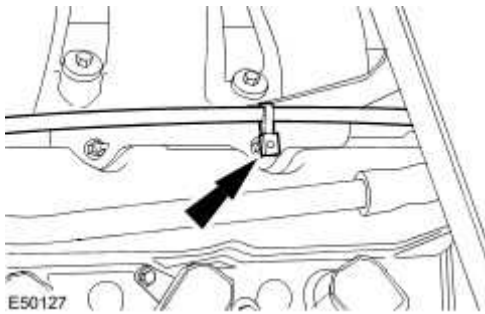
10 . Attach the fuel pressure sensor bracket.



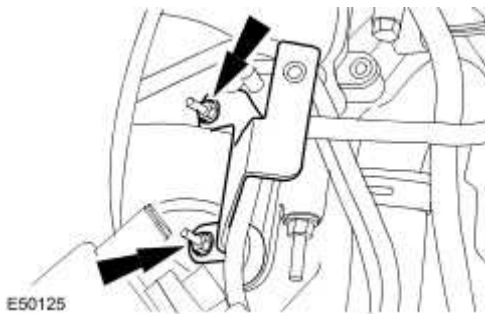
11 . Install the engine cover left-hand side retaining bracket.



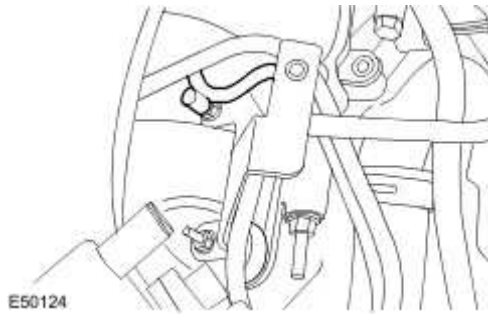
12 . Attach the evaporative emission canister purge valve transfer pipe.



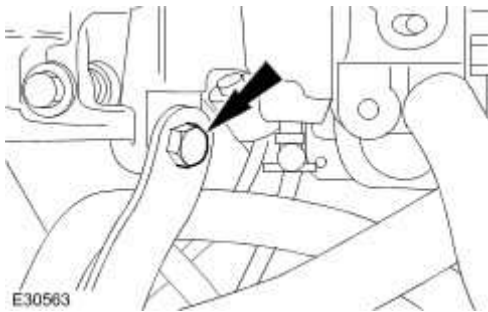
13 . Install the engine cover front retaining bracket.



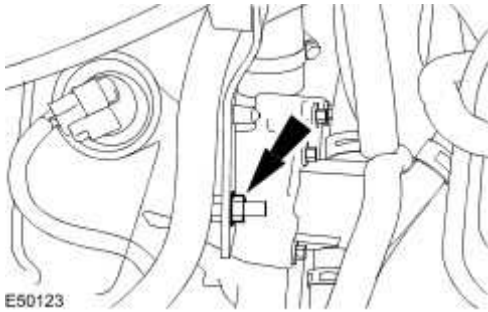
14 . Attach the coolant temperature sensor wiring harness.



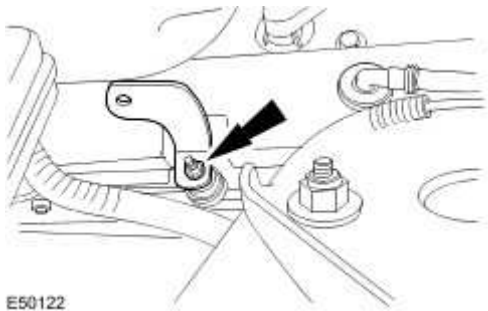
15 . Attach the intake manifold front retaining bracket.



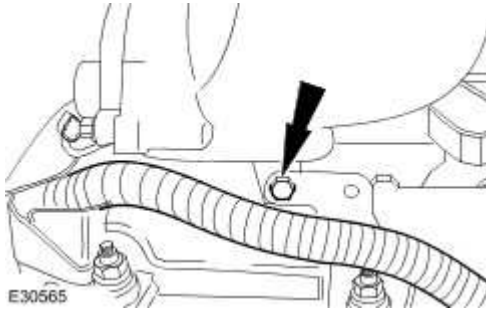
16 . Fully tighten the intake manifold front retaining bracket.



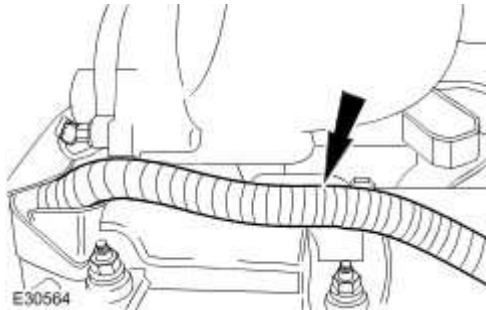
17 . Fully tighten the intake manifold right-hand side retaining bracket.



18 . Fully tighten the intake manifold right-hand side retaining bracket.



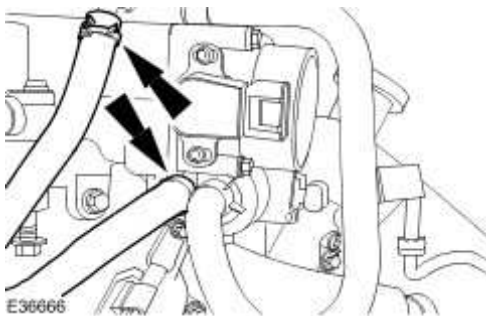
19 . Attach the engine wiring harness to the intake manifold side retaining bracket.



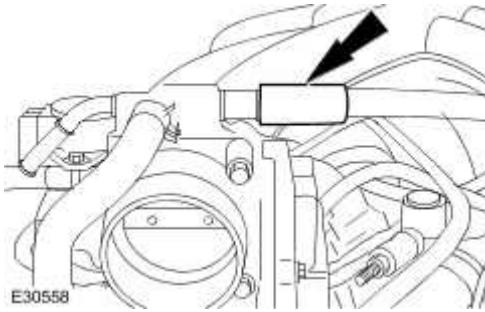
20 . **NOTE:**

Un-cap the coolant hoses.

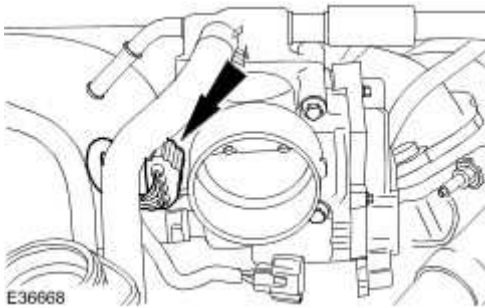
Attach the coolant hoses to the throttle body.



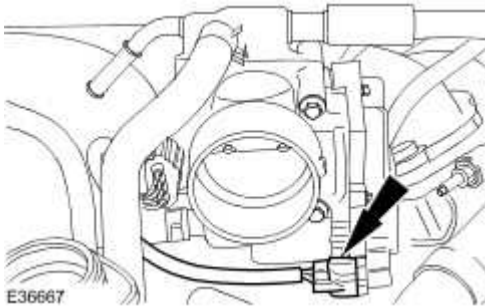
21 . Connect the positive crankcase ventilation (PCV) hose.



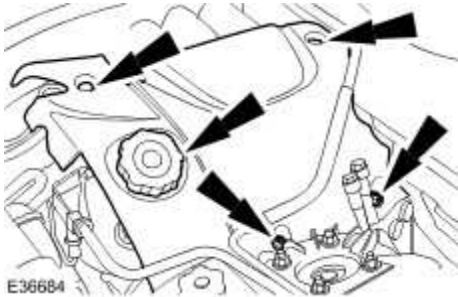
22 . Connect the throttle position sensor (TPS) electrical connector.



23 . Connect the throttle motor electrical connector.



24 . Install the engine cover.



25 . Install the air cleaner outlet pipe.

For additional information, refer to

26 Fill the cooling system up to the MAX mark on the coolant expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.

Lower Intake Manifold (30.15.61)

Removal

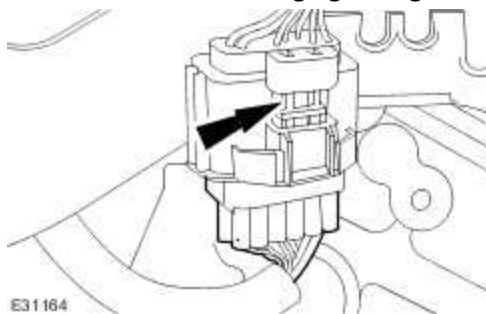
- 1 . Remove the intake manifold.

For additional information, refer to Intake Manifold (30.15.01)

- 2 . Disconnect the spring lock coupling.

For additional information, refer to Spring Lock Couplings

- 3 . Disconnect the fuel charging wiring harness.



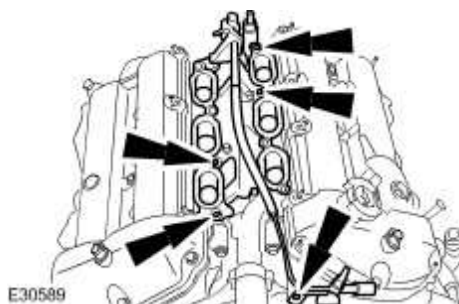
- 4 . **NOTE:**

Fuel may still be present in the fuel injection supply manifold.

NOTE:

Remove and discard the lower intake manifold O-ring seals.

Remove the lower intake manifold.



Installation

1 . NOTE:

Install new O-ring seals.

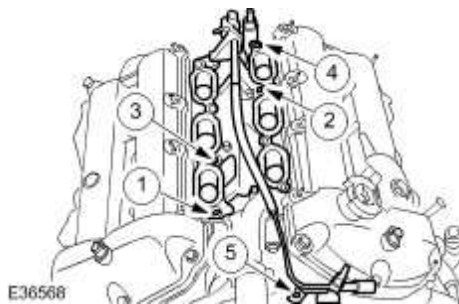
NOTE:

Tighten in the sequence shown.

To install, reverse the removal procedure.

▶ Tighten the retaining bolts in the sequence shown.

▶ Tighten to 10 Nm.



Oil Cooler (12.60.68)

Removal

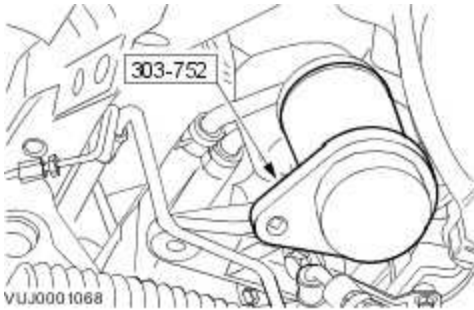
1 . Carry out the cooling system draining procedure. <<303-03A>>

2 . Remove the left-hand engine mount.

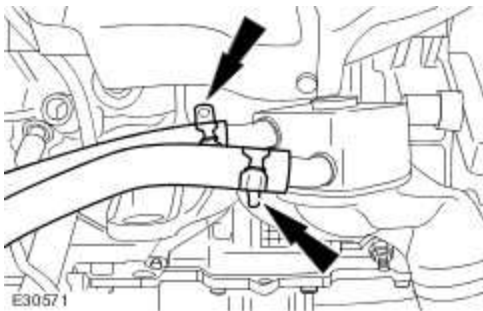
For additional information, refer to

3 . Drain the engine oil.

4 . Remove and discard the engine oil filter.



5 . Disconnect the coolant hoses.

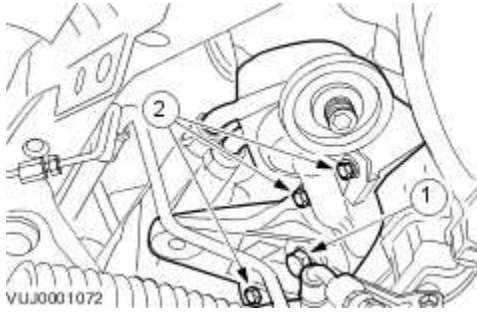


6 . Remove the oil filter housing.

1) Remove the center oil filter housing retaining bolt.

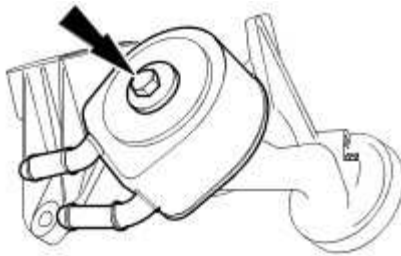
▶ Discard the 'O' ring seal.

2) Remove the oil filter housing.



7 . Remove the oil cooler.

▶ Remove and discard the oil cooler O-ring seal.

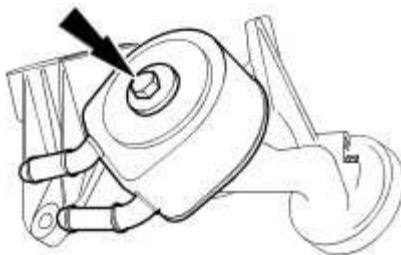


Installation

1 . Install the oil cooler.

▶ Install a new oil cooler O-ring seal.

▶ Tighten to 58 Nm.



2 . NOTE:

Install a new 'O' ring seal.

Install the oil filter housing.

- 1) Loosely install the oil filter housing retaining bolts.
- 2) Loosely install the center oil filter housing retaining bolt.
- 3) Install the oil filter housing.

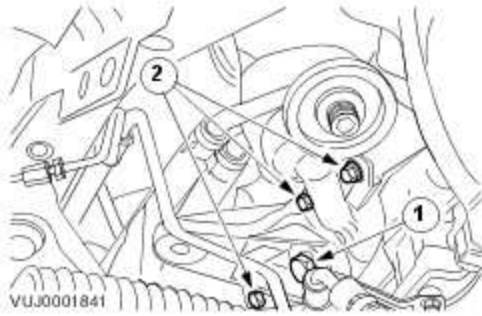


3 . NOTE:

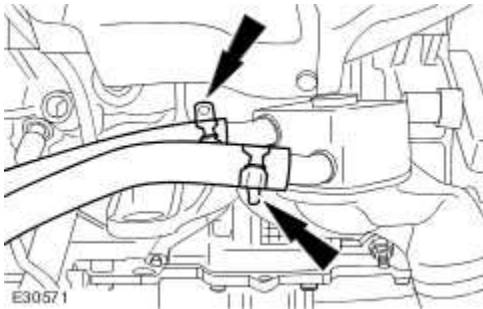
Tighten the bolts in the indicated sequence.

Tighten all bolts to 25 Nm.

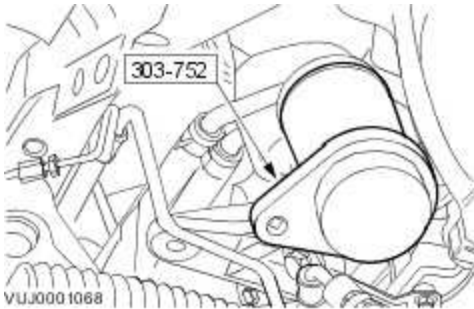
- 1) Tighten to 155 Nm.
- 2) Tighten to 40 Nm + 90 degrees.



4 . Connect the coolant hoses.



5 . Install a new engine oil filter.




6 . Install the left-hand engine mount.
For additional information, refer to

7 . **NOTE:**

Install a new sealing washer to oil pan drain plug

Install the oil pan drain plug

 Tighten to 24 Nm.

8 . Lower the vehicle.

9 . Refill the engine with oil.

10 . Carry out the coolant fill and bleeding procedure.

Oil Pan (12.60.44)

Special Service Tools



Engine Lifting Bracket

303-661



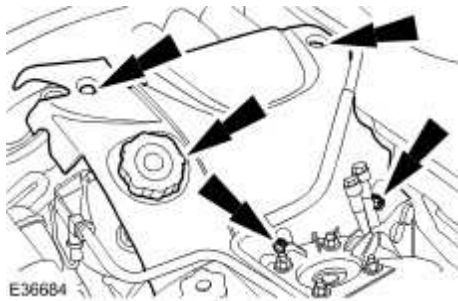
Engine Support Bracket

303-021

Removal

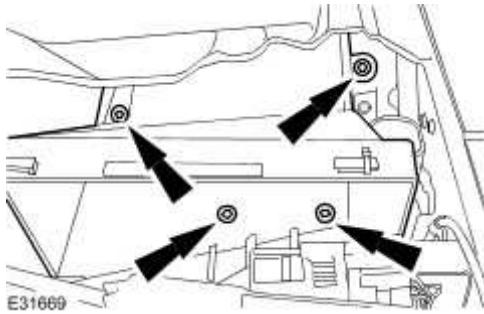
1 . Disconnect the battery ground cable. <<414-01>>

2 . Remove the engine cover.



3 . Remove the cowl vent screen. <<501-02>>

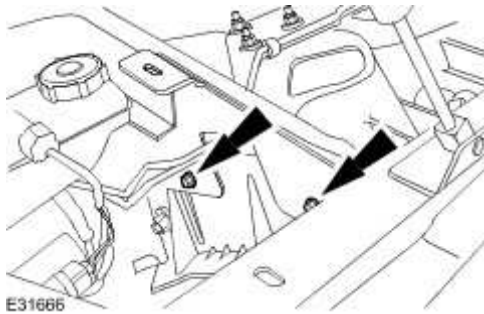
4 . Remove the cabin air filter housing.



5 . NOTE:

Left-hand shown, right-hand similar.

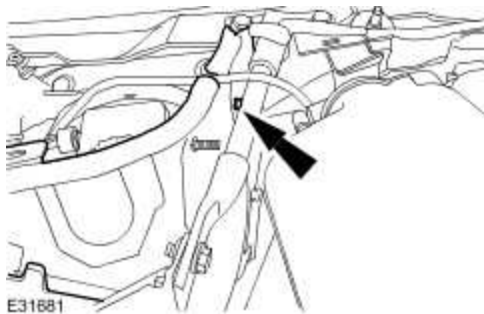
Remove the engine compartment panel retaining bolts.



6 . NOTE:

Left-hand shown, right-hand similar.

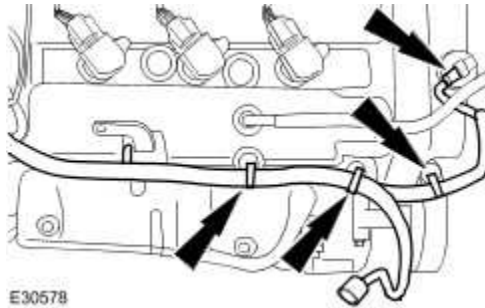
Remove the engine compartment panel.



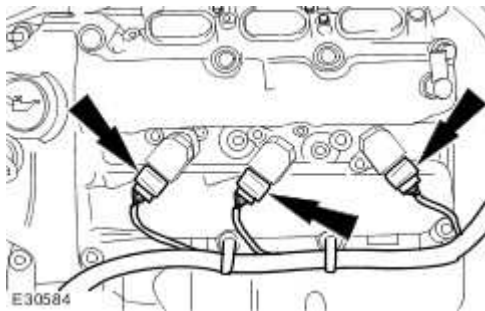
7 . NOTE:

Inlet manifold shown removed for clarity.

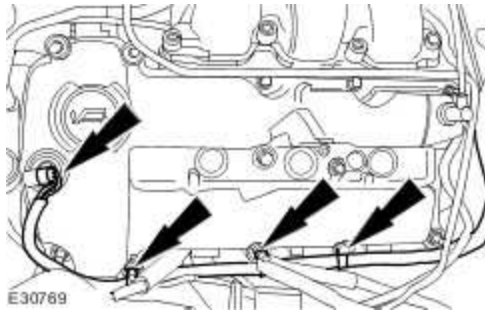
Detach the right-hand valve cover wiring harness.



8 . Disconnect the left-hand ignition coils electrical connectors.

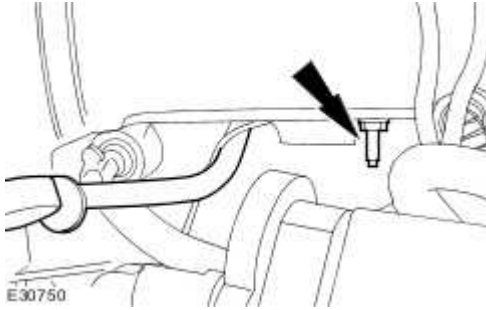


9 . Detach the left-hand valve cover wiring harness.



10 . Remove the dipstick tube retaining bolt.

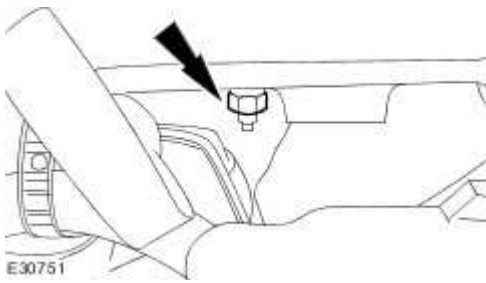
➡ Reposition the dipstick tube.



11 . NOTE:

Left-hand shown, right-hand similar.

Loosen the exhaust manifold retaining nut.

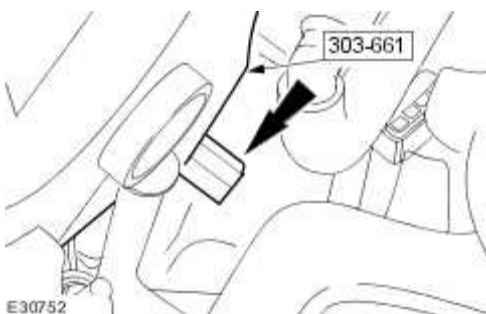


12 . NOTE:

Left-hand shown, right-hand similar.

Install the special tool to the exhaust manifold.

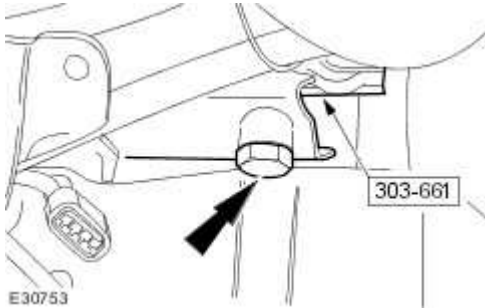
▶ Install the retaining bolt.



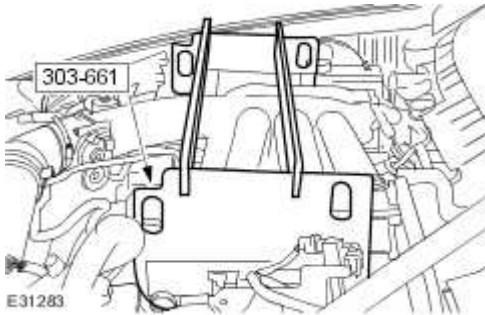
13 . **NOTE:**

Left-hand shown, right-hand similar.

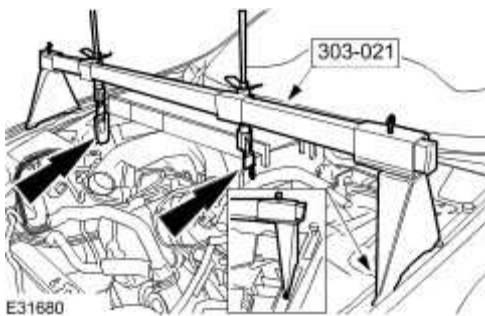
Install the retaining bolt.



14 . Install the special tool support bars to the special tool.



15 . Install the special tool.



16 . Remove the air conditioning (AC) compressor. <<412-03>>

17 . Remove the air conditioning compressor bracket.



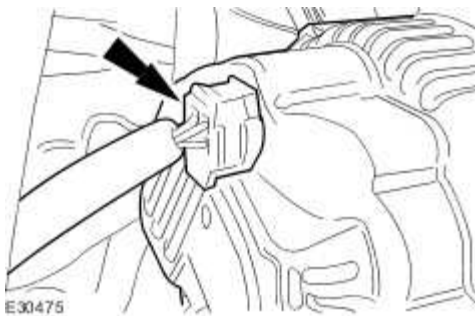
18 . Detach the generator battery positive cable protective cover.



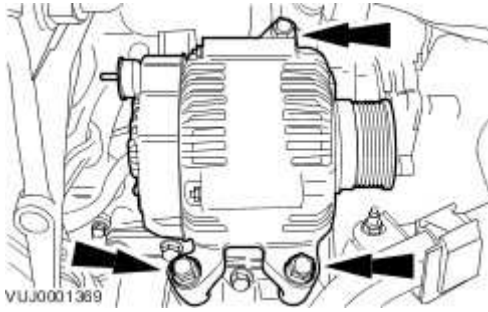
19 . Remove the generator battery positive cable retaining nut.



20 . Disconnect the generator electrical connector.

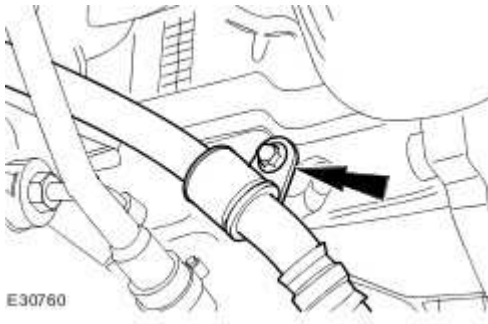


21 . Remove the generator.

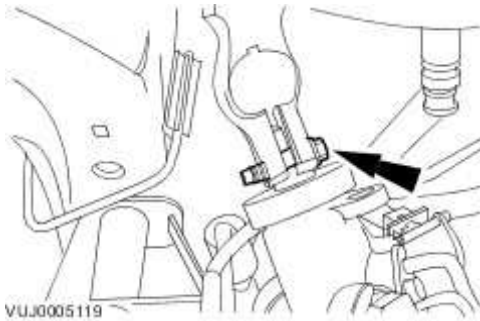


22 . Drain the engine oil.

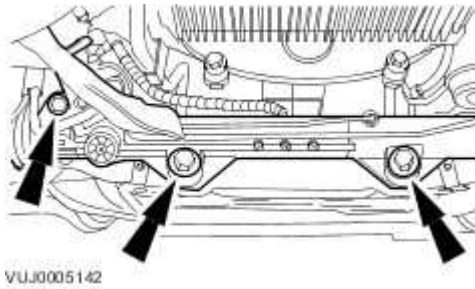
23 . Detach the power steering hose.



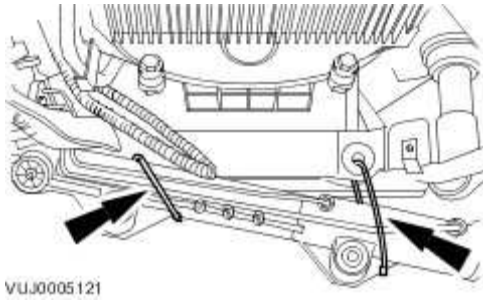
24 . Remove the steering gear shaft pinch bolt.



25 . Detach the steering gear.



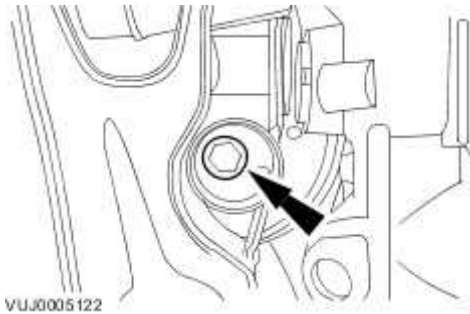
26 . Secure the steering gear.



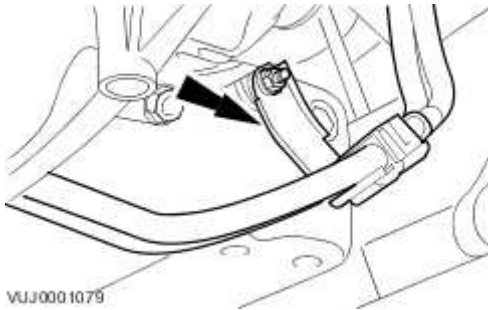
27 . **NOTE:**

Left-hand shown, right-hand similar.

Remove the engine mounts lower retaining bolts.

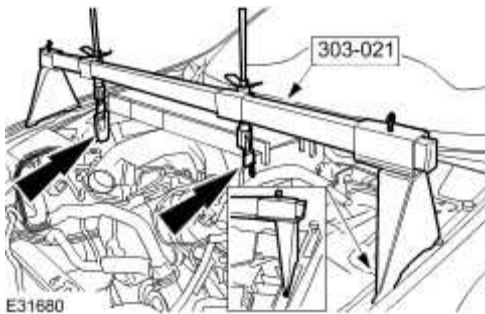


28 . Detach the automatic transmission oil cooler tubes retaining bracket.



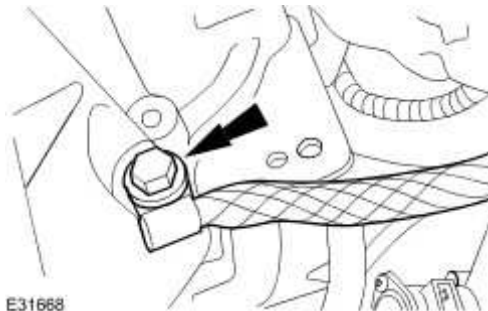
29 . Lower the vehicle.

30 . Using the special tools, raise the engine to a suitable height.



31 . Raise the vehicle.

32 . Detach the engine earth strap from the transmission.

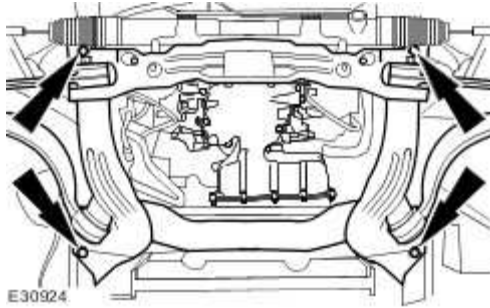


33

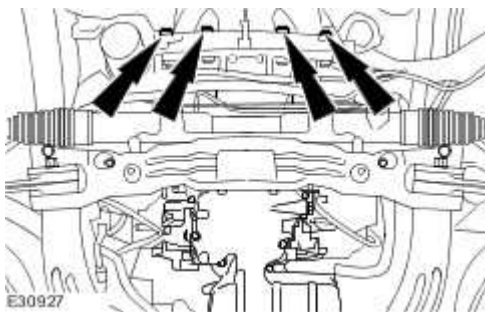


WARNING: Do not remove the front subframe retaining bolts. Failure to follow this procedure may result in personal injury.

Loosen the front subframe retaining bolts to enable the oil pan to be removed.

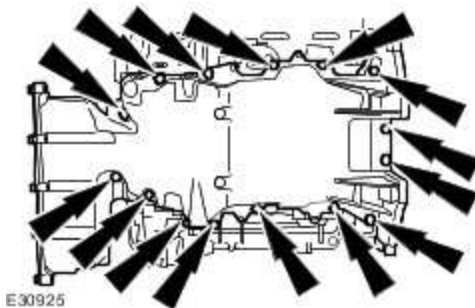


34 . Remove the oil pan rear retaining bolts.



35 Remove the oil pan.

- ▶ Remove and discard the oil pan gasket.
- ▶ Clean and inspect the oil pan and cylinder block sealing surfaces using metal surface cleaner or equivalent meeting Jaguar specification.



Installation

1 NOTE:

Apply an 10 mm dot of silicone gasket and sealant meeting Jaguar specification to the engine block and front cover mating surface.

NOTE:

Loosely install the oil pan to transmission housing bolts.

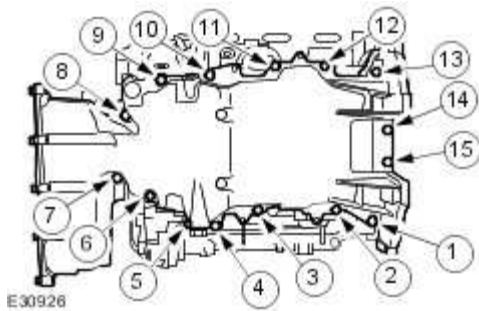
NOTE:

Tighten all oil pan retaining bolts within six minutes of applying the sealer.

Install the oil pan rear retaining bolts.

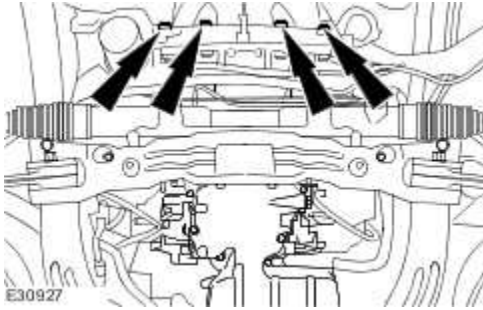
▶ Complete the tightening sequence.

▶ Tighten to 25 Nm.

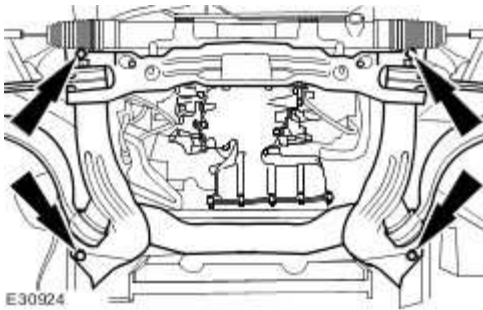


2 . Install the oil pan rear retaining bolts.


▶ Tighten to 45 Nm.



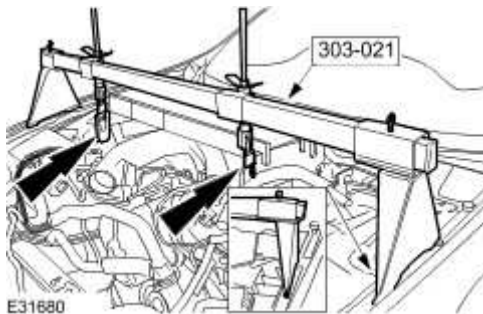
3 . Carry out the front subframe alignment procedure. <<502-00>>



4 . Lower the vehicle.

- 5
- 
CAUTION: Make sure the engine mounts locate into the correct position when the engine is repositioned.

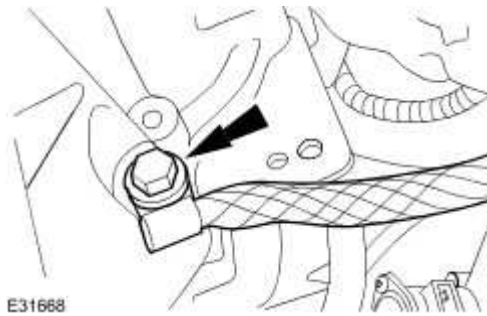
Using the special tools, reposition the engine.



6 . Raise the vehicle.

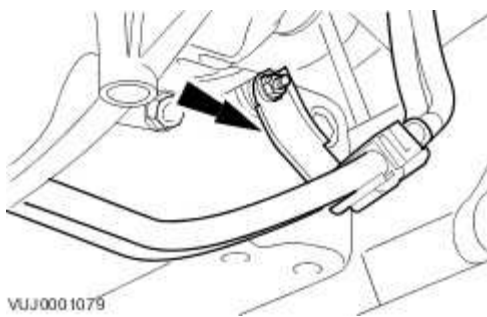
7 . Install the engine earth strap to the transmission.

▶ Tighten to 10 Nm.



8 . Attach the automatic transmission oil cooler tubes retaining bracket.

▶ Tighten to 10 Nm.

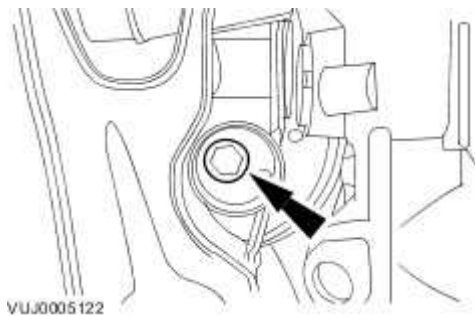


9 . **NOTE:**

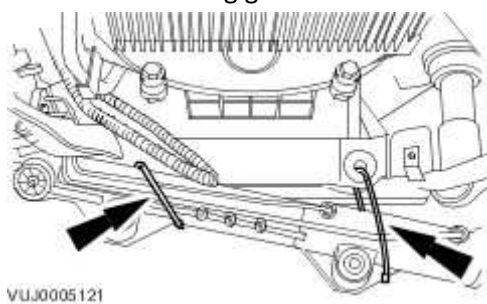
Left-hand shown, right-hand similar.

Install the engine mounts lower retaining bolts.

▶ Tighten to 63 Nm.

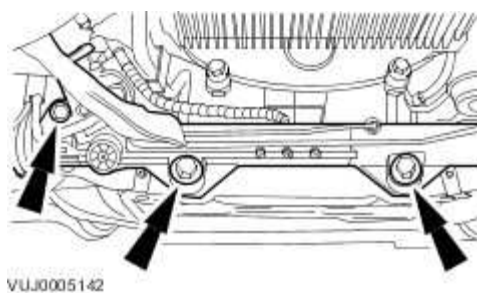


10 . Detach the steering gear.



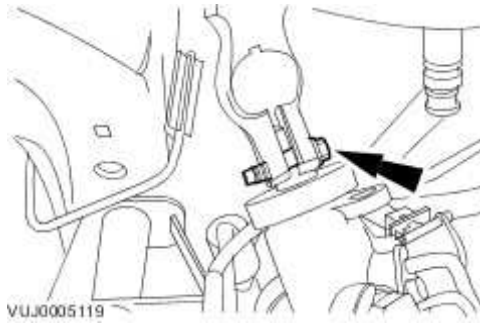
11 . Attach the steering gear.

► Tighten to 100 Nm.



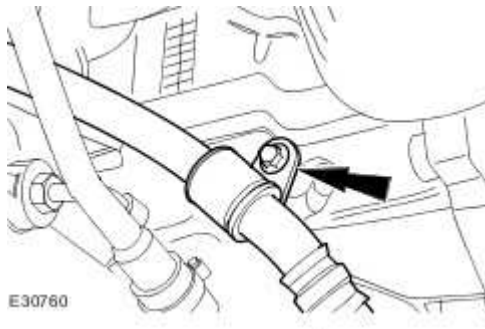
12 . Install the steering gear shaft pinch bolt.

► Tighten to 35 Nm.



13 . Attach the power steering hose.

▶ Tighten to 10 Nm.



14 . **NOTE:**

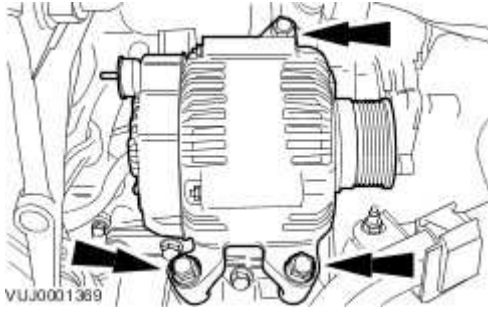
Install a new sealing washer to the oil pan drain plug

Install the oil pan drain plug

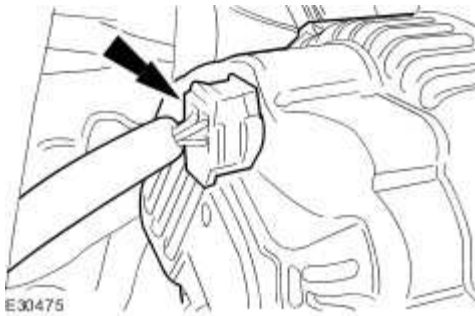
▶ Tighten to 24 Nm.

15 . To install the generator.

▶ Tighten to 48 Nm.



16 . Connect the generator electrical connector.



17 . Install the generator battery positive cable retaining nut.

► Tighten to 12 Nm.



18 . Attach the generator battery positive cable protective cover.



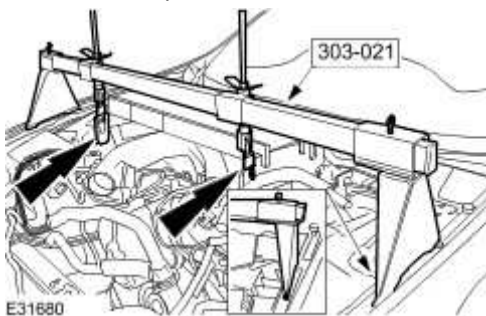
19 . Install the air conditioning compressor bracket.

► Tighten to 25 Nm.

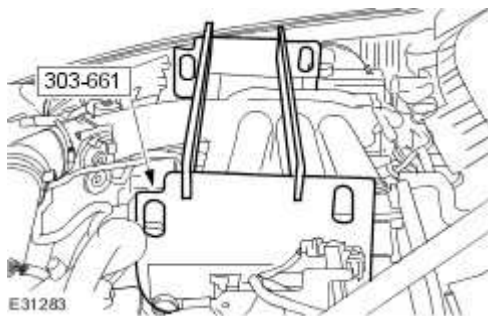


20 . Install the air conditioning (AC) compressor. <<412-03>>

21 . Remove the special tool.



22 . Remove the special tool.

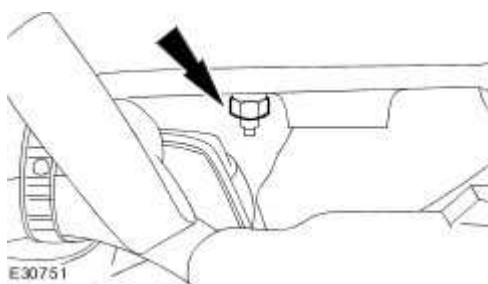


23 . **NOTE:**

Left-hand shown, right-hand similar.

Tighten the exhaust manifold retaining nut.

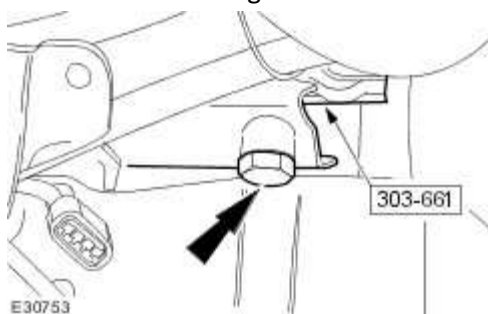
▶ Tighten to 25 Nm.



24 . **NOTE:**

Left-hand shown, right-hand similar.

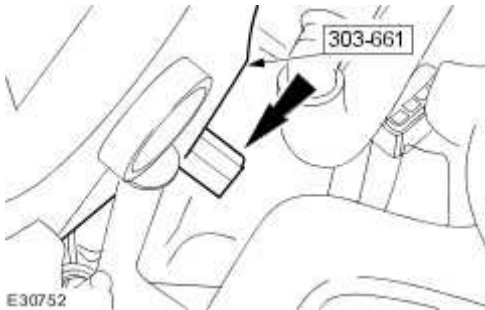
Remove the retaining bolt.



25 . **NOTE:**

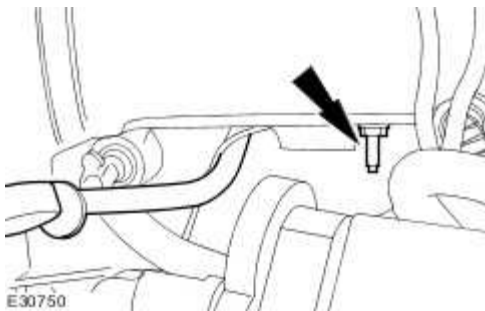
Left-hand shown, right-hand similar.

Remove the special tool from the exhaust manifold.

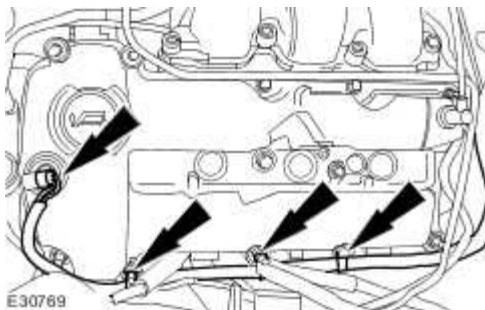


26 . Install the dipstick tube retaining bolt.

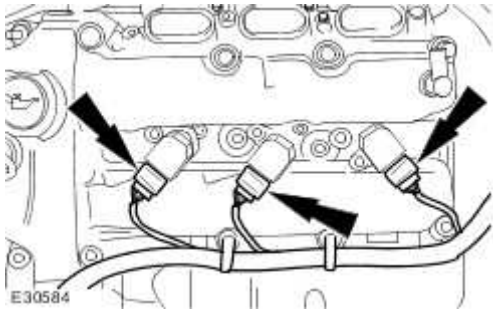
▶ Tighten to 10 Nm.



27 . Attach the left-hand valve cover wiring harness.



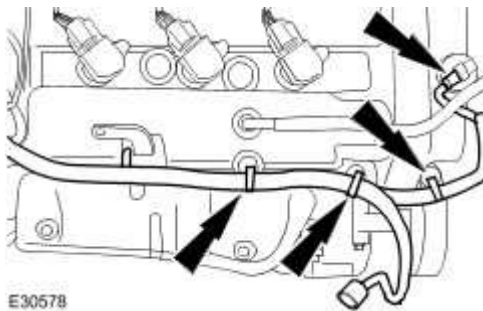
28 . Connect the left-hand ignition coils electrical connectors.



29 . NOTE:

Inlet manifold shown removed for clarity.

Attach the right-hand valve cover wiring harness.

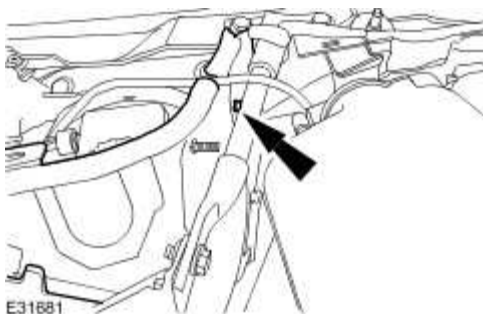


30 . NOTE:

Left-hand shown, right-hand similar.

Install the engine compartment panel.

► Tighten to 10 Nm.

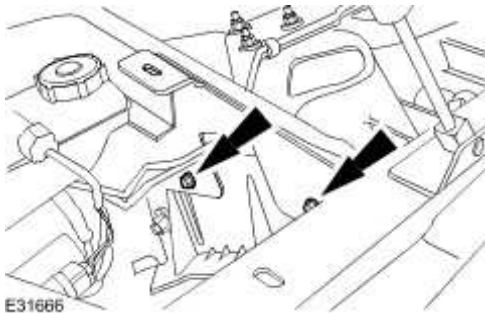


31 . **NOTE:**

Left-hand shown, right-hand similar.

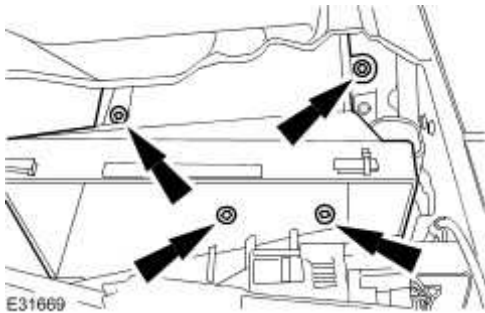
Install the engine compartment panel retaining bolts.

▶ Tighten to 10 Nm.



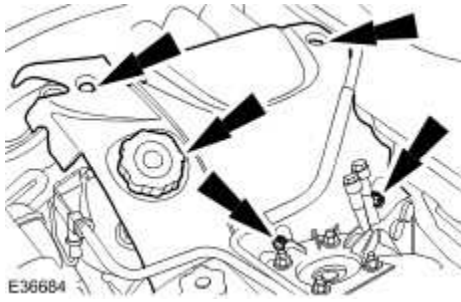
32 . Install the cabin air filter housing.

▶ Tighten to 10 Nm.



33 . Install the cowl vent screen. <<501-02>>

34 . Install the engine cover.



35 . Connect the battery ground cable. <<414-01>>

36 . Refill the engine with oil.

Oil Pump (12.60.26)

Removal

- 1 . Remove the timing drive components.

For additional information, refer to Timing Drive Components (12.65.13)

- 2 . **NOTE:**

Engine inverted for clarity.

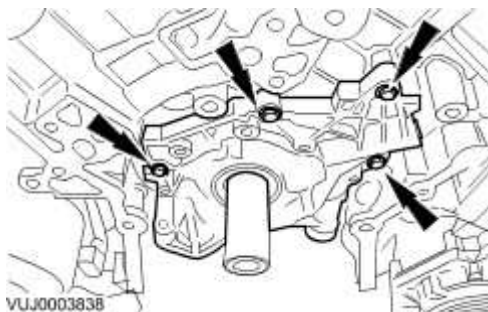
Remove the oil pump tube.



- 3 . Remove the oil pump.

▶ Remove and discard the O-ring seal.

▶ Inspect the oil pump for damage and wear.



Installation

1



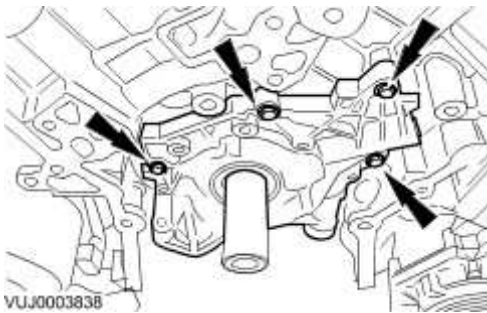
- CAUTION: Install the oil pump flush to the cylinder block for correct sealing.



CAUTION: Rotate the inner rotor of the oil pump to align with the flats on the crankshaft before installation.

Install the oil pump.

▶ Tighten to 10 Nm.



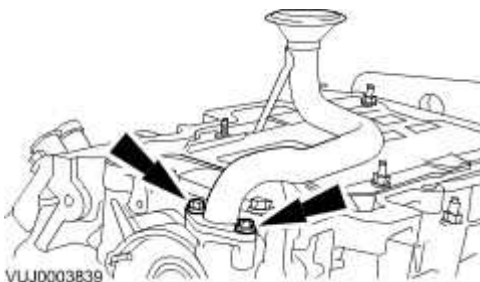
2 . NOTE:

Engine inverted for clarity.

Install the oil pump tube.

▶ Install a new O-ring seal.

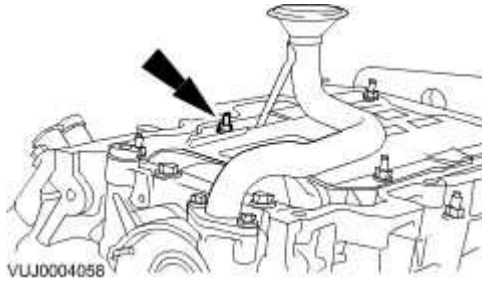
▶ Tighten to 10 Nm.



3 . **NOTE:**

Engine inverted for clarity.

Tighten to 5 Nm + 45°.



4 . Install the timing drive components.

For additional information, refer to Timing Drive Components (12.65.13)

Timing Drive Components (12.65.13)

Removal

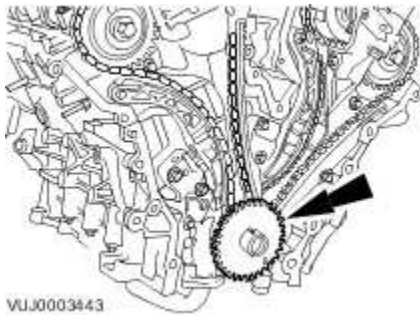
- 1 . Remove the engine front cover.
For additional information, refer to

- 2 . Remove the spark plugs.

3 NOTE:

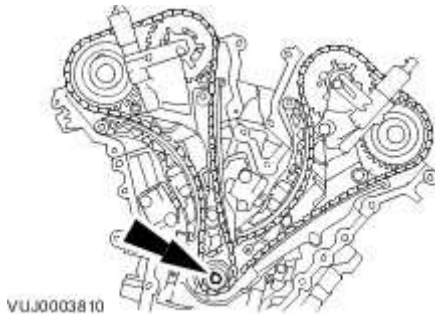
Note the position of the crankshaft position (CKP) sensor pulse wheel during removal. It must be returned to its original position during installation.

Remove the crankshaft position (CKP) sensor pulse wheel.



- 4  **CAUTION: Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.**

Install the crankshaft pulley retaining bolt and washer.

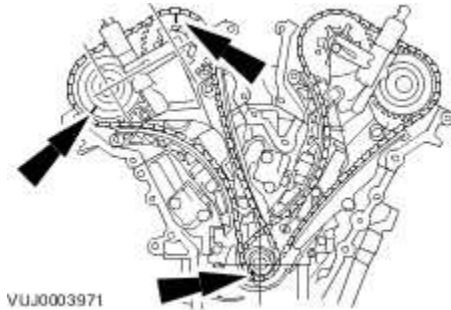


5

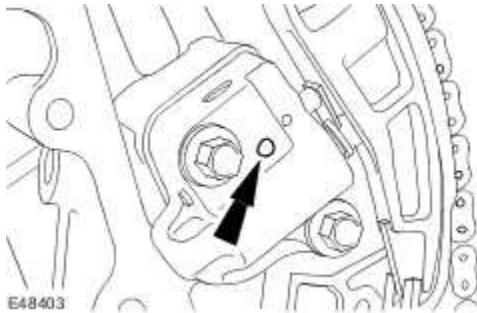


- **CAUTION:** Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.

Rotate the crankshaft clockwise until the crankshaft keyway is at the 7 O'clock position, the alignment mark on the right-hand intake camshaft sprocket is at the 1 O'clock position and the alignment mark on the right-hand exhaust camshaft sprocket is at the 8 O'clock position.



- 6 . Release the timing chain tensioner ratchet.



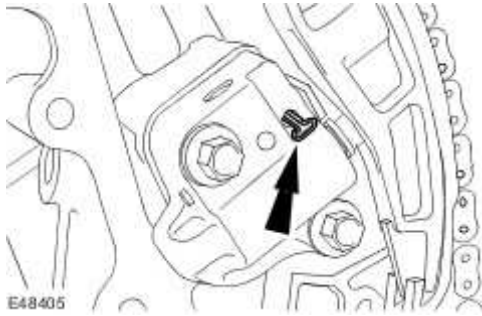
- 7 . **NOTE:**

Keep the timing chain tensioner ratchet released.

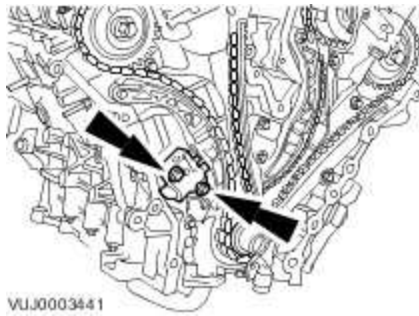
Reposition the timing chain tensioner plunger.



8 . Retain the timing chain tensioner plunger.



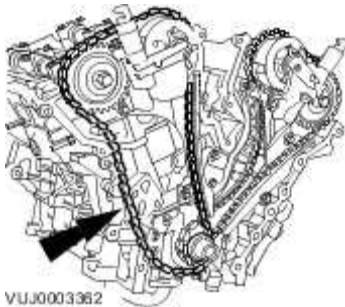
9 . Remove the right-hand timing chain tensioner.



10 . Remove the right-hand timing chain outer guide.

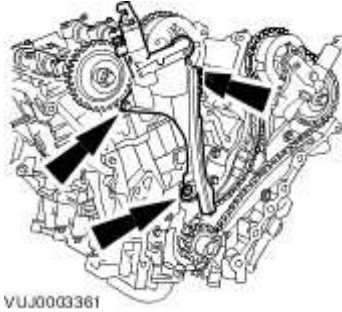


11 . Remove the right-hand timing chain.



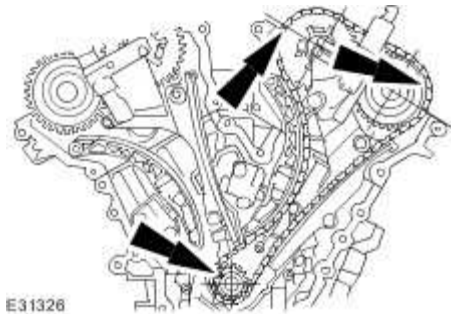
- 12 .  **CAUTION:** Inspect and replace the O-ring seal if necessary.

Remove the right-hand timing chain inner guide.



- 13  **CAUTION:** Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.

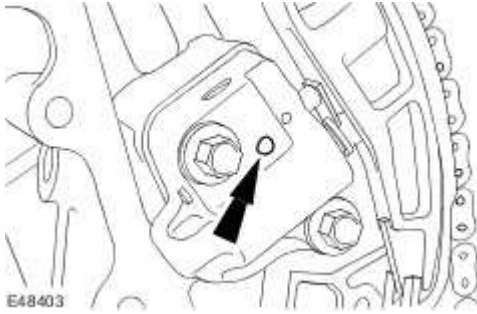
Rotate the crankshaft clockwise until the crankshaft keyway is at the 11 O'clock position, the alignment mark on the left-hand intake camshaft sprocket is at the 9 O'clock position and the alignment mark on the left-hand exhaust camshaft sprocket is at the 2 O'clock position.



- 14 . **NOTE:**

Right-hand bank shown, left-hand bank similar.

Release the timing chain tensioner ratchet.



15 . NOTE:

Right-hand bank shown, left-hand bank similar.

NOTE:

Keep the timing chain tensioner ratchet released.

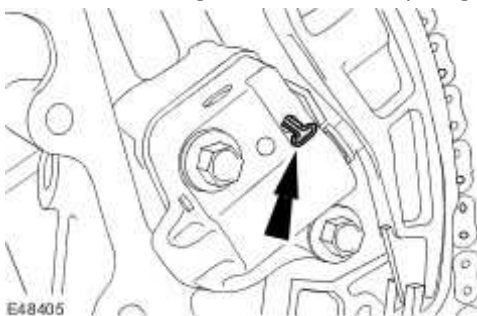
Reposition the timing chain tensioner plunger.



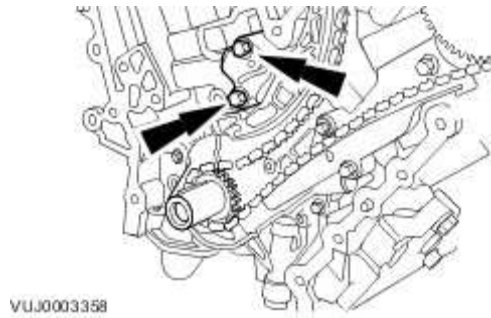
16 . NOTE:

Right-hand bank shown, left-hand bank similar.

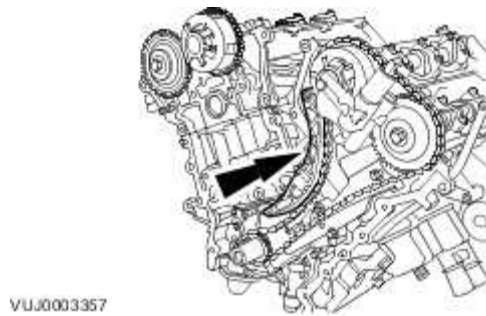
Retain the timing chain tensioner plunger.



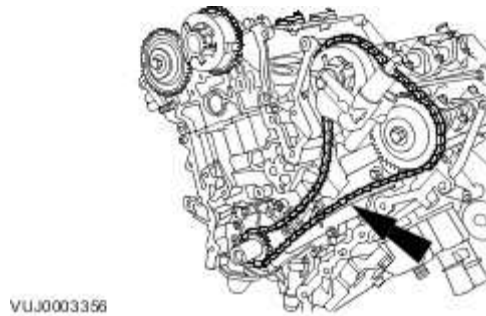
17 . Remove the left-hand timing chain tensioner.



18 . Remove the left-hand timing chain inner guide.

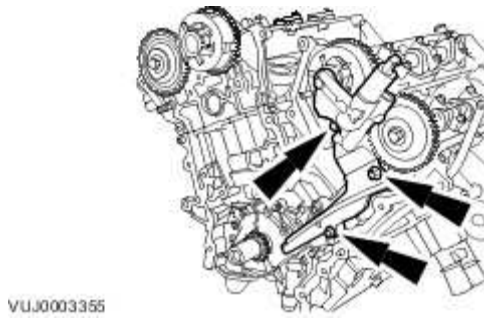


19 . Remove the left-hand timing chain.



20 .  **CAUTION: Inspect and replace the O-ring seal if necessary.**

Remove the left-hand timing chain outer guide.

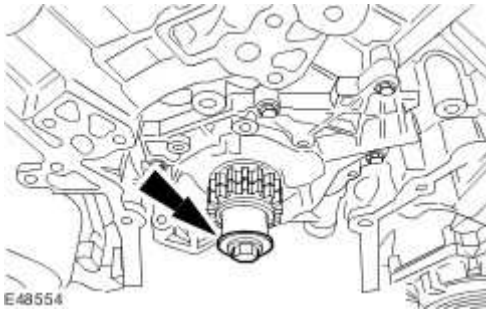


21

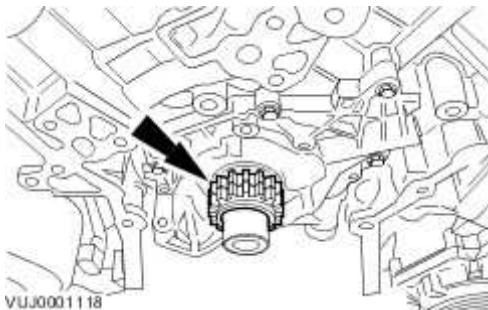


CAUTION: Make sure the crankshaft keyway is at the 9 O'clock position before any further engine repairs are carried out.

Remove the crankshaft pulley retaining bolt and washer.



22 . Remove the crankshaft sprocket.

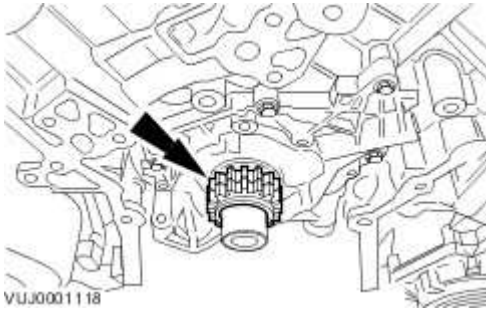


Installation

1 . **NOTE:**

Make sure the crankshaft sprocket timing marks are facing outwards.

Install the crankshaft sprocket.

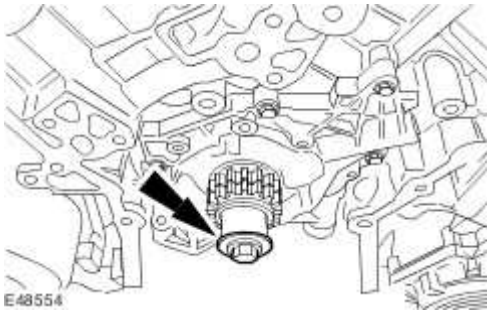


2

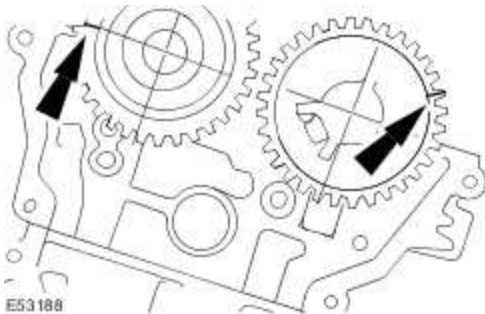


CAUTION: Make sure the crankshaft keyway is at the 9 O'clock position before the camshaft positions are aligned.

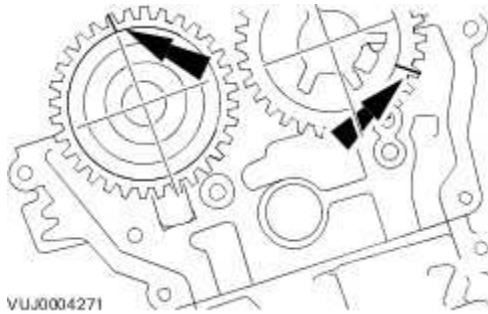
Install the crankshaft pulley retaining bolt and washer.



3 Rotate the left-hand intake camshaft clockwise until the camshaft sprocket alignment mark is at the 9 O'clock position and rotate the left-hand exhaust camshaft sprocket clockwise until the camshaft sprocket alignment mark is at the 2 O'clock position.



4 Rotate the right-hand intake camshaft clockwise until the camshaft sprocket alignment mark is at the 5 O'clock position and rotate the right-hand exhaust camshaft sprocket clockwise until the camshaft sprocket alignment mark is at the 12 O'clock position.



5 . Rotate the crankshaft clockwise until the keyway is at the 11 O'clock position.

6 .  **CAUTION: Inspect and replace the O-ring seal if necessary.**

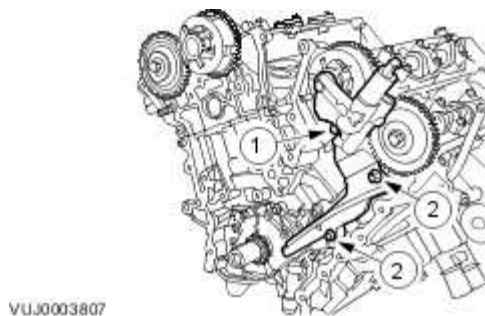
 **CAUTION: Make sure the O-ring seal is correctly installed.**


Install the left-hand timing chain outer guide.

► Tighten the retaining bolts in the sequence shown in two stages.

► Stage 1: Tighten bolt 1 to 25 Nm.

► Stage 2: Tighten bolts 2 to 25 Nm.



7 .  **CAUTION: Make sure the crankshaft keyway is at the 11 O'clock position, the alignment mark on the left-hand intake camshaft sprocket is at the 9 O'clock position and**

the alignment mark on the left-hand exhaust camshaft sprocket is at the 2 O'clock position.

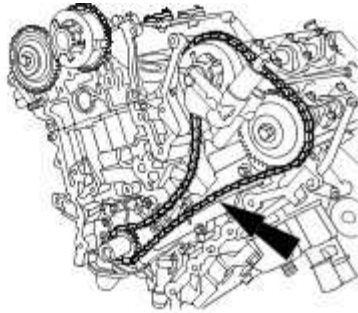


CAUTION: Make sure the timing chain alignment marks are correctly positioned to the crankshaft sprocket and camshaft sprocket alignment marks.

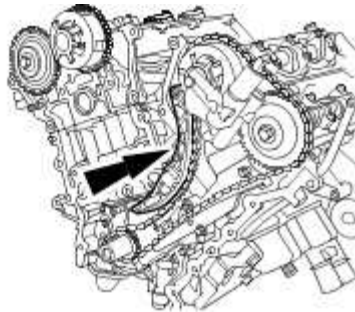


CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

Install the left-hand timing chain.



8 . Install the left-hand timing chain inner guide.



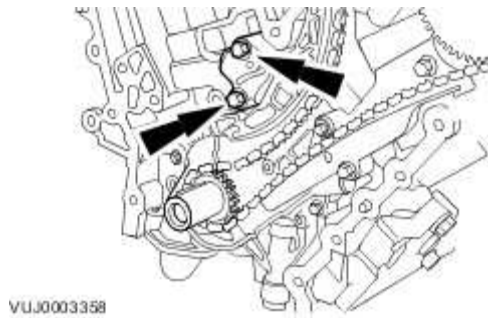
9 .



CAUTION: Do not manually adjust the timing chain tensioner.

Install the left-hand timing chain tensioner.

► Tighten to 25 Nm.

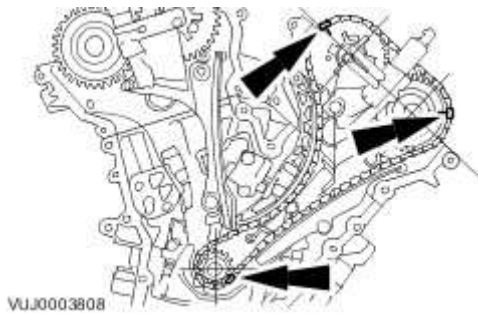


10



CAUTION: Do not manually adjust the timing chain tensioner.

Make sure the left-hand timing chain alignment marks have remained correctly positioned to the camshaft sprocket and crankshaft sprocket alignment marks.

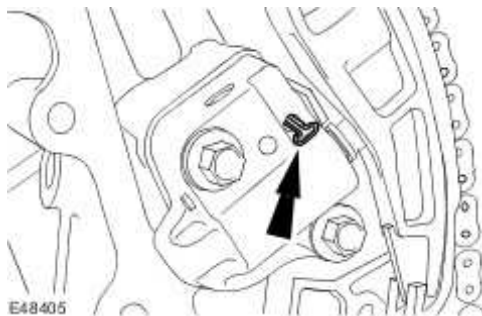


11 .



CAUTION: Do not manually adjust the timing chain tensioner.

Remove the timing chain tensioner retaining pin.

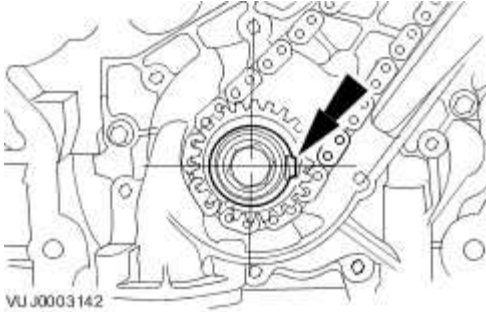


12



CAUTION: Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.

Rotate the crankshaft clockwise until the crankshaft keyway is at the 3 O'clock position.



13 .



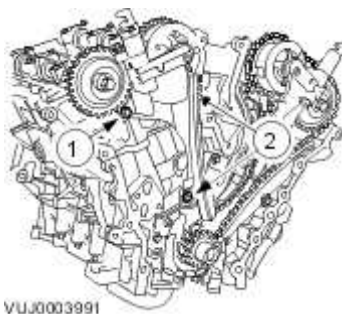
CAUTION: Inspect and replace the O-ring seal if necessary.



CAUTION: Make sure the O-ring seal is correctly installed.

Install the right-hand timing chain inner guide.

- ▶ Tighten the retaining bolts in the sequence shown in two stages.
- ▶ Stage 1: Tighten bolt 1 to 25 Nm.
- ▶ Stage 2: Tighten bolts 2 to 25 Nm.



14



CAUTION: Make sure the crankshaft keyway is at the 3 O'clock position, the alignment mark on the right-hand intake camshaft sprocket is at the 5 O'clock position and the alignment mark on the right-hand exhaust camshaft sprocket is at the 12 O'clock position.

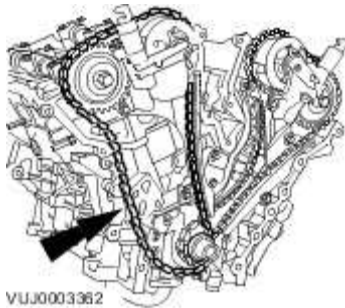


CAUTION: Make sure the timing chain alignment marks are correctly positioned to the crankshaft sprocket and camshaft sprocket alignment marks.



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

Install the right-hand timing chain.



15 . Install the right-hand timing chain outer guide.



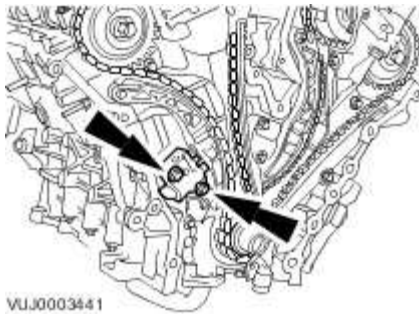
16 .



CAUTION: Do not manually adjust the timing chain tensioner.

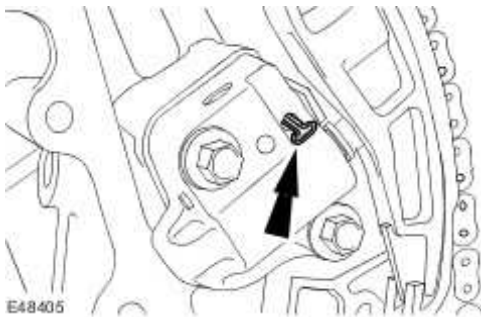
Install the right-hand timing chain tensioner.

► Tighten to 25 Nm.



17.  **CAUTION: Do not manually adjust the timing chain tensioner.**

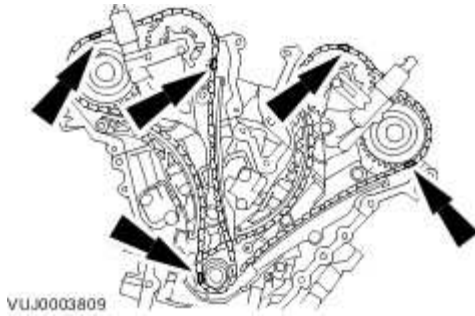
Remove the timing chain tensioner retaining pin.



18.  **CAUTION: Make sure the right-hand timing chain alignment marks have remained correctly positioned to the camshaft sprocket and crankshaft sprocket alignment marks.**

 **CAUTION: Do not manually adjust the timing chain tensioner.**

Make sure all the timing chain alignment marks are in the positions shown.



19



- CAUTION: Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.

NOTE:

Rotate the crankshaft using hand tools only

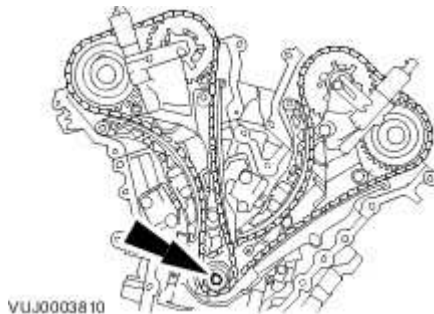
Rotate the crankshaft two complete turns clockwise to make sure the valves and pistons do not clash.

20



- CAUTION: Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.

Remove the crankshaft pulley retaining bolt and washer.



21

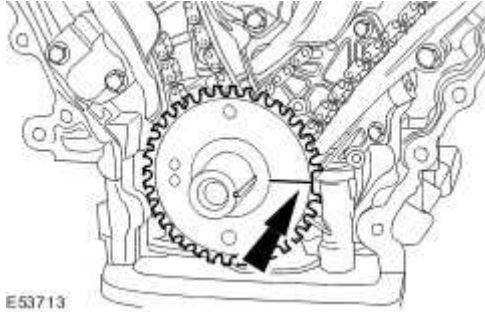


- CAUTION: Make sure the CKP sensor pulse wheel is correctly installed with the missing tooth aligned to the crankshaft keyway.



CAUTION: Make sure the CKP sensor pulse wheel is correctly installed with the teeth pointing outwards.

Install the CKP sensor pulse wheel.



22 . Install the spark plugs.

► Tighten to 15 Nm.

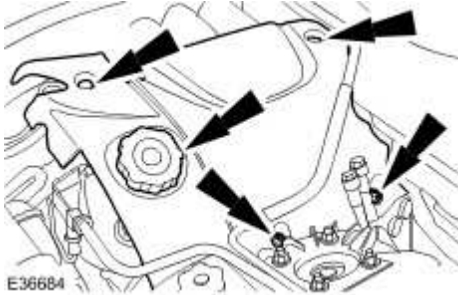
23 . Install the engine front cover.

For additional information, refer to

Valve Cover LH (12.29.43)

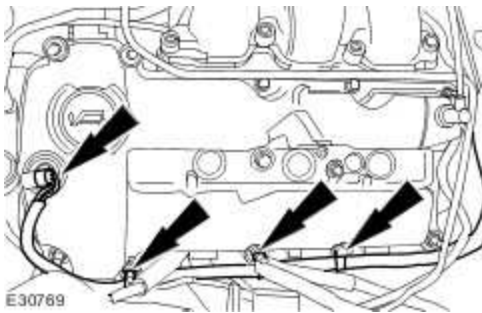
Removal

- 1 . Remove the engine cover.

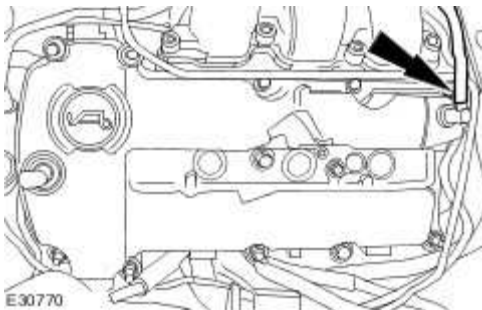


- 2 . Remove the left-hand on-plug coils. <<303-07A>>

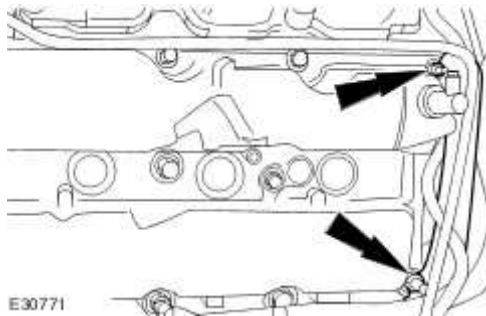
- 3 . Detach the left-hand valve cover wiring harness.



- 4 . Detach the engine breather tube.

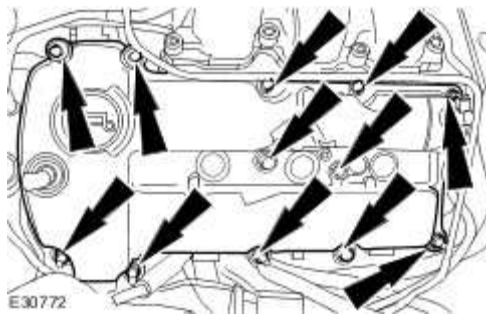


- 5 . Detach the engine wiring harness retaining bracket.



6 . Remove the valve cover.

▶ Remove and discard the gaskets.



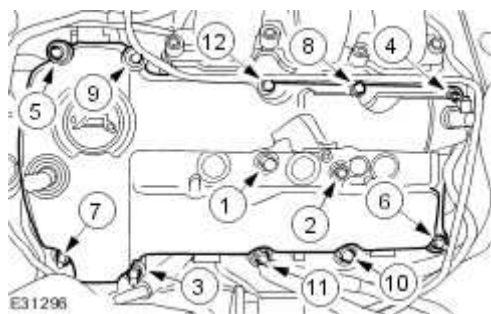
Installation

1 NOTE:

Apply a 5mm diameter bead of silicone gasket sealant or equivalent meeting Jaguar specification on the half round gaskets and apply an 8mm diameter on the two places where the cylinder head and front cover join.

To install, reverse the removal procedure.

- ▶ Install new valve cover gaskets.
- ▶ Complete the tightening sequence.
- ▶ Tighten to 10 Nm.



Valve Cover RH (12.29.44)

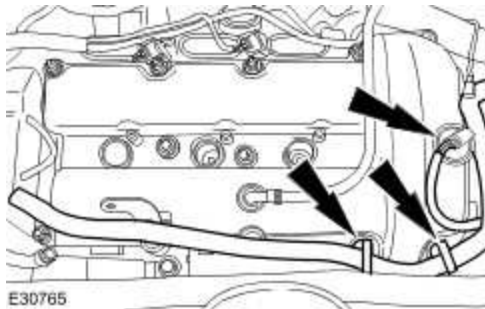
Removal

- 1 . Remove the intake manifold.

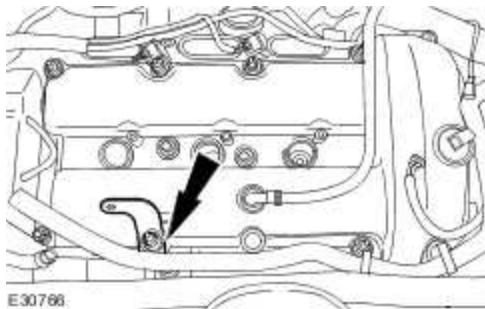
For additional information, refer to Intake Manifold (30.15.01)

- 2 . Remove the right-hand on-plug coils. <<303-07A>>

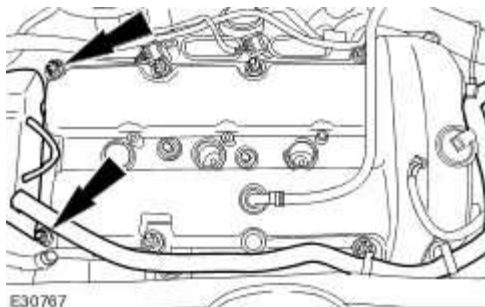
- 3 . Detach the right-hand valve cover wiring harness.



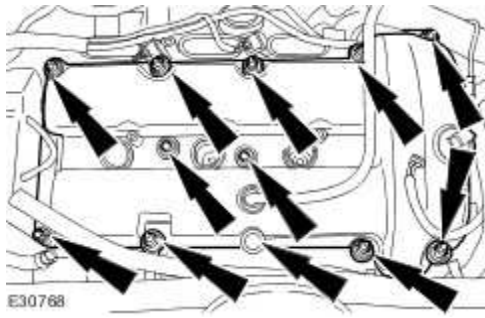
- 4 . Remove the intake manifold rear retaining bracket.



- 5 . Detach the engine wiring harness retaining bracket.



6 . Remove the valve cover.



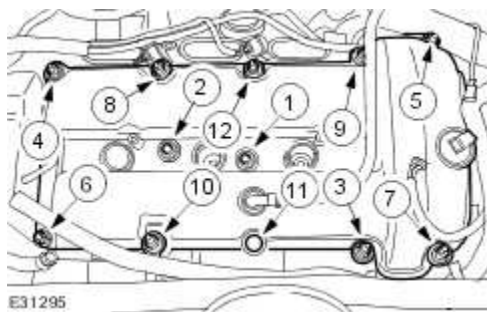
Installation

1 NOTE:

Apply a 5mm diameter bead of silicone gasket sealant or equivalent meeting Jaguar specification on the half round gaskets and apply an 8mm diameter on the two places where the cylinder head and front cover join.

To install, reverse the removal procedure.

- ▶ Install new valve cover gaskets.
- ▶ Complete the tightening sequence.
- ▶ Tighten to 10 Nm.



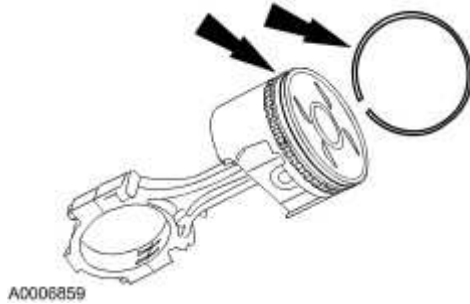
Piston (12.17.02)

Disassembly

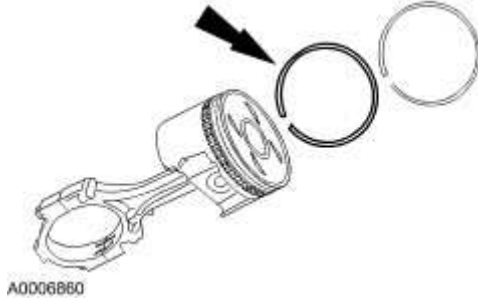
1 NOTE:

- Mark the pistons to the original connecting rods to make sure correct installation in the same cylinders from which they were removed.

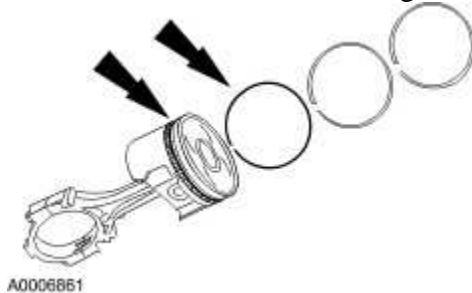
Remove the top compression ring.



2 . Remove the second compression ring.



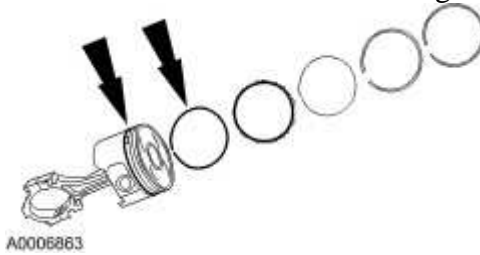
3 . Remove the first oil control ring.



4 . Remove the oil control spacer ring.



5 . Remove the second oil control ring.

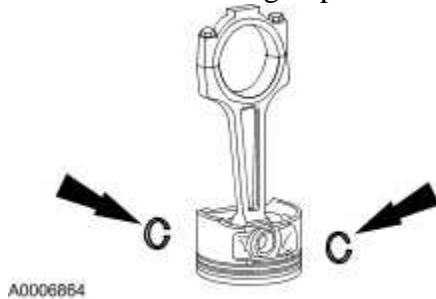


6

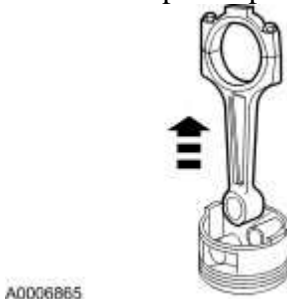


- **WARNING:** The retaining rings have a tendency to spring out during removal. Cover the end of the pin bore with a hand or a rag when removing the retaining ring. Eye protection should be worn. Failure to follow these instructions may result in personal injury.

Remove the retaining clips.



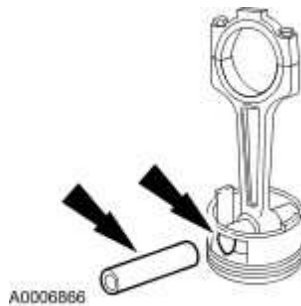
7 . Remove the piston pin and the connecting rod from the piston.



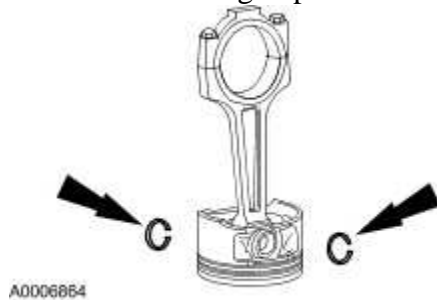
- 8 Clean and inspect the connecting rod and the piston. For additional information, refer to <<303-00>>.

Assembly

- 1 . Install the piston pin.
 - Lubricate the piston pin and piston bore.



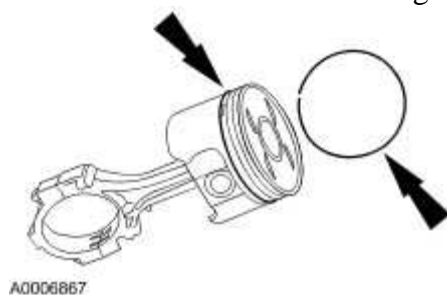
- 2 . Install the retaining clips.



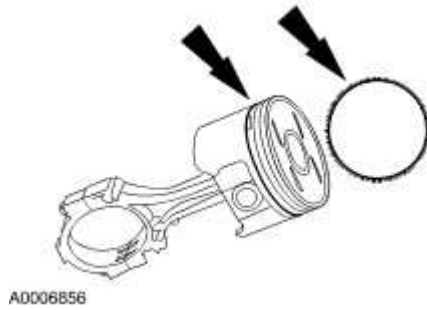
- 3 . Check the piston ring end gap. For additional information, refer to <<303-00>>.

- 4 . Lubricate the piston and piston rings.

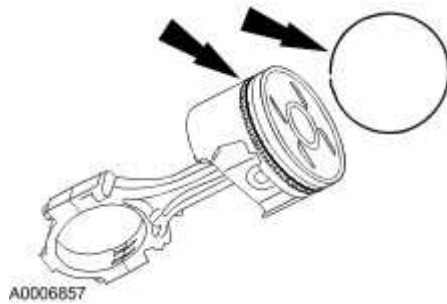
- 5 . Install the second oil control ring.



6 . Install the oil control spacer ring.

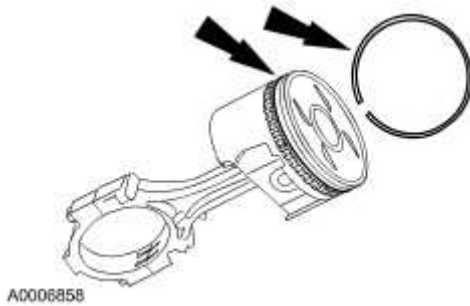


7 . Install the first oil control ring.



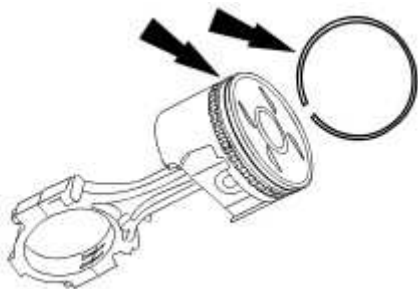
8 Install the second compression ring.

- The top of the second compression ring has a "0" marked on it. Position this side of the ring towards the top of the piston.



9 . Install the top compression ring.

- The top compression ring can be installed with either side up.



A0006859

Cylinder Head (12.29.22)

Special Service Tools



Valve Spring Compressor
303-252

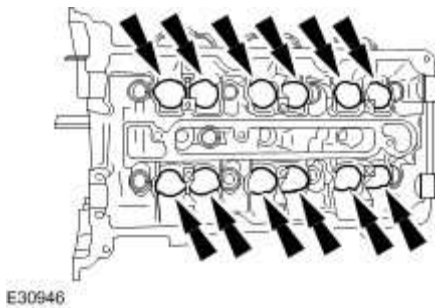
Disassembly

1



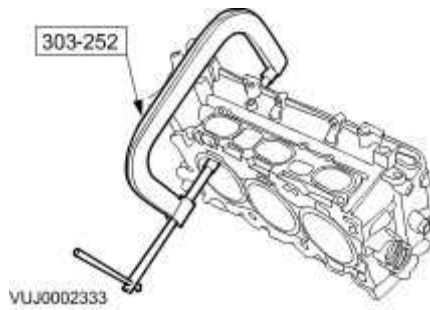
- **CAUTION:** If the cylinder head valve components are to be reused, mark position of the valve components to make sure they are reassembled in the same position.

Remove the bucket tappet and shim assemblies.



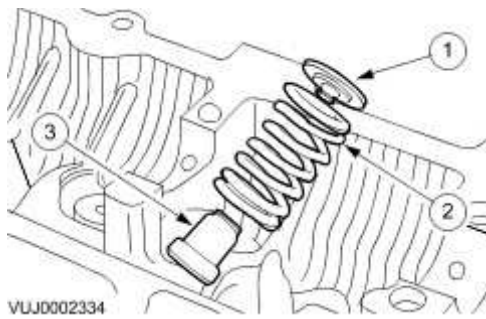
2 . Using the special tool, compress the valve springs.

- Remove the valve collets.



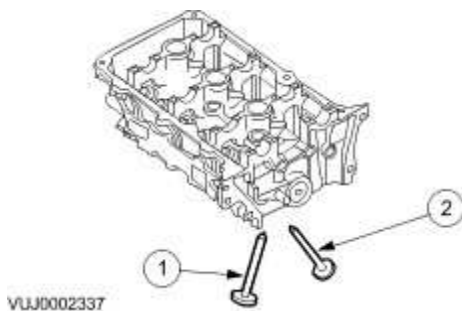
3 . Remove the valve spring retainers and valve springs.

1. Remove the valve spring retainers.
2. Remove the valve springs.
3. Remove the valve stem oil seals.



4 . Remove the valves from the cylinder heads.

4. Remove the intake valves.
5. Remove the exhaust valves.



5 . Inspect the cylinder heads and the related components. <<303-00>>

6 . Remove the pipe plugs and alignment dowels as necessary to clean the cylinder heads.

Assembly

1



- **WARNING:** Eye protection is required during use of compressed air. Failure to follow these instructions may result in personal injury.



CAUTION: The cylinder head surface finish is measured in microns. For correct head gasket sealing, avoid any contact of finish with metallic objects.

Clean gasket material, dirt and foreign material from cylinder heads. Wash with a suitable soap and water solution and dry completely using compressed air if pipe plugs have been removed.

2 . Install the pipe plugs and alignment dowels to cylinder heads.

- Apply pipe sealant to plugs prior to installation.

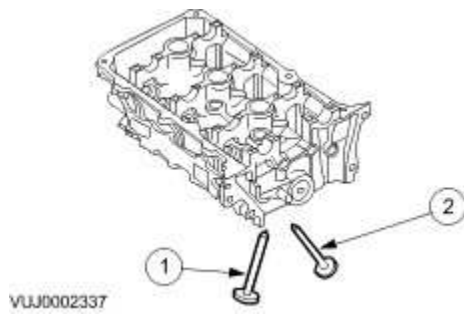
3 . **NOTE:**

Lubricate the valve stems before assembly.

Install the valves into the cylinder heads.

6. Install the intake valves.

7. Install the exhaust valves.

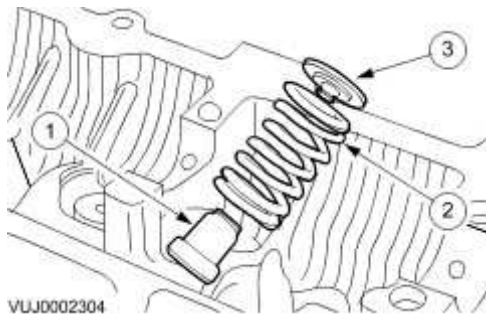


4 . Install the valve spring retainers and valve springs.

8. Install the valve stem oil seals.

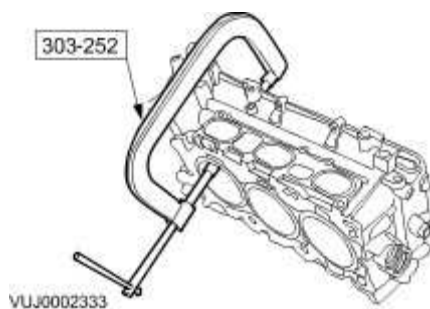
9. Install the valve springs.

10. Install the valve spring retainers.

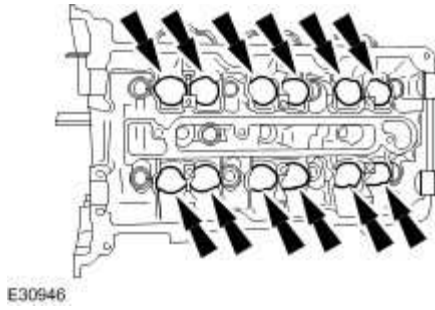


5 . Using the special tool, compress the valve springs.

- Install the valve collets.



6 . Install the bucket tappet and shim assemblies.



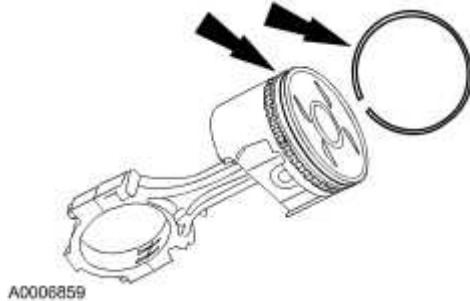
Piston (12.17.02)

Disassembly

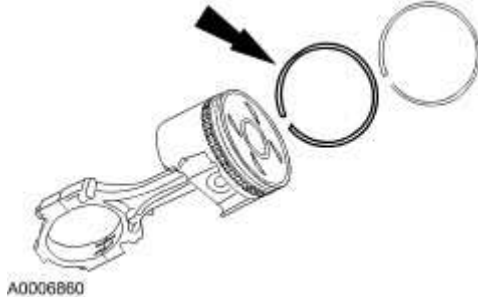
1 NOTE:

- Mark the pistons to the original connecting rods to make sure correct installation in the same cylinders from which they were removed.

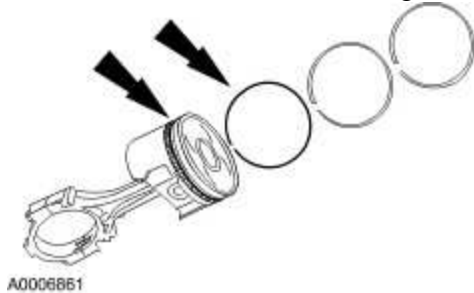
Remove the top compression ring.



2 . Remove the second compression ring.



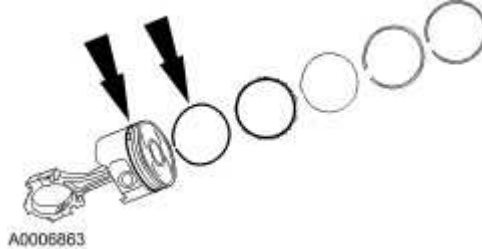
3 . Remove the first oil control ring.




4 . Remove the oil control spacer ring.

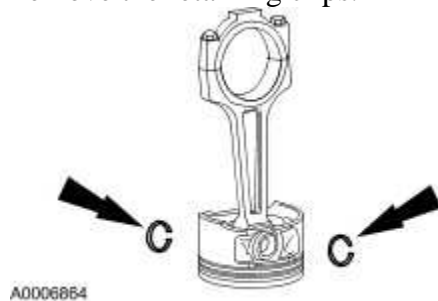


5 . Remove the second oil control ring.



- 6
- 
WARNING: The retaining rings have a tendency to spring out during removal. Cover the end of the pin bore with a hand or a rag when removing the retaining ring. Eye protection should be worn. Failure to follow these instructions may result in personal injury.

Remove the retaining clips.



7 . Remove the piston pin and the connecting rod from the piston.

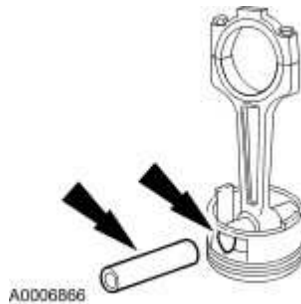


8 Clean and inspect the connecting rod and the piston. For additional information, refer to <<303-00>>.

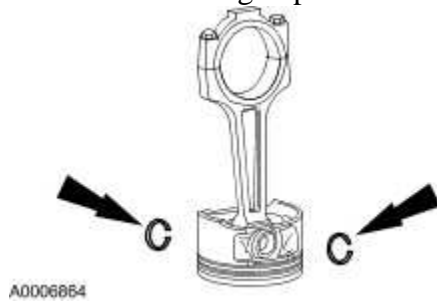
Assembly

1 . Install the piston pin.

- Lubricate the piston pin and piston bore.



2 . Install the retaining clips.



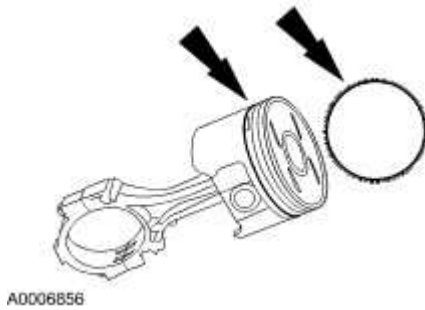
3 . Check the piston ring end gap. For additional information, refer to <<303-00>>.

4 . Lubricate the piston and piston rings.

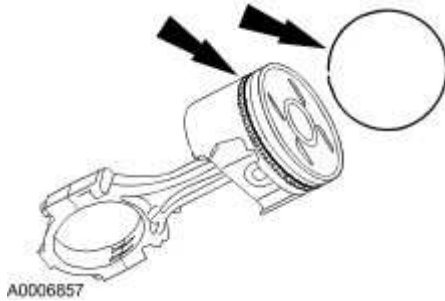
5 . Install the second oil control ring.



6 . Install the oil control spacer ring.

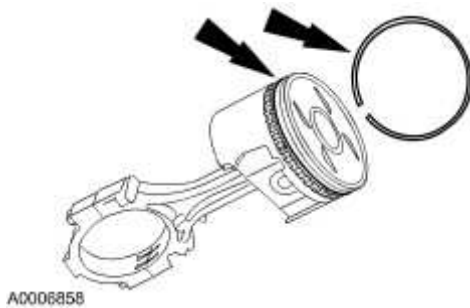


7 . Install the first oil control ring.



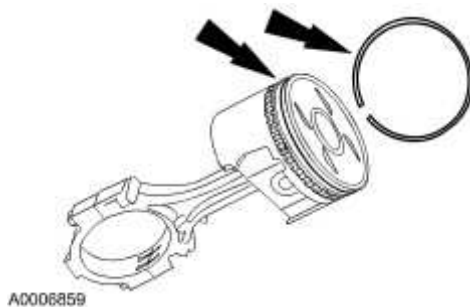
8 Install the second compression ring.

- The top of the second compression ring has a "0" marked on it. Position this side of the ring towards the top of the piston.



9 . Install the top compression ring.

- The top compression ring can be installed with either side up.



Engine

Special Service Tools



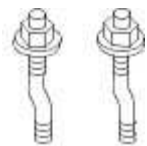
303D055

Wrench Strap-Universal
303-D055



303-178

Crankshaft Rear Seal Installer
303-178



303384

Crankshaft Rear Seal Installer Adapter Bolts
303-384



303372

Piston Ring Compressor
303-372



Cylinder Bore Protector
303-535



Crankshaft Pulley Installer
303-102



Crankshaft Pulley Installer
303-335/2

Assembly

1



CAUTION: Use only plastic scraper when removing old gasket material.

Clean all the mating faces and reusable parts thoroughly and check for damage.

- If gasket material remains on the cylinder head after cleaning, use a plastic tipped scraper to remove remaining material.

2 . NOTE:

Never remove pipe plugs or alignment dowels unless they are to be serviced.

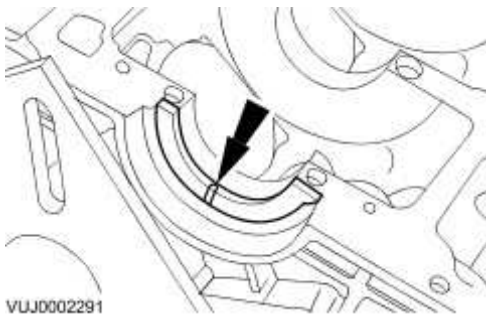
Reseal oil passage blanking plugs, as necessary.

3 NOTE:

The main bearings are precision selective fit. For additional information, refer to <<303-00>>.

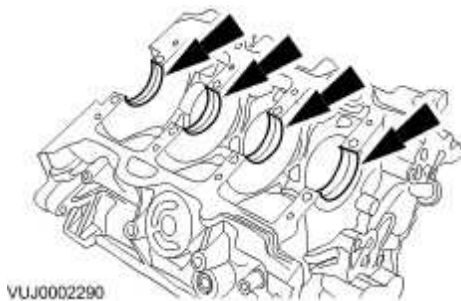
Install the upper crankshaft thrust washer.

- Align assembly tab on thrust bearing to machining spot face on cylinder block.



4 . Install the upper crankshaft main bearings.

- Lubricate the bearings and thrust washer.

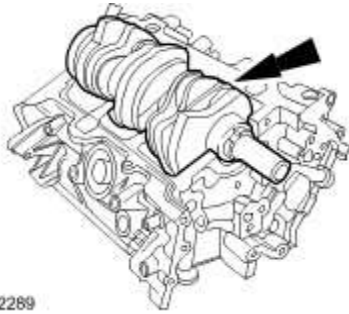


5.



CAUTION: Avoid damage to any crankshaft journal bearing surfaces.

Install the crankshaft.



VUJ0002289

6 **NOTE:**

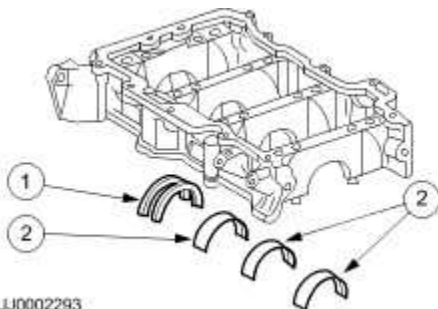
Push the crankshaft rearward prior to installation of upper thrust bearings.

NOTE:

Visually inspect the bearings to verify that the bearing oiling holes align with cylinder block oil feed holes.

Install the lower crankshaft bearings into the cylinder block.

1. Install the lower crankshaft thrust main bearing into lower cylinder block.
 2. Install the lower crankshaft main bearings into lower cylinder block.
- Lubricate the bearings and thrust washer.



VUJ0002293

7 NOTE:

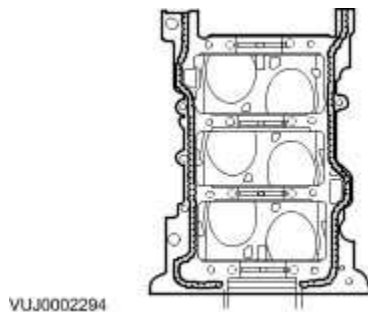
Sealant application must stop 6 mm from the rear crankshaft bore on each side.

NOTE:

Install lower cylinder block and tighten all bolts to specification within four minutes of applying sealer.

Apply a bead of sealant to the cylinder block housing.

- Use Silicone gasket and sealant.



8



CAUTION: Make sure all dowels are fully seated into lower cylinder block prior to tightening the bolts.

NOTE:

Before installing the bolts lightly seat the crankshaft forward.

NOTE:

Do not lubricate the lower cylinder block bolts.

NOTE:

Loosely install the lower cylinder block bolts.

NOTE:

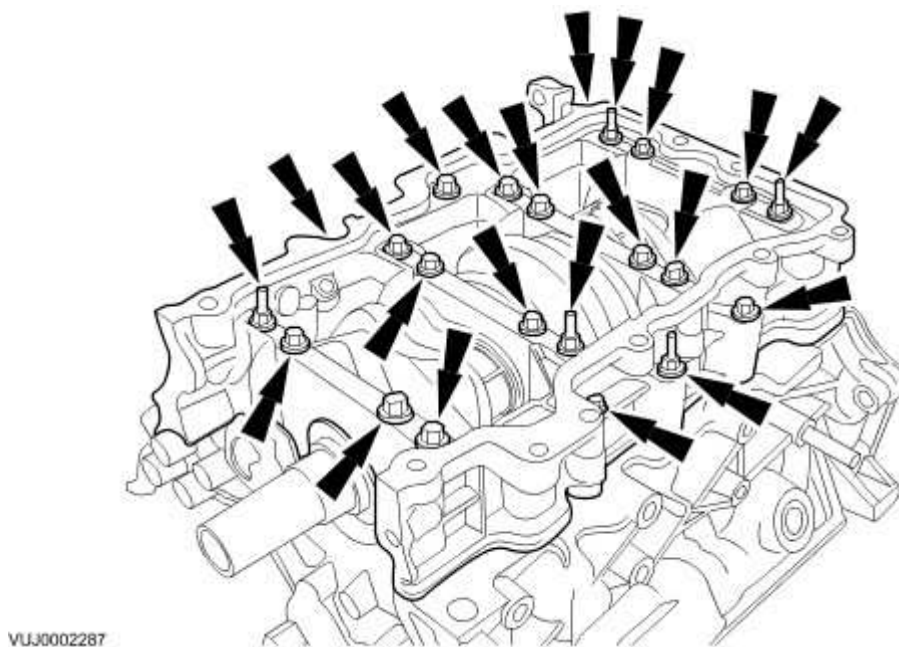
Do not rotate crankshaft until all bolts are tightened to specification.

NOTE:

Bolts must be tightened within 4 minutes of applying sealant.

Install the lower cylinder block on the cylinder block.

- Push crankshaft rearward to seat the crankshaft thrust washer.



9.



CAUTION: Bolts 1 through 16 are tighten-to-yield and must be replaced.

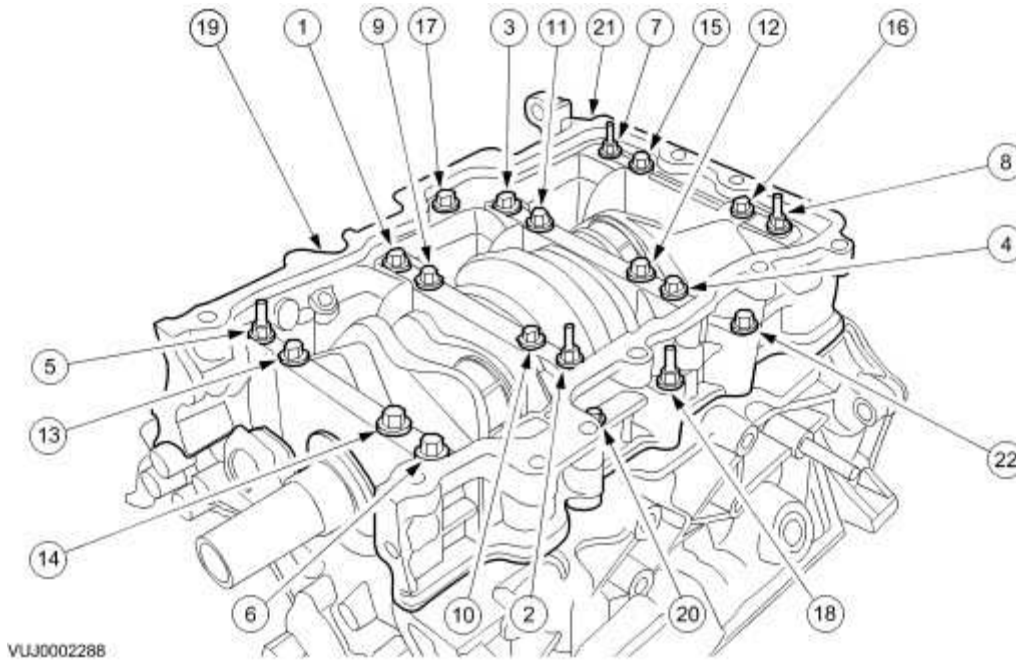
NOTE:

Tighten the bolts in the indicated sequence in four stages.

Complete the tightening sequence.

- Stage 1: Bolts 1-8, 25 Nm

- Stage 2: Bolts 9-16, 40 Nm
- Stage 3: Bolts 1-16, 90°
- Stage 4: Bolts 17-22, 25 Nm
- Verify the crankshaft rotates freely.

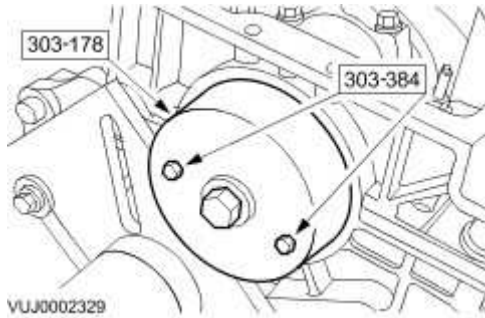


10 . Remove excess sealant which may squeeze out at the front cover sealing surface.

11 NOTE:

Alternate bolt tightening to correctly seat the crankshaft rear oil seal until it is flush with the cylinder block.

Using the special tools, install the crankshaft rear oil seal.



12



CAUTION: Use appropriate protection to prevent damage to the crankshaft bearing journals and cylinder bore surfaces.

Install special tools to the connecting rods.

- Position the crankshaft journal at the bottom of the stroke.

13 **NOTE:**

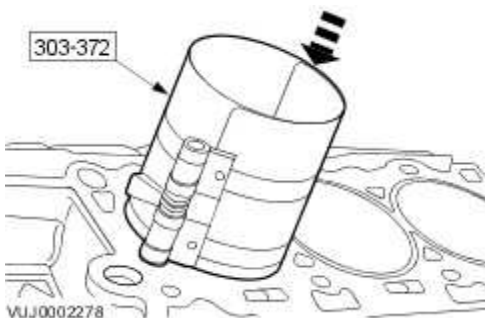
Make sure the piston ring gaps are positioned at different locations opposite the thrust side of the piston before installation.

NOTE:

Install pistons with arrow to front of engine.

Using the special tool compress the rings and install the piston and connecting rod.

- Lubricate all piston components.



14



CAUTION: When assembling the connecting rods and connecting rod caps, it is imperative that bearing slots and tangs be located on the same side of the connecting rods.



CAUTION: Connecting rod bolts are torqued to yield and must be replaced.

NOTE:

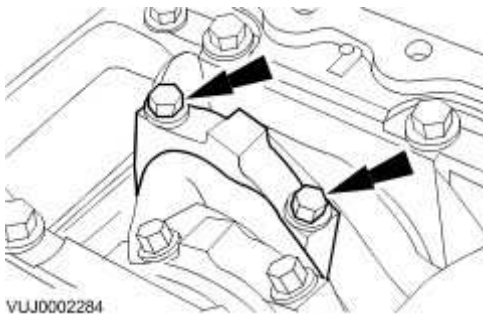
Remove the special tools from the connecting rods.

NOTE:

Tighten the bolts in the indicated sequence in three stages.

Position the connecting rod cap on the appropriate connecting rod.

- Stage 1: 23 Nm
- Stage 2: 43 Nm
- Stage 3: 105°



15 . Rotate the crankshaft to check correct operation.

16



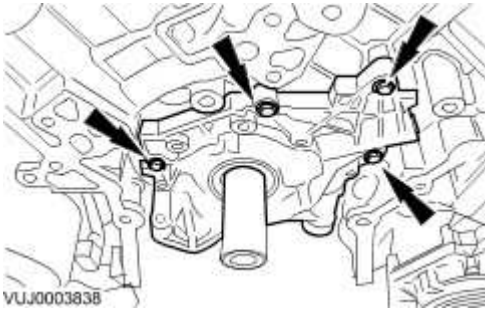
CAUTION: Install the oil pump flush to the cylinder block for correct sealing.



CAUTION: Rotate the inner rotor of the oil pump to align with the flats on the crankshaft before installation.

Install the oil pump.

- Install a new O-ring seal.
- Tighten to 10 Nm.



17 .



CAUTION: Oil pan baffle nuts are tightened to yield and must not be reused.

NOTE:

Engine inverted for clarity.

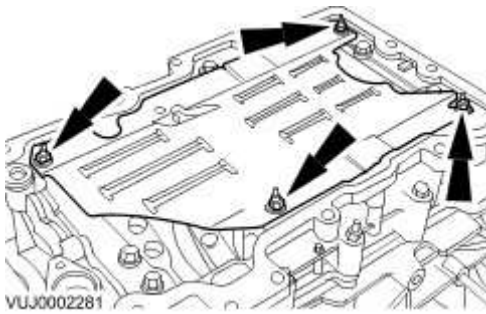
NOTE:

Tighten the nuts in the indicated sequence in two stages.

Install the oil pan baffle.

- Stage 1: 5 Nm

- Stage 2: 45°

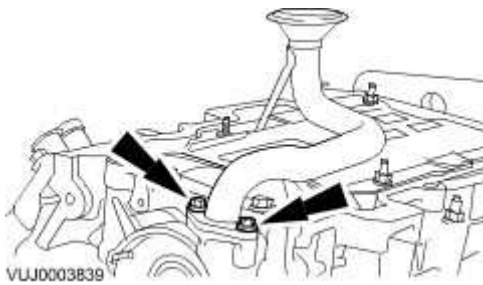


18 . NOTE:

Engine inverted for clarity.

Install the oil pump tube.

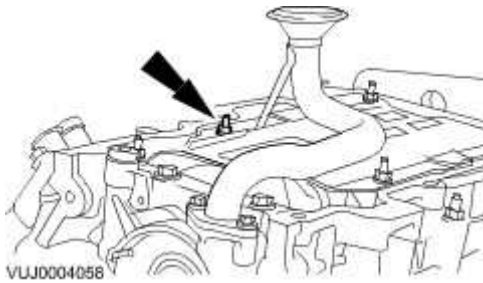
- Install a new O-ring seal.
- Tighten to 10 Nm.



19 . NOTE:

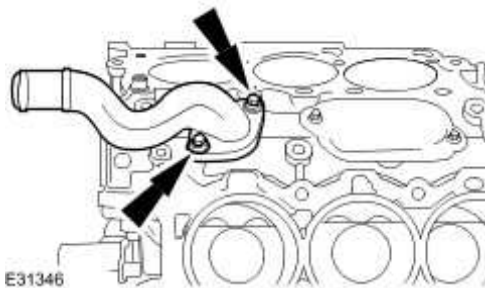
Engine inverted for clarity.

Tighten to 5 Nm + 45°.



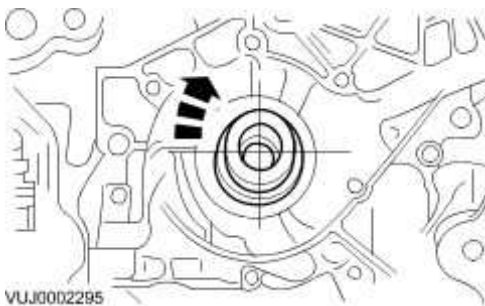
20 . Install the engine coolant housing.

- Install new O-ring seals.
- Tighten to 25 Nm.



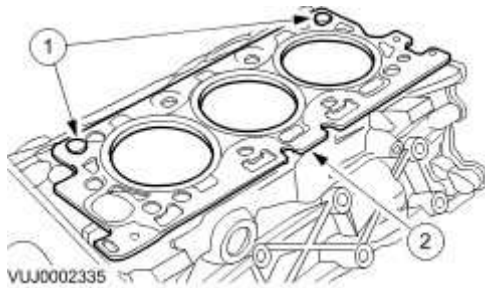
21 . Position the crankshaft.

- Turn the crankshaft until the key is in the 11 O'clock position.
- Remove the crankshaft pulley bolt and washer.



22 . Install a new cylinder head gasket (left-hand shown - right-hand similar).

3. Make sure the cylinder head dowels are correctly located.
4. Install a new cylinder head gasket.

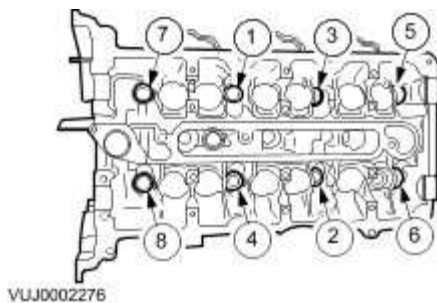


23 . NOTE:

Install the bolts in the indicated sequence.

Install the left-hand cylinder head.

- Tighten to 30 Nm.
- Tighten 90°.
- Loosen 360°.
- Tighten to 30 Nm.
- Tighten 90°.
- Tighten 90°.

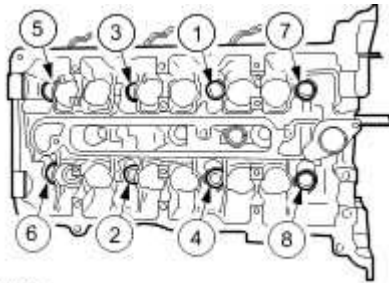


24 . **NOTE:**

Install the bolts in the indicated sequence.

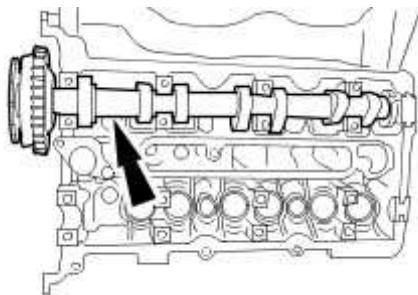
Install the right-hand cylinder head.

- Tighten to 30 Nm.
- Tighten 90°.
- Loosen 360°.
- Tighten to 30 Nm.
- Tighten 90°.
- Tighten 90°.



VUJ0002274

25 . Install the left-hand inlet camshaft.



E36669

26



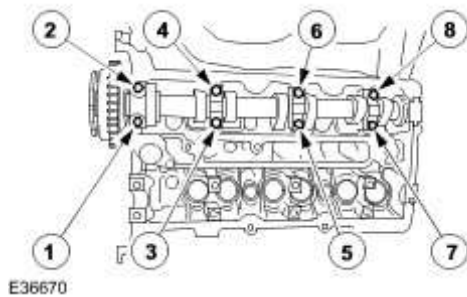
CAUTION: Do not install the cylinder head camshaft journal thrust caps until the camshaft journal caps are installed or damage to the thrust caps may occur.

NOTE:

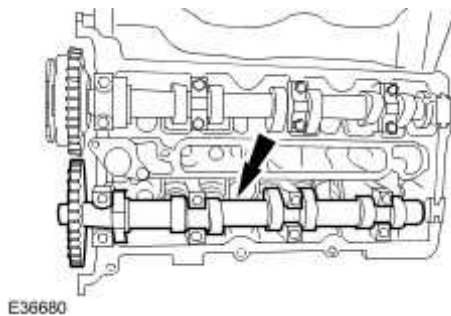
Lubricate the camshafts and the camshaft bearing caps with oil WSE-M2C908-A or equivalent meeting Jaguar specification prior to installation.

Install the left-hand inlet camshaft bearing cap bolts evenly.

- Install the inlet camshaft bearing caps.
- Tighten to 10 Nm.



27 . Install the left-hand exhaust camshaft.



28



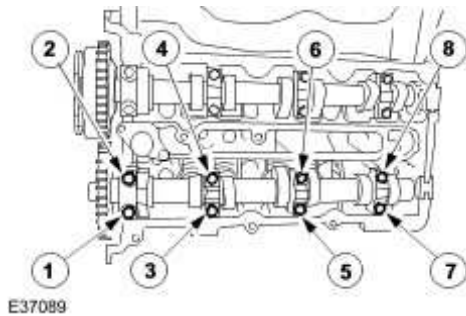
CAUTION: Do not install the cylinder head camshaft journal thrust caps until the camshaft journal caps are installed or damage to the thrust caps may occur.

NOTE:

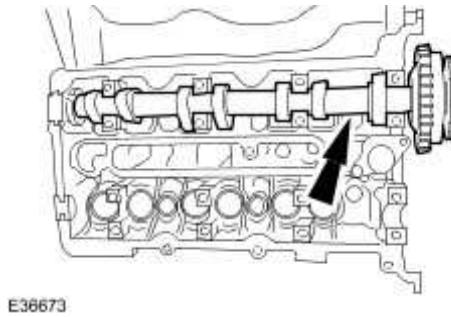
Lubricate the camshafts and the camshaft bearing caps with oil WSE-M2C908-A or equivalent meeting Jaguar specification prior to installation.

Install the left-hand exhaust camshaft bearing cap bolts evenly.

- Install the exhaust camshaft bearing caps.

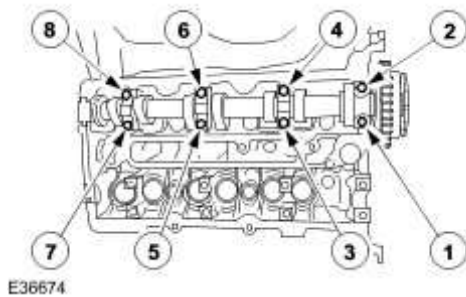


29 . Install the right-hand inlet camshaft.

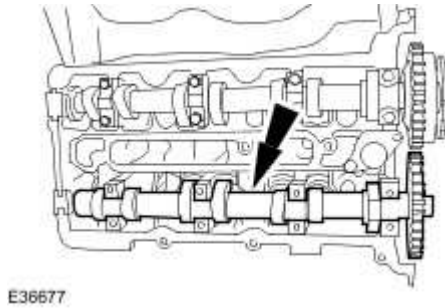


30 . Install the right-hand inlet camshaft bearing cap bolts evenly.

- Install the inlet camshaft bearing caps.

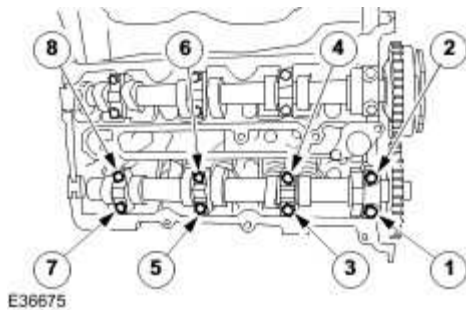


31 . Install the right-hand exhaust camshaft.

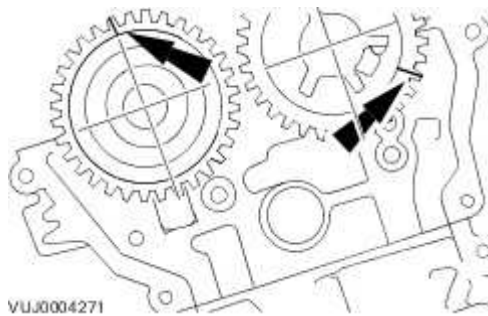


32 . Install the right-hand exhaust camshaft bearing cap bolts evenly.

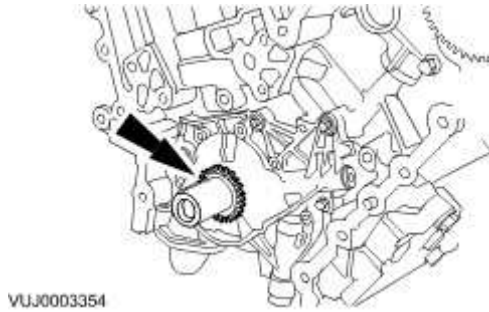
- Install the exhaust camshaft bearing caps.



33 Rotate the right-hand intake camshaft clockwise until the camshaft sprocket alignment mark is at the 5 O'clock position and rotate the right-hand exhaust camshaft sprocket clockwise until the camshaft sprocket alignment mark is at the 12 O'clock position.

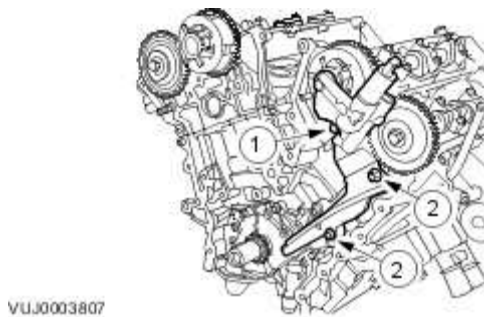


34 . Install the crankshaft inner sprocket.



35 . Install the left-hand timing chain outer guide.

- Tighten the retaining bolts in the sequence shown in two stages.
- Stage 1: Tighten bolt 1 to 25 Nm.
- Stage 2: Tighten bolts 2 to 25 Nm.



36



CAUTION: Make sure the crankshaft keyway is at the 11 O'clock position, the alignment mark on the left-hand intake camshaft sprocket is at the 9 O'clock position and the alignment mark on the left-hand exhaust camshaft sprocket is at the 2 O'clock position.



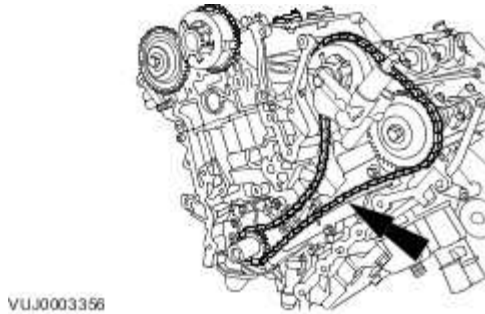
CAUTION: Make sure the timing chain alignment marks are correctly positioned to the crankshaft sprocket and camshaft sprocket alignment marks.



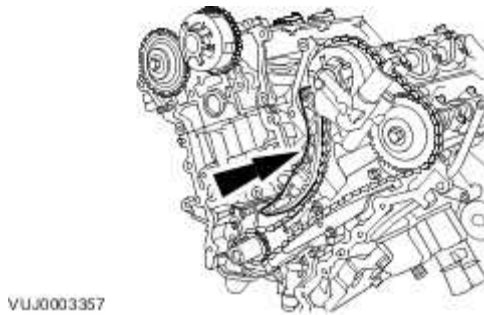
CAUTION: Make sure the timing chain slack is on the tensioned side of the timing


chain.

Install the left-hand timing chain.

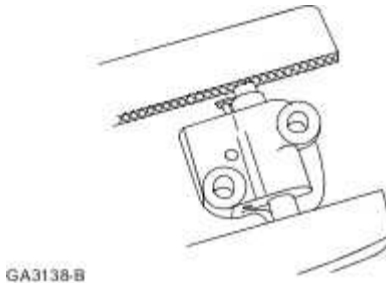



37 . Install the left-hand timing chain inner guide.



- 38  **CAUTION:** Use suitable protective covers on the vice jaws to protect the timing chain tensioner.

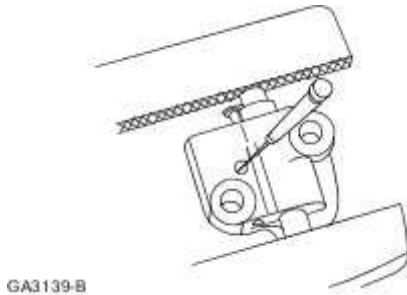
Secure the left-hand timing chain tensioner in the vice jaws.



- 39  **CAUTION:** During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the

ratchet stem will result.

Using a suitable tool, hold the left-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



40 NOTE:

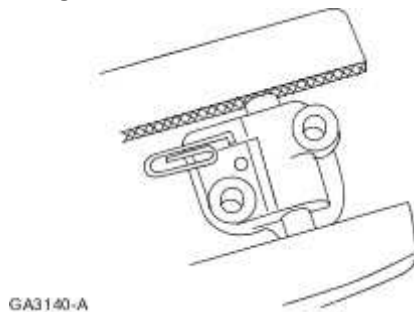
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the left-hand timing chain tensioner.

41 NOTE:

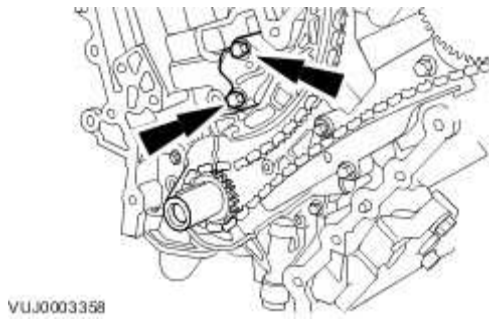
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the left-hand timing chain tensioner piston.



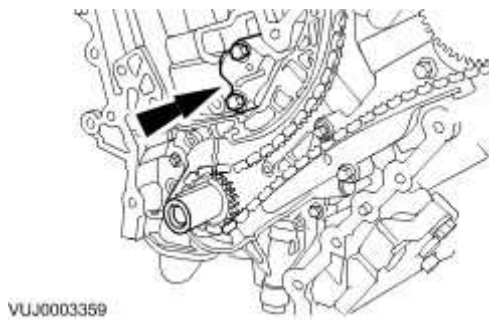
42 . Install the left-hand timing chain tensioner.

- Tighten to 25 Nm.

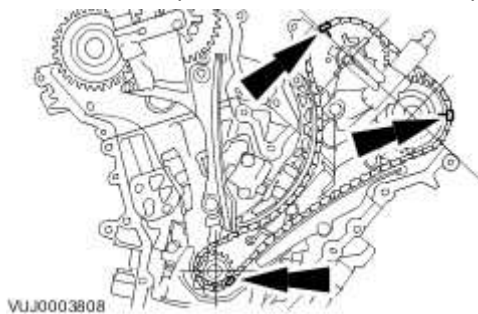


43 . Release the tension in the left-hand timing chain tensioner.

- Remove the retaining tool.



44 Make sure the left-hand timing chain alignment marks have remained correctly positioned to the camshaft sprocket and crankshaft sprocket alignment marks.



45



CAUTION: Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.

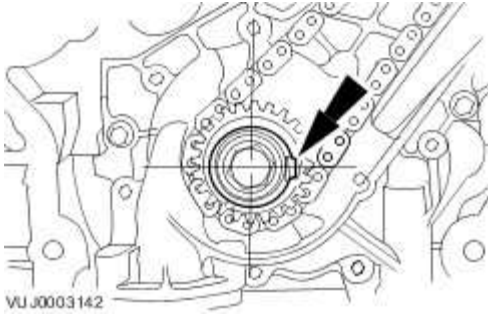
Install the crankshaft pulley retaining bolt and washer.

46



CAUTION: Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.

Rotate the crankshaft clockwise until the crankshaft keyway is at the 3 O'clock position.



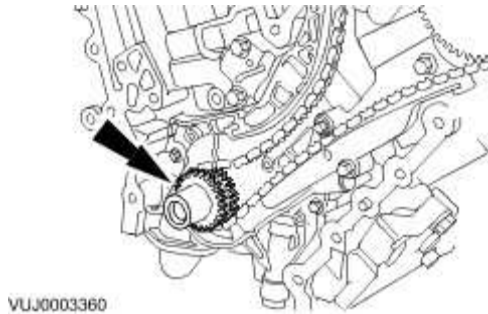
47



CAUTION: Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.

Remove the crankshaft pulley retaining bolt and washer.

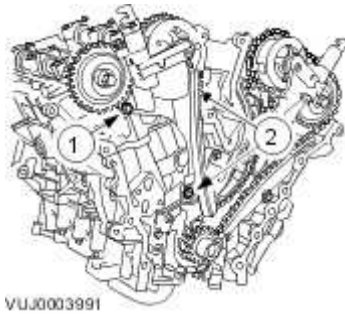
48 . Install the crankshaft outer sprocket.



49 . Install the right-hand timing chain inner guide.

- Tighten the retaining bolts in the sequence shown in two stages.

- Stage 1: Tighten bolt 1 to 25 Nm.
- Stage 2: Tighten bolts 2 to 25 Nm.



50



CAUTION: Make sure the crankshaft keyway is at the 3 O'clock position, the alignment mark on the right-hand intake camshaft sprocket is at the 5 O'clock position and the alignment mark on the right-hand exhaust camshaft sprocket is at the 12 O'clock position.

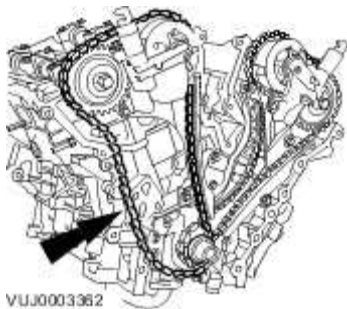


CAUTION: Make sure the timing chain alignment marks are correctly positioned to the crankshaft sprocket and camshaft sprocket alignment marks.



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

Install the right-hand timing chain.



51 . Install the right-hand timing chain outer guide.

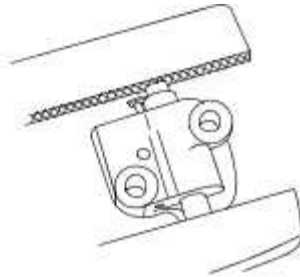


52



CAUTION: Use suitable protective covers on the vice jaws to protect the timing chain tensioner.

Secure the right-hand timing chain tensioner in the vice jaws.

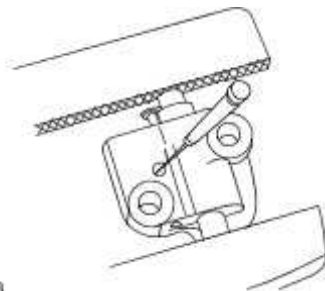


53



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the right-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



54 **NOTE:**

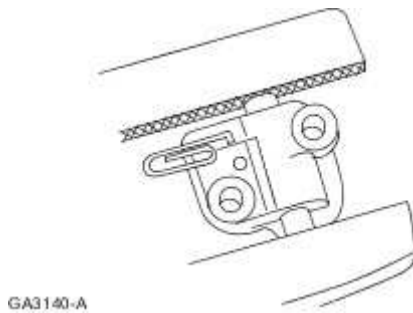
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the right-hand timing chain tensioner.

55 **NOTE:**

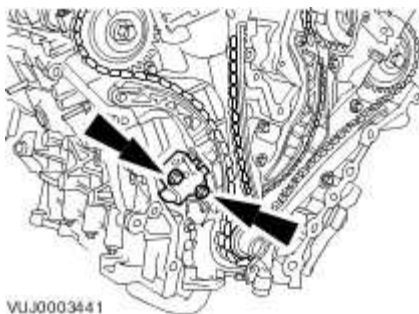
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the right-hand timing chain tensioner piston.



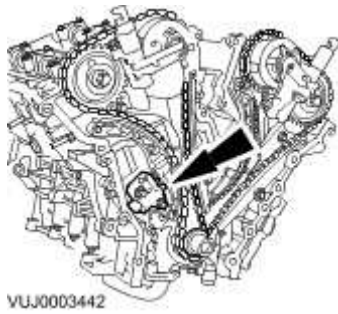
56 . Install the right-hand timing chain tensioner.

- Tighten to 25 Nm.



57 . Release the tension in the right-hand timing chain tensioner.

- Remove the retaining tool.

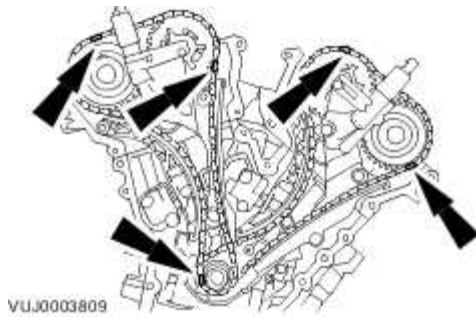


58



CAUTION: Make sure the right-hand timing chain alignment marks have remained correctly positioned to the camshaft sprocket and crankshaft sprocket alignment marks.

Make sure all the timing chain alignment marks are in the positions shown.

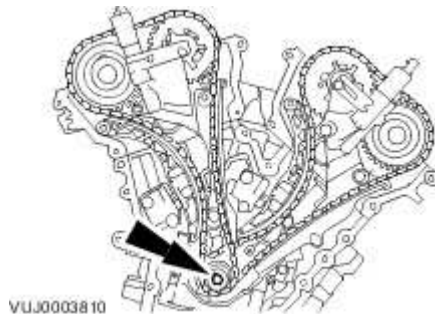


59



CAUTION: Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.

Install the crankshaft pulley retaining bolt and washer.



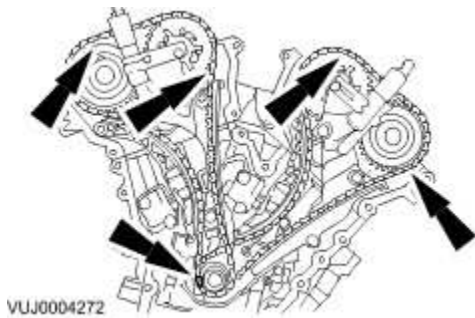
60



- **CAUTION: Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.**

Check the engine valve timing is correctly set.

- Rotate the crankshaft two complete turns clockwise. Make sure the alignment marks on the camshaft sprockets are in the positions shown when the crankshaft keyway is at the 11 O'clock position.

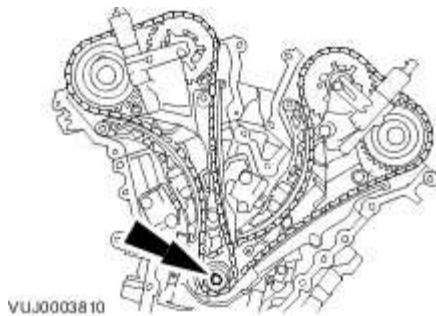


61



- **CAUTION: Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.**

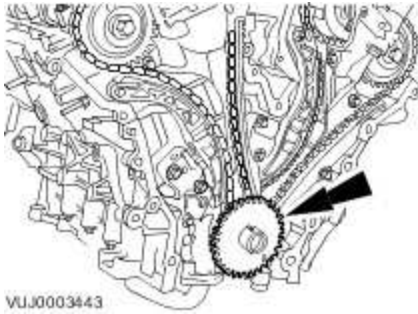
Remove the crankshaft pulley retaining bolt and washer.



62 **NOTE:**

- Make sure the CKP sensor pulse wheel is correctly installed with the teeth pointing outwards.

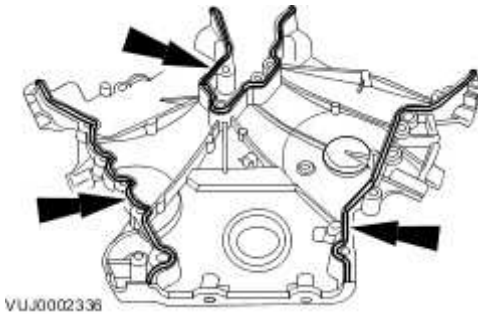
Install the CKP sensor pulse wheel.



63 . Carry out a valve clearance check.

For additional information, refer to Valve Clearance Check (12.29.47)

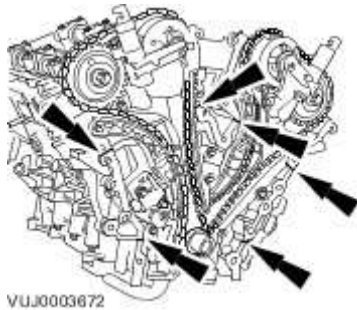
64 . Install new front timing cover gaskets.



65 **NOTE:**

Prior to applying sealer clean the front cover to engine block and cylinder head sealing surfaces with metal surface cleaner.

Apply a 6 mm diameter dot of silicone sealant meeting Jaguar specification to the indicated locations.

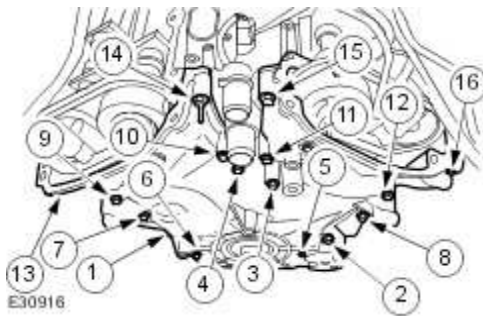


66 NOTE:

The engine front cover retaining bolts numbered 3,4,10 and 11 are longer than the retaining bolts numbered 1,2,5,6,7,8,9,12,13,15 and 16. The retaining bolt numbered 14 is a retaining bolt with a stud head.

Install the engine front cover, completing the tightening sequence.

- Tighten to 25 Nm.



67 NOTE:

Apply an 10 mm dot of silicone gasket and sealant meeting Jaguar specification to the engine block and front cover mating surface.

NOTE:

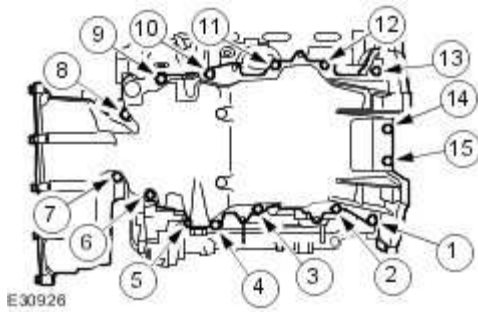
Loosely install the oil pan to transmission housing bolts.

NOTE:

Tighten all oil pan retaining bolts within six minutes of applying the sealer.

Install the oil pan rear retaining bolts.

- Complete the tightening sequence.
- Tighten to 25 Nm.

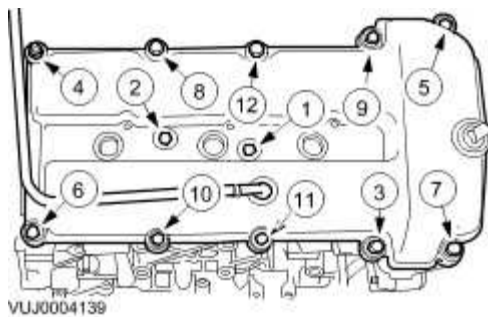


68 . **NOTE:**

Right-hand shown, left-hand similar.

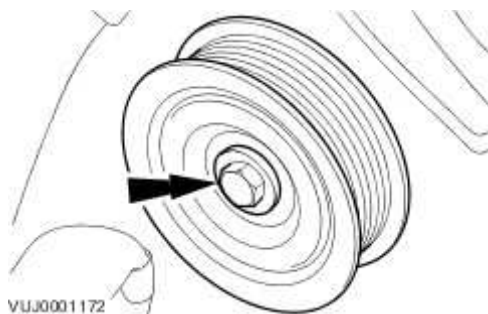
Install the valve covers.

- Complete the tightening sequence.
- Tighten to 10 Nm.



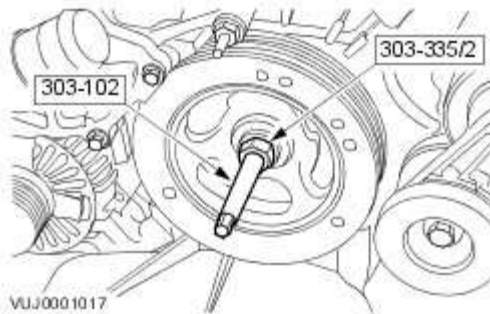
69 . Install the left-hand idler pulley.

- Tighten to 25 Nm.



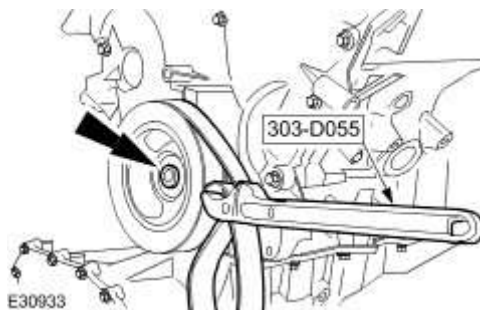
70 Using the special tools, install the crankshaft pulley.

- Coat the crankshaft pulley keyway with silicone gasket sealant meeting Jaguar specification.
- Coat the sealing surfaces of the crankshaft pulley with silicone gasket sealant meeting Jaguar specification.



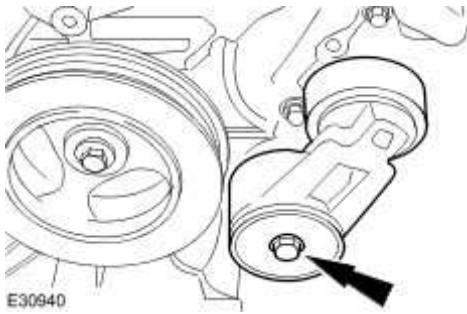
71 . Install the special tool, install the crankshaft pulley retaining bolt.

- Torque to 120 Nm.
- Loosen the bolt (minimum 1 turn).
- Torque to 50 Nm.
- Angle Torque to 90°.



72 . Install the accessory drive belt tensioner.

- Tighten 45 Nm.

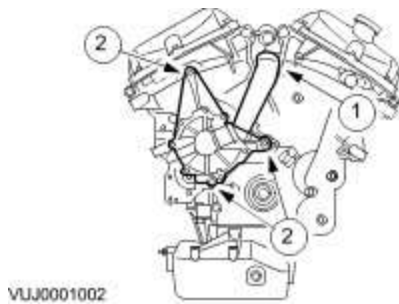


73 . Install the water pump and coolant hose assembly.

5. Attach the hose.

6. Install the water pump and coolant hose assembly.

- Tighten to 25 Nm.

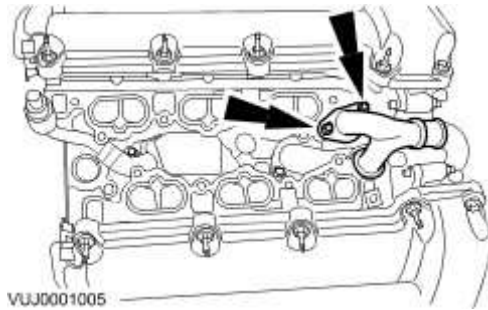


74 . **NOTE:**

Install new coolant crossover O-ring seals.

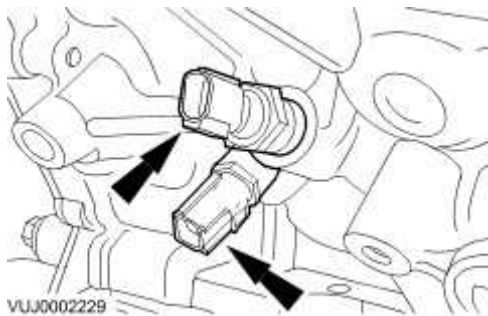
Install the coolant crossover tube.

- Install new O-ring seals.
- Tighten to 10 Nm.



75 . Install the engine oil pressure and oil temperature sensors.

- Tighten to 14 Nm.

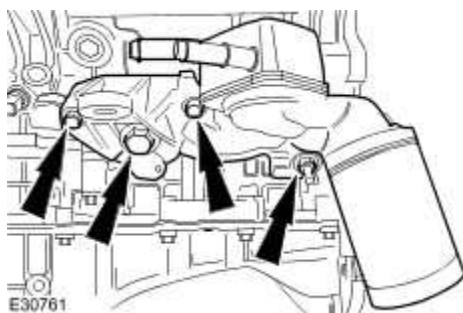


76 . **NOTE:**

Install new O-ring seals.

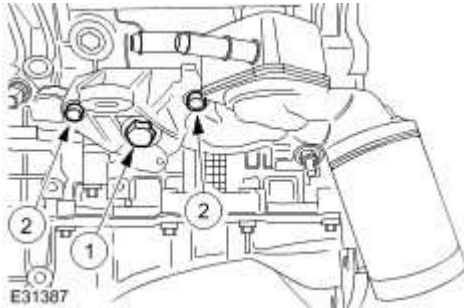
Install the oil filter housing assembly.

- Tighten all oil filter housing retaining bolts to 25 Nm.

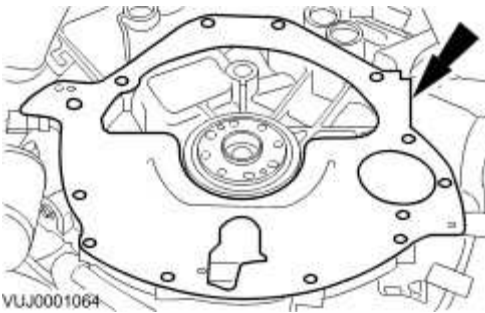


77 . Tighten the oil filter housing assembly retaining bolts in sequence.

- Tighten to 150 Nm.
- Tighten to 40 Nm + 90 degrees.

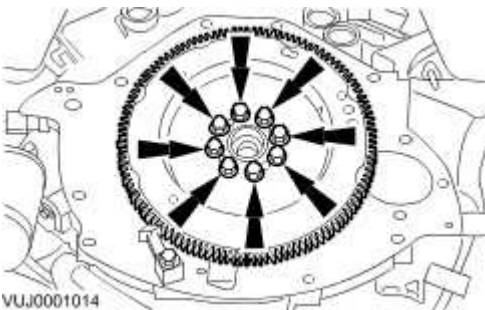


78 . Install the engine rear backing plate.



79 . Install the flexplate.

- Prevent the engine from rotating.
- Tighten to 80 Nm.

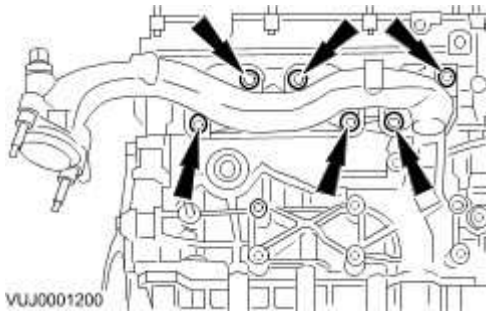


80 . NOTE:

Right-hand shown, left-hand similar.

Install the exhaust manifolds.

- Tighten to 25 Nm.

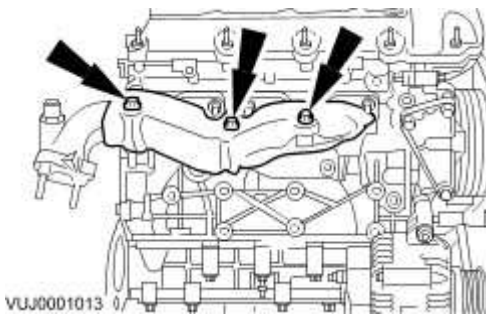


81 . NOTE:

Right-hand shown, left-hand similar.

Install the exhaust manifold heat shields.

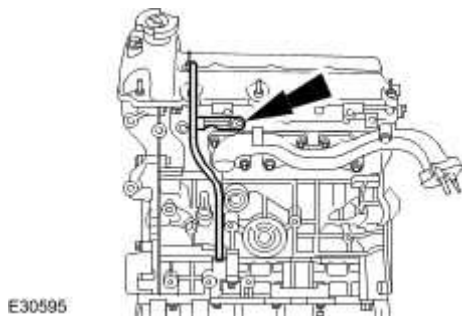
- Tighten to 10 Nm.



82 . NOTE:

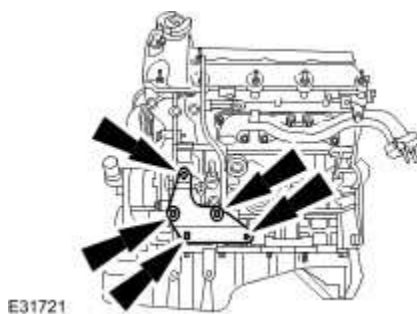
Install a new O-ring seal.

Install the oil level indicator tube.



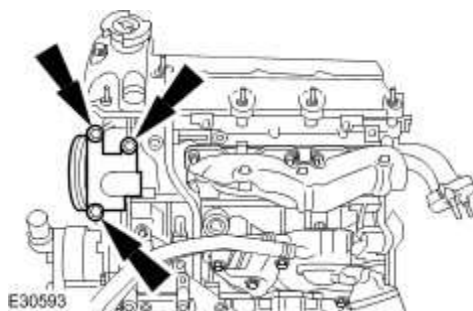
83 . Install the A/C compressor mounting bracket.

- Tighten to 25 Nm.



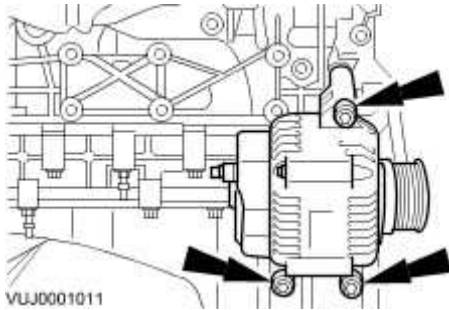
84 . Install the power steering pump.

- Tighten to 25 Nm.



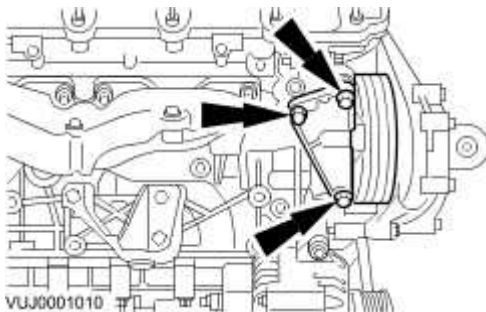
85 . Install the generator.

- Tighten to 48 Nm.



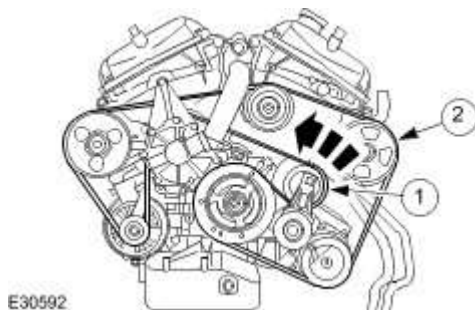
86 . Install the right-hand idler pulley.

- Tighten to 25 Nm.



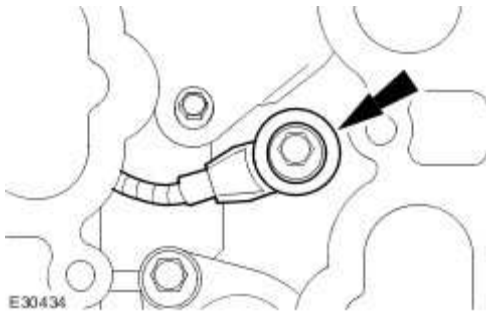
87 . Install the accessory drive belt.

- Use a 3/8 inch drive bar to release the accessory drive belt tensioner.
- Install the accessory drive belt.

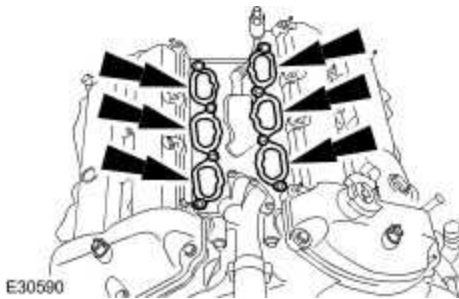


88 . Install the left-hand knock sensor.

- Tighten to 25 Nm.

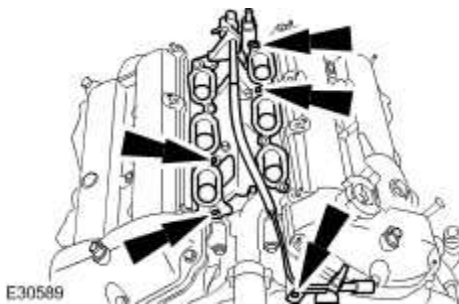


89 . Install new lower intake manifold gaskets.



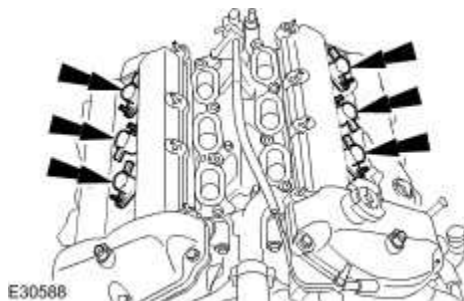
90 . Install the lower intake manifold and injector supply manifold.

- Tighten to 10 Nm.



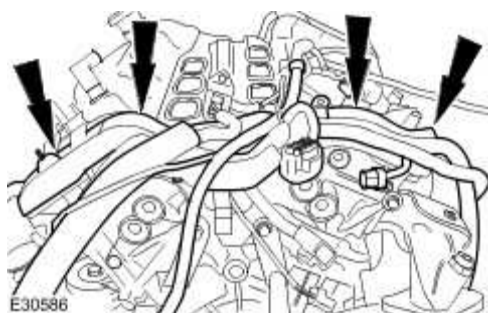
91 . Install the ignition coils.

- Tighten to 10 Nm.



92 . Install the engine wiring harness.

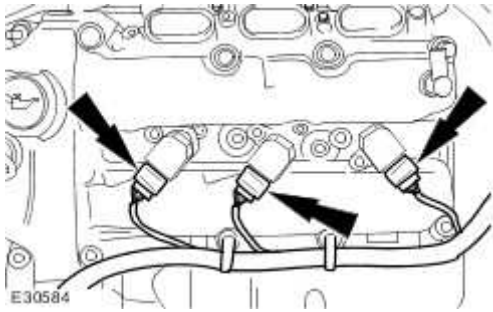
- Tighten to 10 Nm.



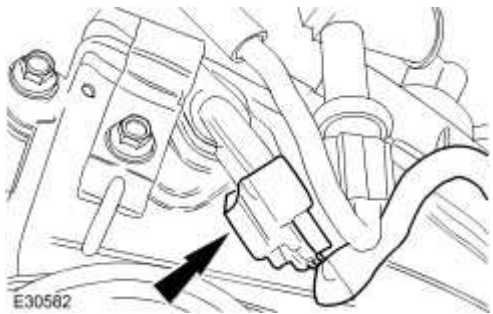
93 . Connect the engine wiring harness electrical connectors.



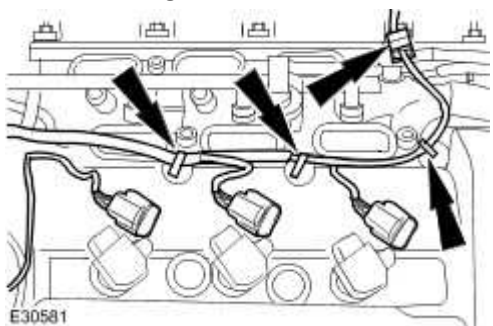
94 . Connect the left-hand ignition coils.



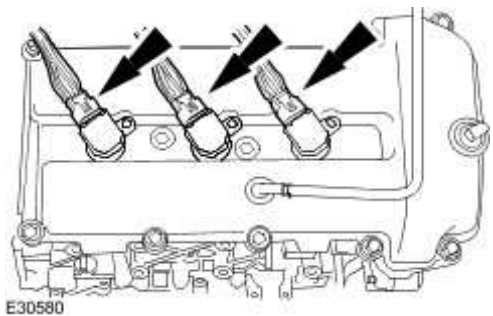
95 . Connect the left-hand camshaft position sensor.



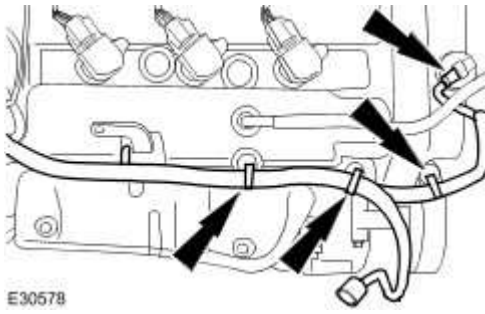
96 . Attach the engine harness.



97 . Connect the right-hand ignition coils.



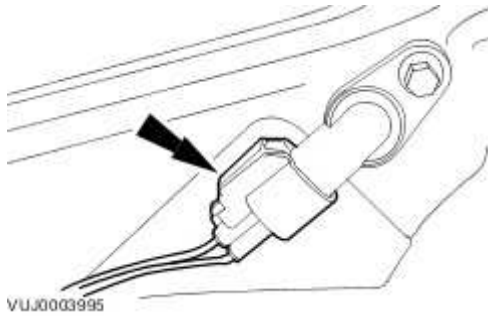
98 . Attach the engine harness.



99 . Attach the engine harness retaining bracket.



100 . Disconnect the right-hand camshaft position sensor.

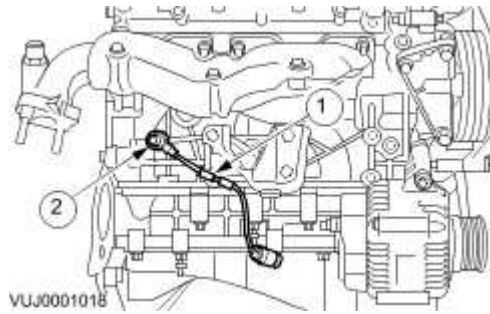


101 . Install the rear knock sensor.

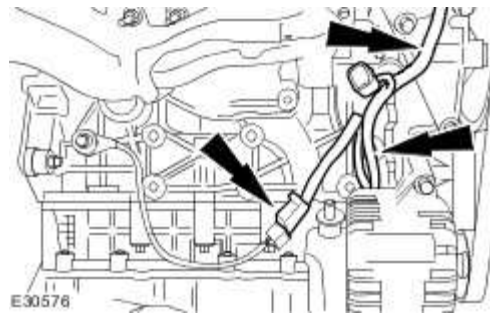
7. Attach the knock sensor wiring harness.

8. Install the rear knock sensor.

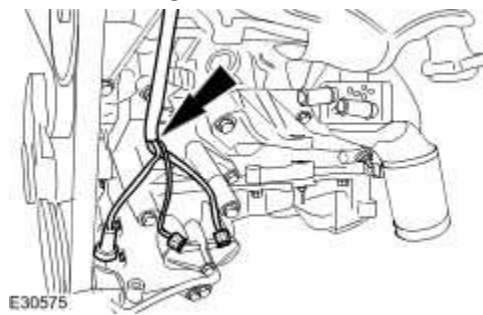
- Tighten to 25 Nm.



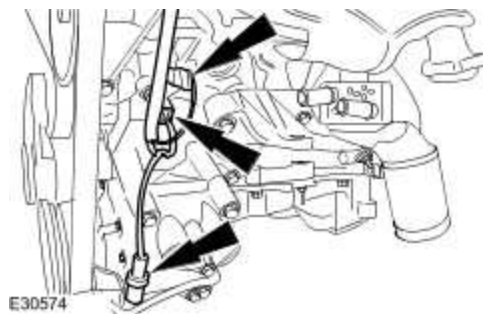
102 . Attach engine harness.



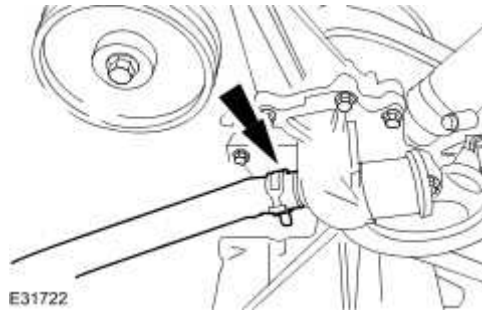
103 . Attach the engine harness.



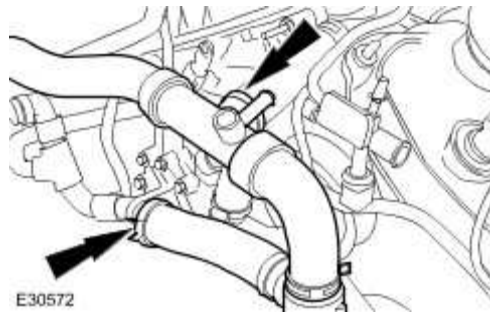
104 . Connect the electrical connectors.



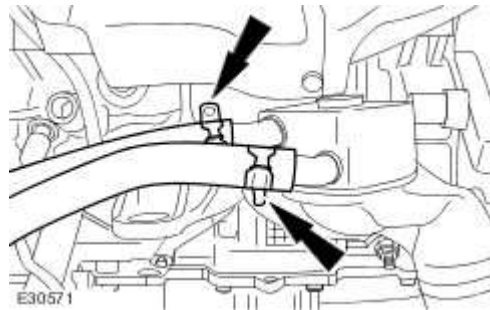
105 . Install the coolant hose.



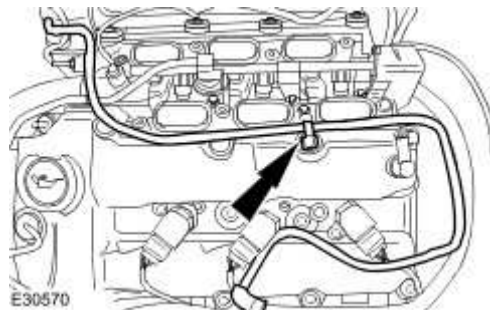
106 . Install the coolant hose.



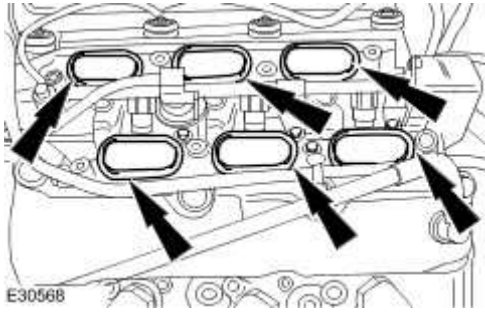
107 . Connect the oil cooler coolant hoses.



108 . Install the evaporative emission purge valve hose.



109 . Install new intake manifold gaskets.

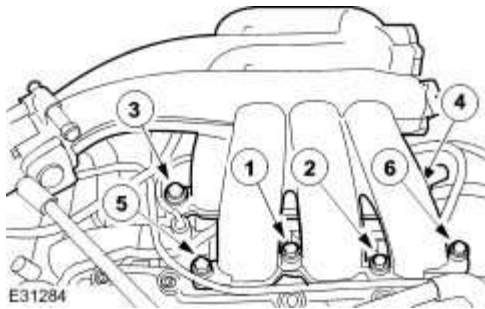


110 **NOTE:**

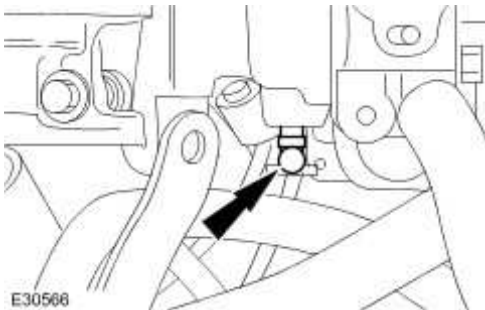
The intake manifold retaining bolts in position 1,2,3 and are longer than the retaining bolts in position 4,5 and 6.

Install the intake manifold.

- Tighten to 10 Nm.

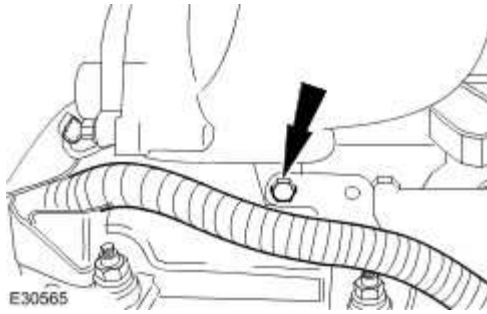


111 . Connect the evaporative emission canister purge valve transfer pipe.

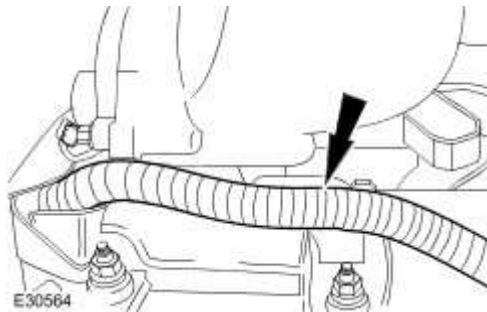


112 . Attach the intake manifold rear retaining bracket.

- Tighten to 10 Nm.

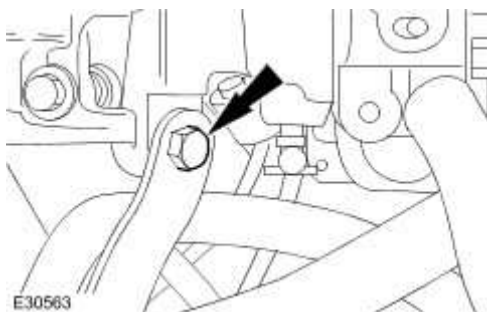


113 . Attach the engine wiring harness from the intake manifold rear retaining bracket.



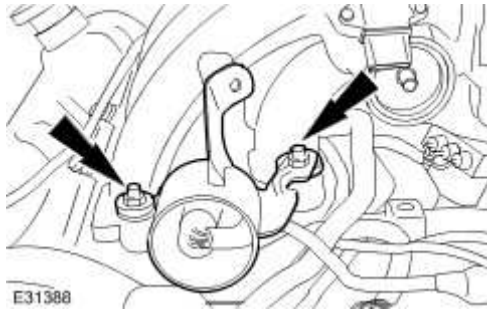
114 . Attach the intake manifold front retaining bracket.

- Tighten to 10 Nm.

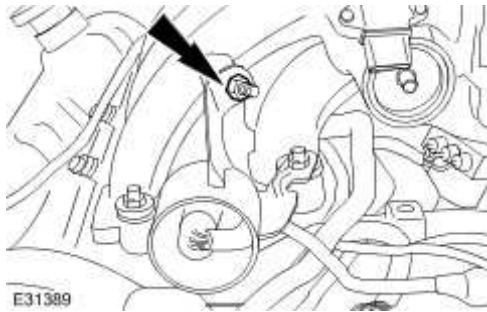


115 . Install the fuel pressure sensor bracket.

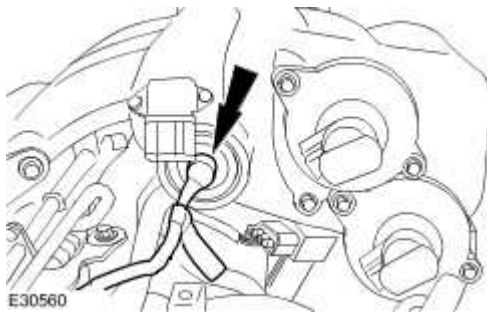
- Tighten to 10 Nm.



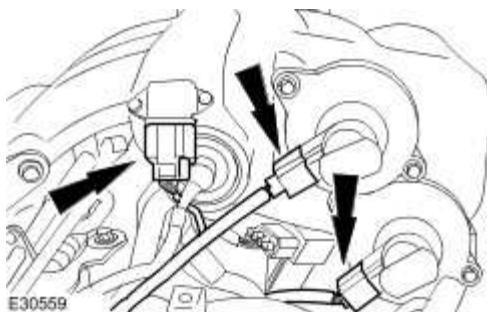
116 . Tighten to 7 Nm.



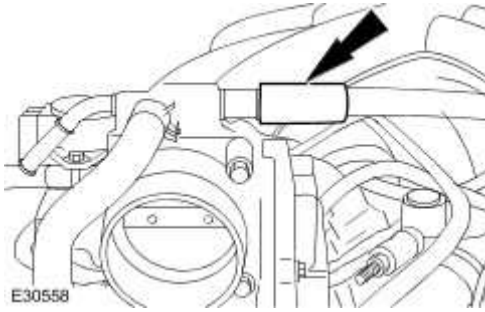
117 . Connect the fuel pressure sensor vacuum hose.



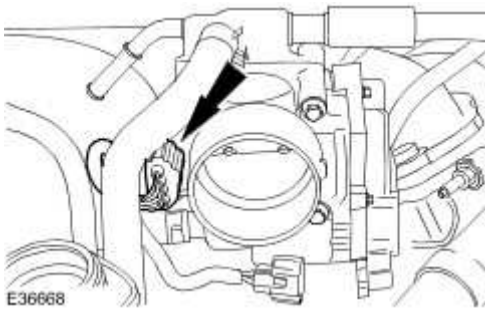
118 . Connect the electrical connectors.



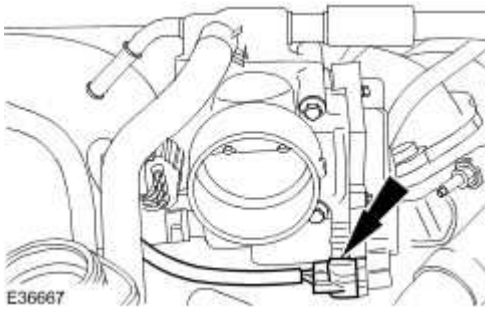
119 . Connect the positive crankcase ventilation (PCV) hose.



120 . Connect the throttle position sensor electrical connector.



121 . Connect the throttle motor electrical connector.



303-01B : Engine – 3.5L/4.2L

Specifications

Specifications

Lubricants, Fluids, Sealers and Adhesives

Description	Specification
Engine oil, SAE 5W-30	WSS-M2C-912A
Engine assembly lubricant	SQM-2C9003 AA EP90
Sealant	WSS M4G 320-A3
Hose assembly surfactant	ESE-M99 B144-B

Capacities

Description	Liters
Engine oil, initial fill	6.8
Engine oil, service fill with oil filter change	6.5

Cylinder Head

Item	Specification
Maximum permitted cylinder head warp (mm)	0.125

Torque Specifications

Description	Nm	lb-ft	lb-in
Accessory drive belt idler pulley retaining bolt	25	18	-
Accessory drivebelt tensioner retaining bolt	40	30	-
Air conditioning compressor retaining bolts	25	18	-
Air conditioning compressor mounting bracket retaining bolts	25	18	-
A/C manifold retaining bolt	20	15	-
Camshaft bearing caps retaining bolts	10	7	-
Camshaft position sensor retaining bolt	7	-	62

Connecting rod retaining bolts	A	-	-
Crankshaft pulley retaining bolt	377	278	-
Crankshaft position sensor retaining bolt	10	7	-
Cylinder head retaining bolts	A	-	-
Drive plate retaining bolts	A	-	-
Engine front cover retaining bolts	13	10	-
Engine mounting bracket retaining bolts	40 (+/- 15%)	30 (+/- 15%)	-
Engine mount retaining nuts to crossmember	55 (+/- 15%)	40 (+/- 15%)	-
Engine mount bracket to engine mount retaining nuts	63 (+/- 15%)	46 (+/- 15%)	-
Engine wiring harness retaining bracket	10	7	-
Exhaust manifold heat shield retaining bolts	3	-	27
Exhaust manifold heat shield retaining bolt to cylinder head	50	37	-
Exhaust manifold retaining bolts	20	15	-
Flexiplate retaining bolts	A	-	-
Front engine cover retaining bolts	12	9	-
Generator lower retaining bolt	40	30	-
Generator upper retaining bolt	21	15	-
Generator lower retaining bolt	40	30	-
Generator mounting bracket retaining bolts	45	33	-
Ignition coil retaining bolts	5	4	-
Intake manifold assembly retaining bolts	22	16	-
Intake camshaft sprocket retaining bolt			
Stage 1	20	15	-
Stage 2	Further 90 degrees	Further 90 degrees	-
Knock sensor retaining nuts	20	15	-
Lower cylinder block to the upper cylinder block retaining bolts	A	-	-
Oil cooler to oil filter housing retaining bolt	20	15	-
Oil filter housing retaining bolts	21	15	-
Oil level indicator tube retaining nut	6	-	51
Oil pan retaining bolts	12	9	-
Oil pump to engine block retaining bolts	12	9	-
Oil pan drain plug	25	18	-
Oil separator retaining bolts	12	9	-
Oil filter	18	13	-
Piston cooling jet retaining bolt	9	-	80

Power steering bracket retaining bolts	25	18	-
Power steering pump retaining bolts	25	18	-
Primary timing chain tensioner retaining bolts	12	9	-
Primary timing chain tensioner guide retaining bolts	12	9	-
Secondary timing chain tensioner retaining bolts	12	9	-
Spark plugs	27	20	-
Starter motor retaining bolts	45	33	-
Thermostat housing retaining bolts	10	7	-
Water pump retaining bolts	12	9	-
Water pump pulley retaining bolts	A	-	-
Upper oil pan retaining bolts	21	15	-
Valve cover retaining bolts	10	7	-
Variable camshaft timing (VCT) oil control unit housing retaining bolts	22	16	-
VCT sprocket centre retaining bolt			
Stage 1	20	15	-
Stage 2	Further 90 degrees	Further 90 degrees	-
A = refer to the procedure for the correct torque sequence	-	-	-

Valve Clearance Adjustment (12.29.48)

Special Service Tools



Tappet hold down tool
303-540



Fan nozzle, air gun
303-590

1. Remove the left-hand valve cover.
2. Remove the right-hand valve cover.
3. Use a cloth to wipe away as much oil as possible from the tappet and shim.
- 4.



CAUTION: Rotating the crankshaft in a counterclockwise direction may cause engine damage. Crankshaft journals are directionally machined. Rotating the crankshaft counterclockwise can raise burrs on bearing surfaces, reducing engine life.

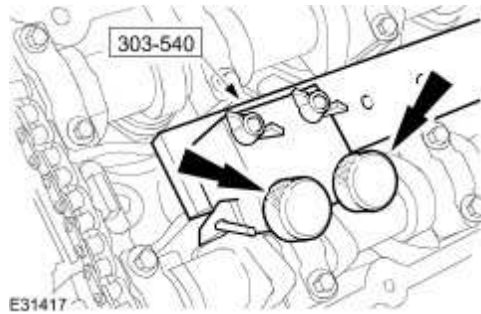


CAUTION: Camshaft lobes must be 180 degrees away from each valve tappet or the valve clearance will be incorrect.

Rotate the engine clockwise to position the camshaft lobe away from the shim surface.

5. Install the base plate of the valve clearance adjusting tool to the relevant cylinder head using the bolts supplied.

- Secure the tool to the valve cover retaining holes.



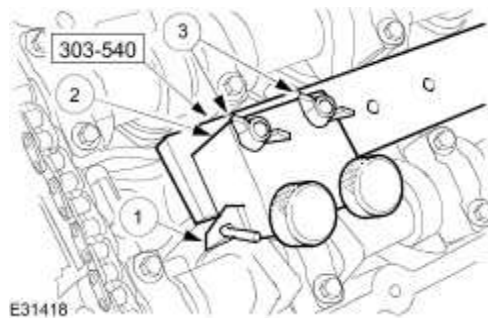
6.



CAUTION: Do not rotate the crankshaft while the attachment is installed to the base plate.

Install the attachment of the tool to the base plate to remove the relevant shims.

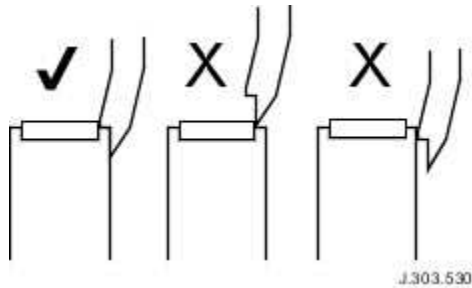
1. Adjust the fingers of the attachment to the highest position.
2. Install the attachment to the base plate.
3. Tighten the retaining screws to secure the attachment to the base plate.



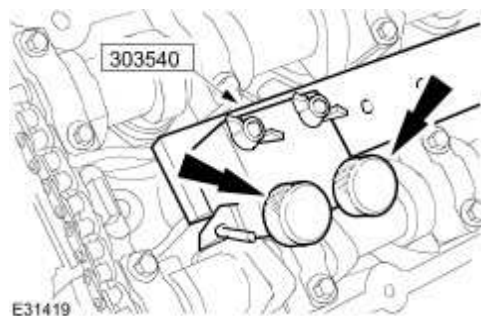
7. **NOTE:**

Use a mirror to help locating the fingers of the special tool as access is restricted.

Position the fingers on the outer edges of the tappet. Make sure the recessed step on each finger locates on the edge of the tappet.



8. Tighten the special tool to compress the valve springs.



9.



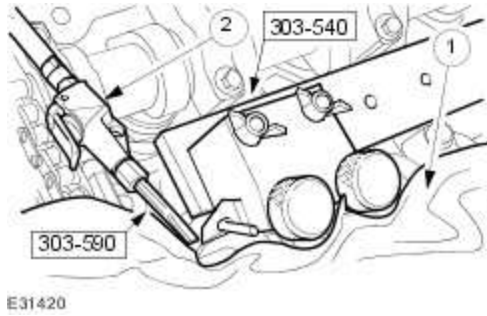
WARNING: The following operations require the use of compressed air. Always wear suitable eye protection.



CAUTION: Do not use a magnet to remove shims. Failure to follow these instructions may result in damage to the vehicle.

Remove, clean and measure the shim.

1. Surround the immediate working area with a cloth to retain any loose shims displaced by the compressed air.
2. Use special tool aimed at the edge of the shim to lift it from the tappet. Remove the shim from each tappet, noting the position of each one.



10. **NOTE:**

Two shims within each procedure are possible to be replaced using the special tool.

Use the following formula to calculate the required shim thickness.

- Original shim thickness + measured shim clearance - desired clearance = required shim thickness.

11.



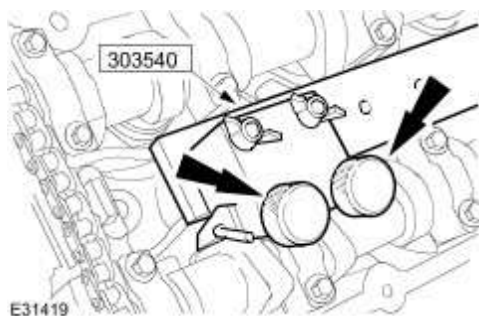
CAUTION: Do not use a magnet to install shims. Failure to follow these instructions may result in damage to the vehicle.

NOTE:

Shims must be fitted with the size markings facing the tappet, not the camshaft.

Apply a light coat of engine oil to the replacement shim(s) and install.

12. Loosen the special tool to allow the valve springs to return to their normal position.



13. Using the feeler gauge set, measure the clearance between the camshaft and the shim surface. Record and check the readings.
Valve Clearance Check (12.29.47)

14. When the valve clearance is correct, remove the attachment from the base plate and repeat the procedure for the following two valves to be adjusted.

15. Install the right-hand valve cover.

16. Install the left-hand valve cover.

Valve Clearance Check (12.29.47)

1. Remove the left-hand valve cover.
2. Remove the right-hand valve cover.
- 3.



CAUTION: Rotating the crankshaft in a counterclockwise direction may cause engine damage. Crankshaft journals are directionally machined. Rotating the crankshaft counterclockwise can raise burrs on bearing surfaces, reducing engine life.

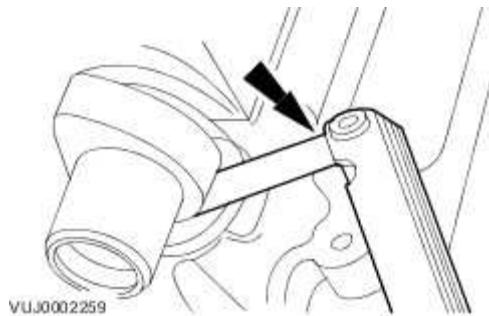


CAUTION: Camshaft lobes must be 180 degrees away from each valve tappet or the valve clearance will be incorrect.

Rotate the engine clockwise to position the camshaft lobe away from the shim surface.

4. Using the feeler gauge set, measure the clearance between the camshaft and the shim surface. Record and check the readings. Adjust the clearances as necessary.

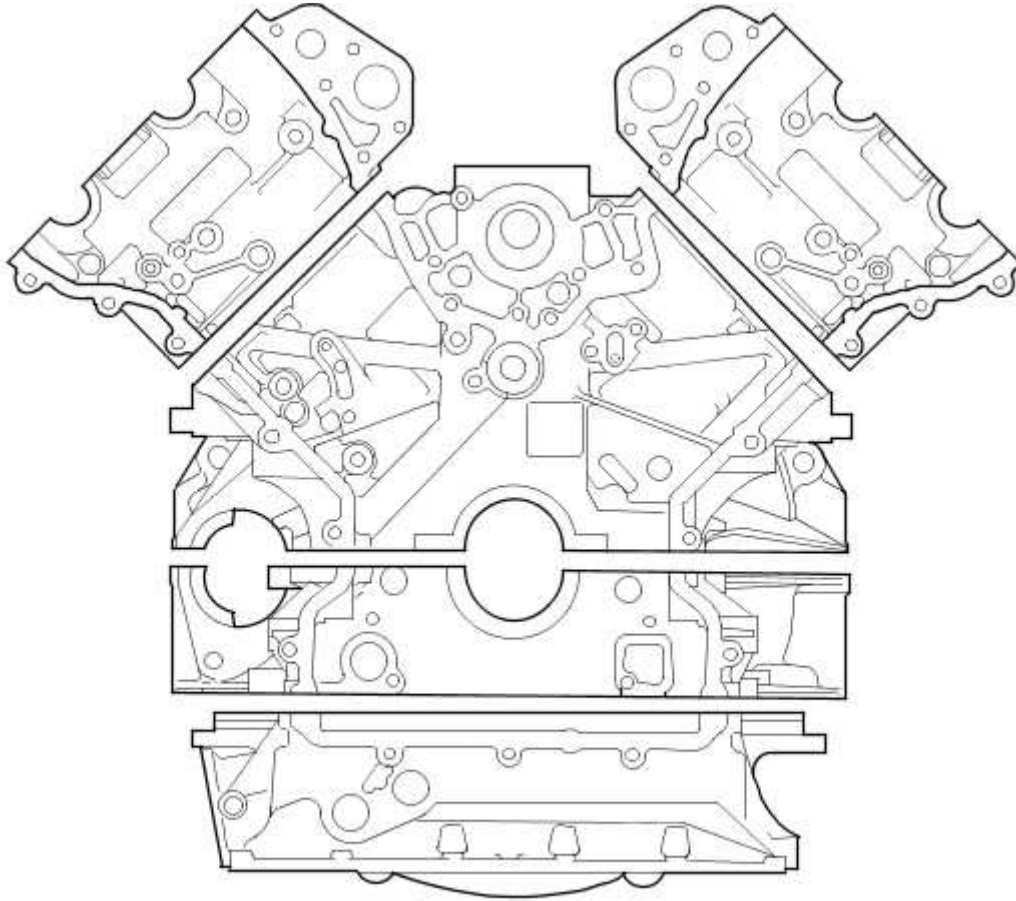
Valve Clearance Check (12.29.47)



5. Install the right-hand valve cover.
6. Install the left-hand valve cover.

Engine

Cylinder Block



E31285

The 3.5L & 4.2L engine consists of an eight cylinder 90 degree 'Enclosed V' configuration liquid cooled aluminium cylinder block with dry cast liners.

Viewed from the driving position, the right-hand cylinder bank is designated A-bank and the left-hand cylinder bank as B-bank.

Cylinder Block Drain Plug

The coolant drain plug is located on the rear left side of the cylinder block.

On vehicles supplied with a cold climate package (i.e. vehicles operating in conditions regularly below -30°C) a cylinder block heater unit is fitted instead of the drain plug.

Knock Sensors

Two knock sensors are fitted to the cylinder block on the inboard side of each cylinder bank. The electrical connector of each sensor is secured to the left-hand engine cover bracket.

These piezo-electric sensors provide inputs to the engine control module (ECM) to indicate the detection and location of detonation during combustion.

Crankshaft



E31286

The cast iron crankshaft has undercut and rolled fillets for improved strength and six counter-balance weights make sure low levels of vibration from the four throw, five bearing configuration.

The main bearing shells are aluminium/tin split plain type. An oil groove in the top half of each bearing transfers oil into the crankshaft oilway drillings for lubrication of the connecting rod bearings. A lead/bronze thrust washer is fitted on each side of the top half of the center main bearing.

The crankshaft rear oil seal is lipped and is a press fit in the interface of the bedplate to cylinder block.

A torsional vibration crankshaft damper pulley is bolted to the front of the crankshaft.

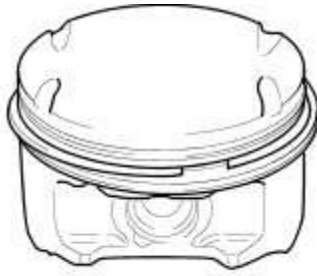
Connecting Rods and Pistons



E31287

The connecting rods are manufactured from sinter-forged steel and have fracture-split bearing caps. The opposing sides of each connecting rod being fractured at the bearing horizontal center line.

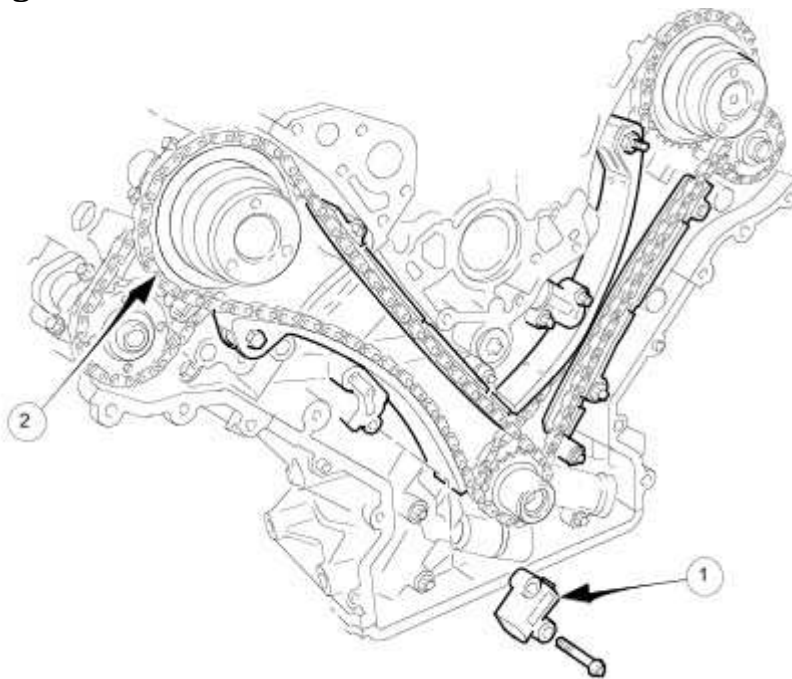
The cylinder position is etched on adjoining sides of the joint to identify matching connecting rods and bearing caps. The connecting rod bearing shells are lead/bronze, split plain bearings.



E31285

The pistons are open ended skirt design with small recesses for valve clearance and flat upper surfaces to reduce heat absorption. Three piston rings, two compression and one oil control, are fitted to each piston. Each piston is fitted on a gudgeon pin which is in a lead/bronze bush fitted in the connecting rod.

Timing Gear



E31289

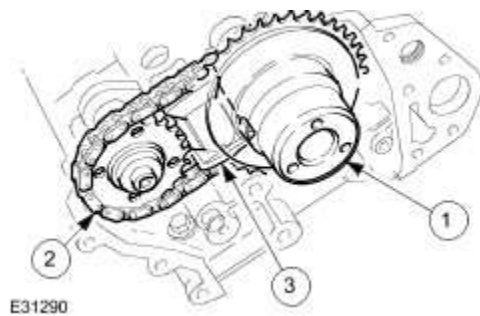
Item	Part Number	Description
1	—	Primary chain tensioner
2	—	Primary chain

Multi link primary and single link secondary chains drive the camshafts of each cylinder bank. The primary chains transmit the drive from sprocket on the crankshaft to a sprocket on each intake camshaft. The secondary chains transmit the drive from a second, smaller sprocket on the intake camshaft to a sprocket on the exhaust camshaft.

Each chain has a hydraulic tensioner operated by the engine lubricating system. A jet of oil from the end of each tensioner lubricates the chains. The primary chain tensioners act on pivoting flexible

tensioner blades, the secondary chain tensioners act directly on the chains.

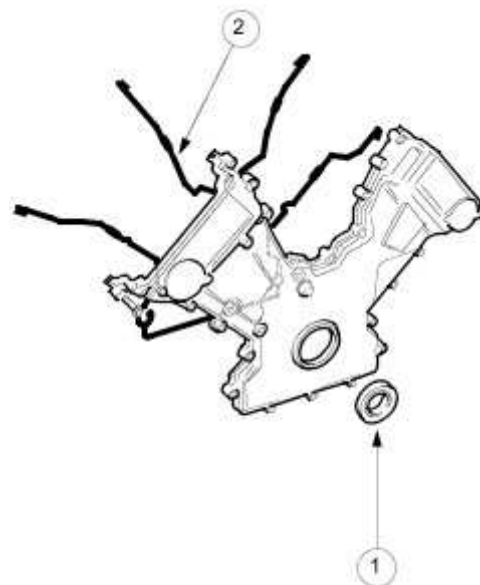
A woodruff key locates the drive sprocket on the crankshaft and these are retained in position by the crankshaft damper pulley.



Item	Part Number	Description
1	—	Variable valve timing unit
2	—	Secondary chain
3	—	Secondary chain tensioner

The variable valve timing (VVT) oil control unit and the exhaust camshaft sprockets are non-interference. They are clamped in place on the camshafts by the retaining bolt and clamping plate/washer.

Timing Cover

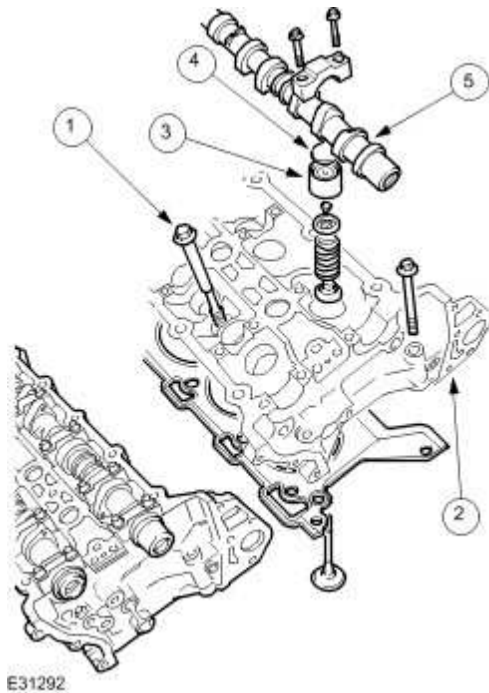


E31291

Item	Part Number	Description
1	—	Crankshaft front oil seal
2	—	Poly-acrylic seal

The aluminium-alloy timing cover accommodates the crankshaft front oil seal. Poly-acrylic seal in-groove gaskets seal the joint between the timing cover and the front face of the engine.

Cylinder Heads and Valve Gear



Item	Part Number	Description
1	—	Cylinder head bolt
2	—	Coolant outlet
3	—	Valve lifter
4	—	Adjustment shim
5	—	Camshaft

Cylinder heads are unique to each cylinder bank and are secured, using deep seated bolts, to the cylinder block. Two hollow dowels align each cylinder head with the cylinder block.

Each cylinder head gasket consists of a silicon beaded composite gasket with metal eyelets for the

cylinder bores.

Each cylinder head incorporates dual overhead camshafts operating four valves per cylinder via solid aluminium-alloy valve lifters. A steel shim in the top of each lifter allows adjustment of valve clearances.

Collets, valve collars and spring seats locate the valve springs on the intake and exhaust valves. Valve stem seals are integrated into the spring seats.

Four 14mm spark plugs are located in a recess on the center-line of each cylinder head. <<303-07B>>

Camshafts

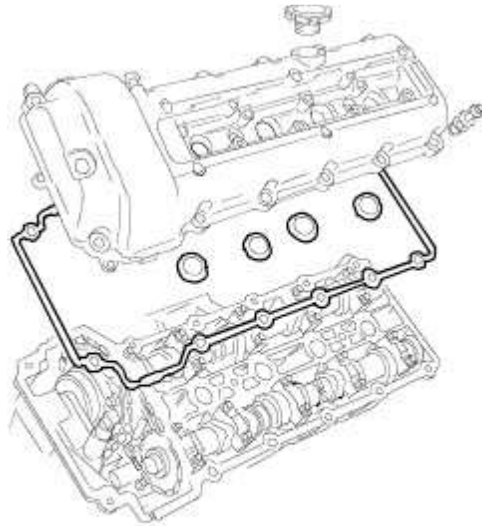
The chilled cast iron camshafts are each retained by five aluminium alloy caps - location numbers 0 to 4 for the intake camshaft and 5 to 9 for the exhaust camshaft from the front.

A machined flat near the front of each camshaft enables the camshafts to be locked during the valve timing procedure.

Camshaft Sensor

The camshaft sensors are fitted to the rear of each cylinder head and are triggered by four toothed sensing rings fitted to the rear of the intake camshaft. The camshaft sensors are variable reluctance sensors that provides an input to the ECM of intake camshaft position.

Camshaft Covers



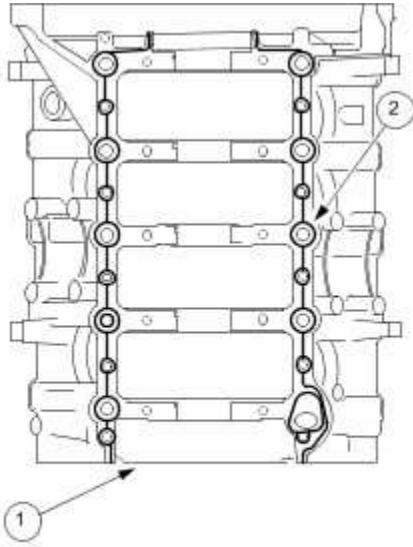
VUJ0001974

The valve covers are made from thermoplastic plastic; the right-hand bank cover incorporates an outlet for the part load engine breather.

The left-hand bank cover incorporates the engine oil filler cap and an outlet for the full load engine

breather. Identical oil separators are incorporated inside the top of each cover. Each oil separator comprises a wire gauze packing in an open ended enclosure below the breather outlet.

Bedplate



E31293

Item	Part Number	Description
1	—	Bedplate
2	—	Sealant track

This is a structural casting bolted to the bottom of the cylinder block to retain the crankshaft and to further improve overall rigidity.

Main bearing clearance changes due to expansion are minimized by means of iron inserts cast into the bedplate main bearing supports.

Two hollow dowels align the bedplate with the cylinder block and the joint is sealed by a continuous bead of sealant.

Engine Mountings

The engine is mounted at two points. At each side of the engine, there is a mounting bracket with a hydraulic mounting to the subframe.

Engine Lubrication

Oil is drawn from the reservoir in the oil pan and pressurized by the oil pump. The output from the oil pump is then filtered and distributed through the internal oil passages.

Where an oil cooler is fitted, the oil is cooled before entering the filter.

All moving parts are lubricated either by pressure or splash oil. Pressurized oil is also provided for operation of the variable valve timing units and the timing gear chain tensioners.

All of the oil system components are installed on the structural sump.

Oil is returned to the oil pan under gravity through large drain holes in the cylinder heads and the engine block to make sure quick return of the oil.

Oil Pick-Up

The plastic moulded oil pick-up is attached to the underside of the structural sump. It is immersed in the oil reservoir to provide a supply to the oil pump during all normal vehicle attitudes. A castellated inlet allows the supply to be maintained after any deformation of the sump pan (e.g. after grounding). A mesh screen in the inlet prevents debris from entering the oil system.

Oil Pressure Switch

Installed at the right front of the structural sump, the oil pressure switch connects a ground input to the instrument cluster when oil pressure is present. This switch operates at a pressure of 0,15 to 0,41 bar (2.2 to 5.9 lbf.in²).

Oil Pump

The oil pump is fitted at the front of the engine and is driven directly by the crankshaft. The inlet and outlet ports align with oil passages in the bedplate, with a rubber coated metal gasket to seal the pump to bedplate interface.

An integral pressure relief valve regulates pump outlet pressure at 4,5 bar (65.25lbf.in²).

Oil Pan

The oil pan/sump comprises an aluminium-alloy structural sump bolted to the bedplate and a pressed steel pan with integral sump plug, bolted to the structural sump.

Oil Filler Cap

The oil filler cap is located on the top of the left-hand bank valve cover.

Windage Tray

A windage tray attached to the top of the structural sump isolates the oil pan from the disturbed air flow, caused by the rotation of the crankshaft; preventing oil aeration and improving oil drainage.

Crankcase Ventilation

The engine is ventilated through a part-load and a full-load breather; one on each valve cover. These flexible plastic hoses incorporate O-ring seals and quick release connectors.

The part-load breather ventilates the left-hand valve cover (B-bank) and feeds onto the throttle body adaptor and the purge valve. This breather is connected between the oil separator in the cover and the induction elbow.

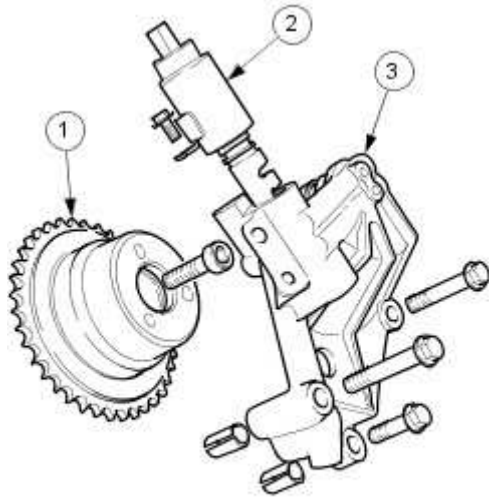
The full-load breather ventilates the right-hand cover (A-bank) and is connected between the oil

separator in the cover and the air intake duct between the mass air flow (MAF) sensor and the throttle body.

The MAF sensor unit combines the two sensors: one for air flow and one for air inlet temperature. It is a hot wire sensor that provides an input which is (approximately) proportional to the mass air flow into the engine.

Each valve cover oil separator consists of wire gauze packed into an open ended enclosure in the top of the cover, below the breather outlet.

Variable Valve Timing (VVT)



E31298

Item	Part Number	Description
1	—	Variable valve timing (VCT) oil control unit
2	—	Variable valve timing (VCT) oil control solenoid
3	—	Bush carrier

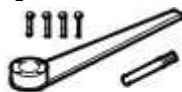
The variable valve timing system improves both low speed and high speed engine performance, engine idle quality and exhaust emissions. It is an infinitely variable system operating on the intake camshafts only. There is the equivalent of 48° of crankshaft movement between the retarded and advanced positions. Engine oil pressure operates the system under the control of the ECM.

Engine

For additional information, refer to <<303-00>>

Crankshaft Main Bearing Carrier

Special Service Tools



303-191

Crankshaft locking, main tool

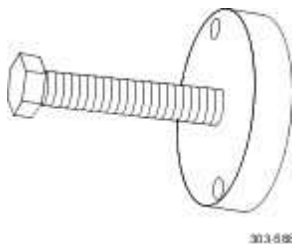
303-191



303-191-02

Adapter

303-191-02



303-588

Crankshaft pulley/damper remover

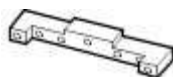
303-588



303-645

Crankshaft setting, main tool

303-645



303-530

Camshaft setting

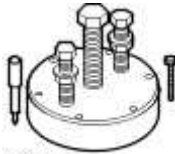
303-530



303-532

Timing chain tensioning tool

303-532



303-538

Crankshaft rear oil seal remover/replacer

303-538



303-750

Crankshaft front seal installer

303-538



303-751

Remover, crankshaft front seal

303-751

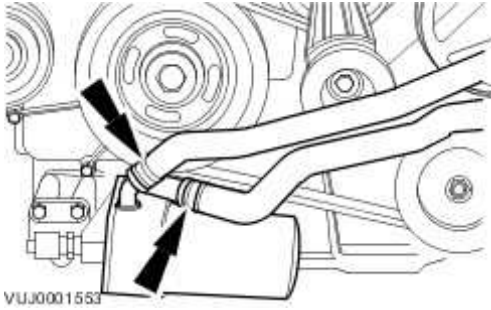
Removal

All vehicles

- 1 . Remove the engine from the vehicle.
For additional information, refer to Engine (12.41.01)
- 2 . Mount the engine to a suitable engine stand.

Vehicles without supercharger

3 . Disconnect the oil cooler hoses.

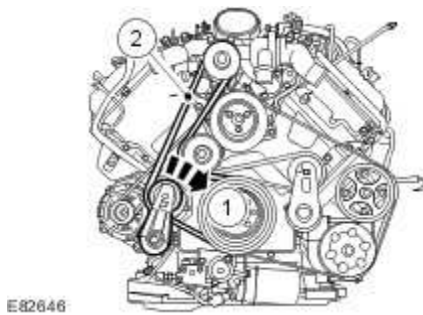


Vehicles with supercharger

4 . Detach the supercharger belt.

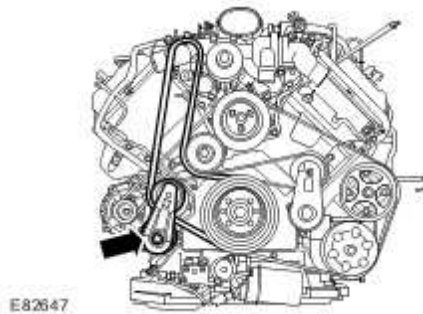
► Use a ½ inch square drive bar to rotate the supercharger belt tensioner.

► Detach the supercharger belt.



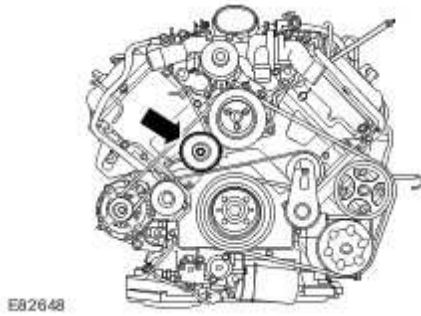
5 . Remove the supercharger belt tensioner.

► Remove the supercharger belt.



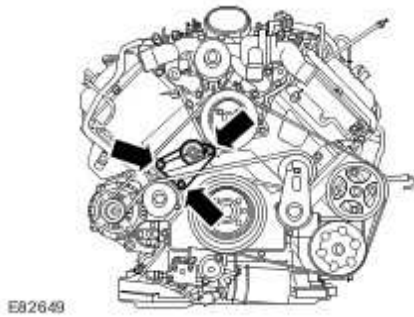
6 . Remove the supercharger belt idler pulley.

▶ Remove the retaining bolt.



7 . Remove the mounting bracket.

▶ Remove the retaining bolts.

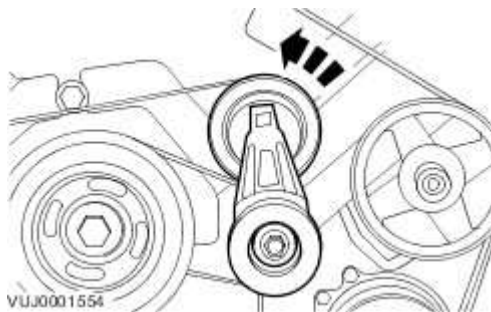


All vehicles

8 . Detach the accessory drive belt.

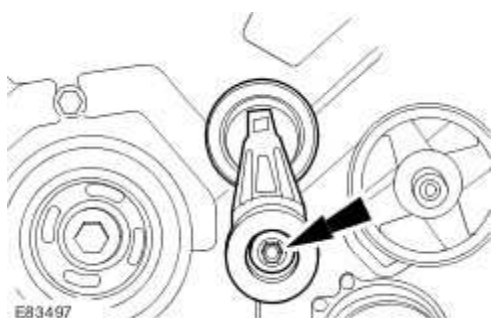
▶ Rotate the accessory drive belt tensioner counter-clockwise.

▶ Detach the accessory drive belt.

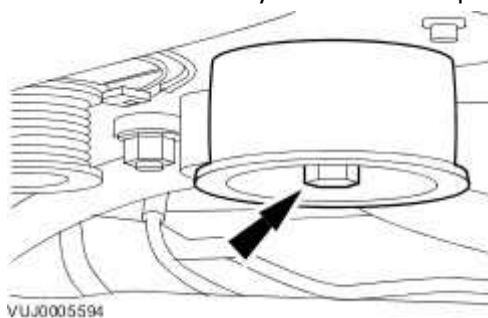


9 . Remove the accessory drive belt tensioner.

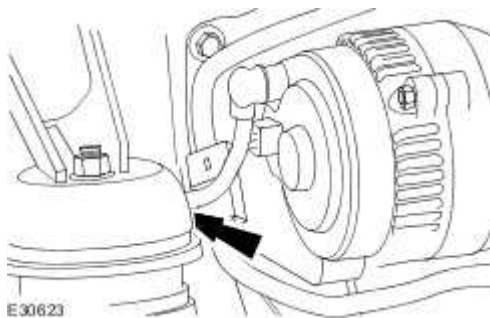
▶ Remove the accessory drive belt.



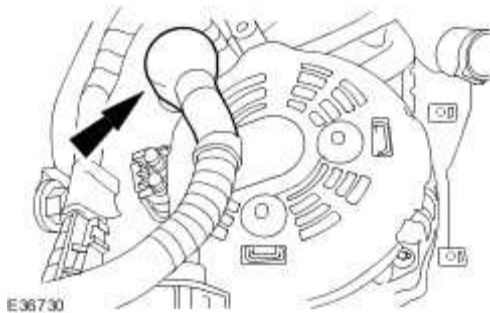
10 . Remove the accessory drive belt idler pulley.



11 . Detach the battery positive cable.

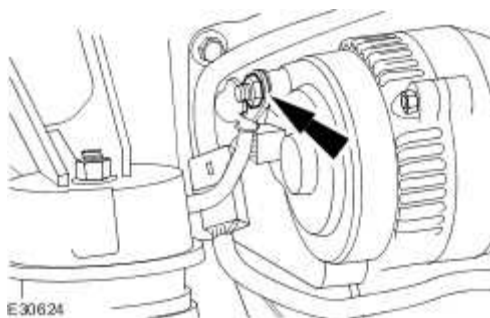


12 . Detach the generator battery positive cable protective cover.

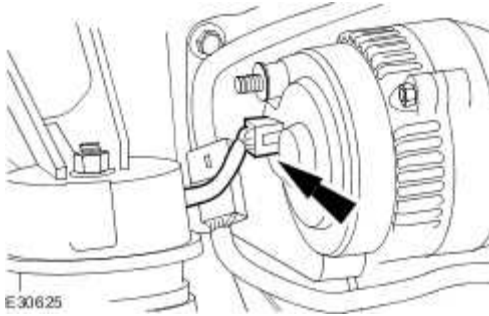


13 . Remove the battery positive cable.

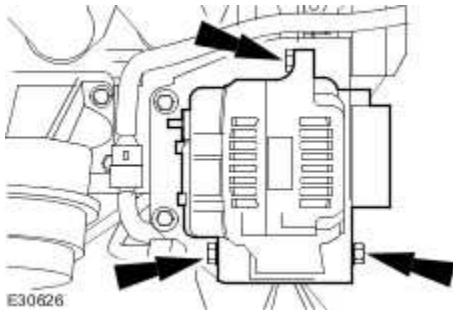
➤ Remove the retaining nut.



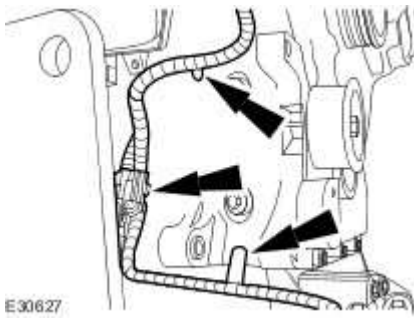
14 . Disconnect the generator electrical connector.



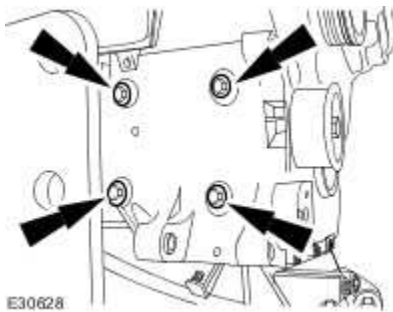
15 . Remove the generator.



16 . Detach the engine wiring harness.

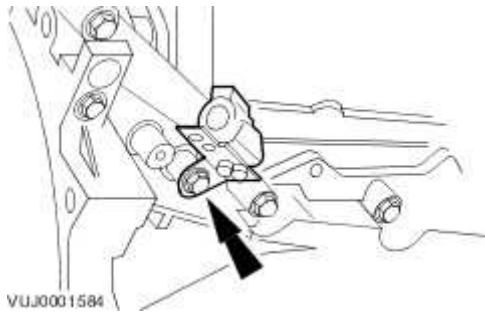


17 . Remove the generator mounting bracket.

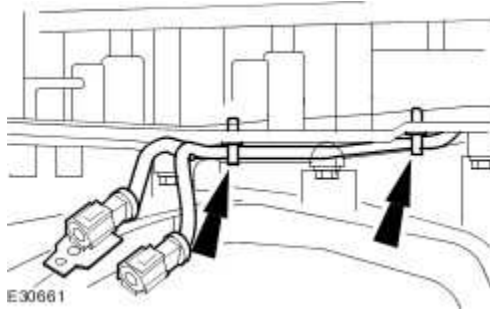


18 . Detach the right-hand heated oxygen sensor (HO2S) retaining bracket.

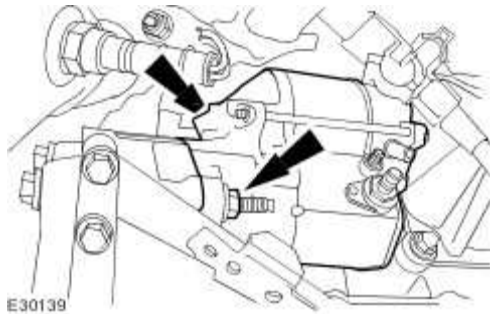
▶ Remove the retaining bolt.



19 . Detach the HO2S wiring harness, from the engine.



20 . Remove the starter motor.

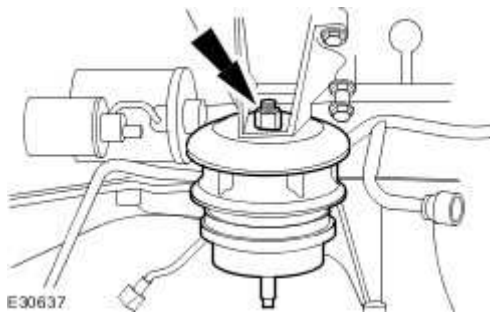


21 . **NOTE:**

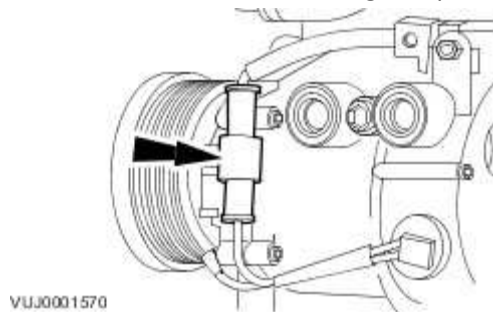
Right-hand shown, left-hand similar.

Remove both engine mounts.

► Remove the retaining nuts.

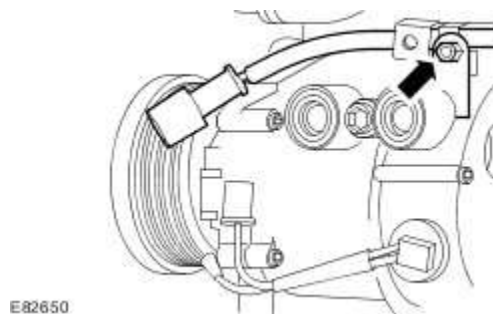


22 . Disconnect the air conditioning compressor electrical connector.

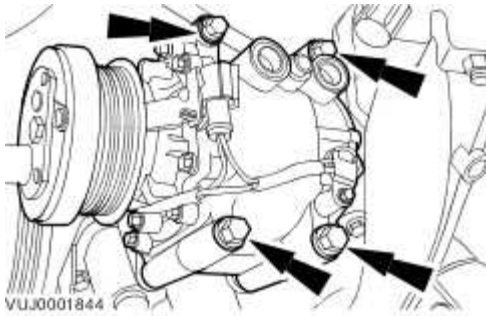


23 . Detach the A/C compressor wiring harness.

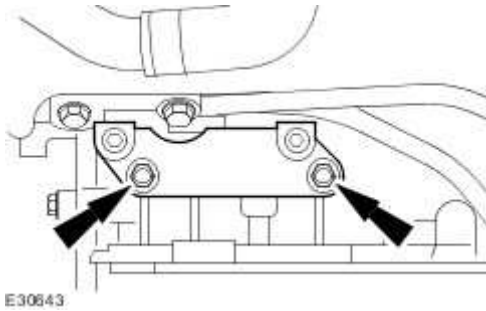
► Remove the retaining nut.



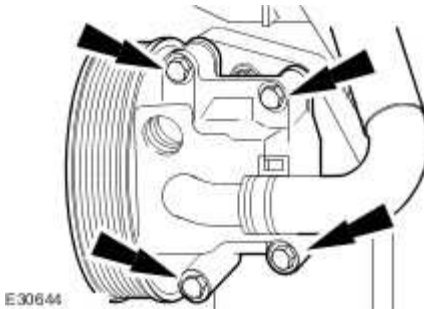
24 . Remove the A/C compressor.



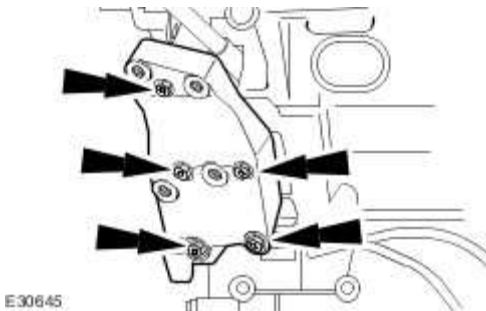
25 . Remove the air conditioning compressor mounting bracket.



26 . Remove the power steering pump.



27 . Remove the power steering pump mounting bracket.

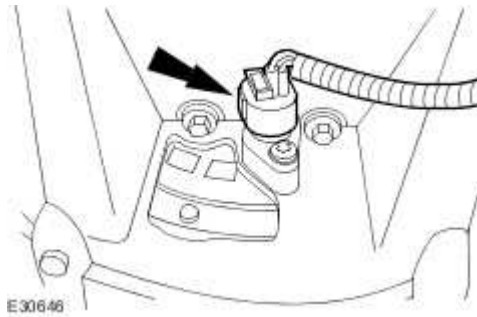


28 . Remove the oil level indicator and tube.

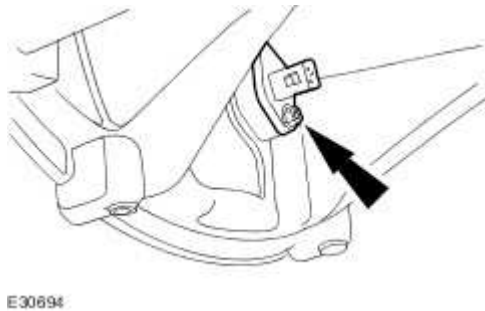
▶ Remove and discard the O-ring seal.



29 . Disconnect the crankshaft position (CKP) sensor electrical connector.

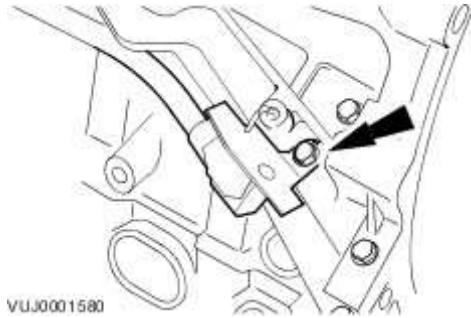


30 . Remove the CKP sensor.

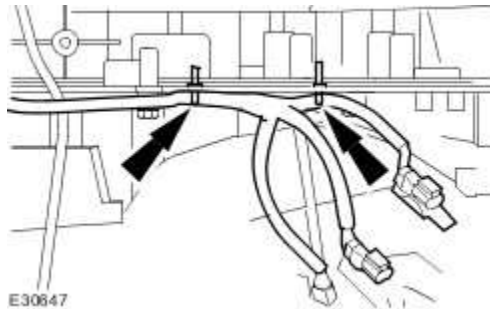


31 . Detach the left-hand heated oxygen sensor (HO2S) wiring harness.

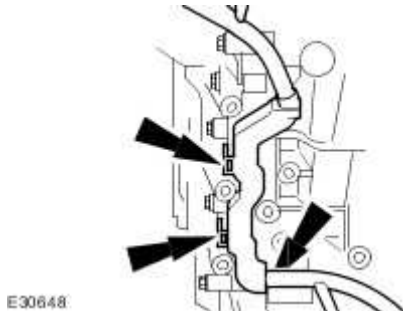
▶ Remove the retaining bolt.



32 . Detach the engine wiring harness from the cylinder block.

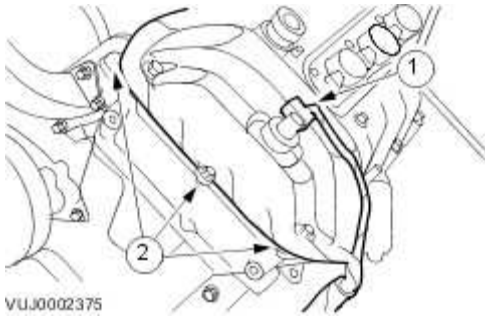


33 . Detach the engine wiring harness.



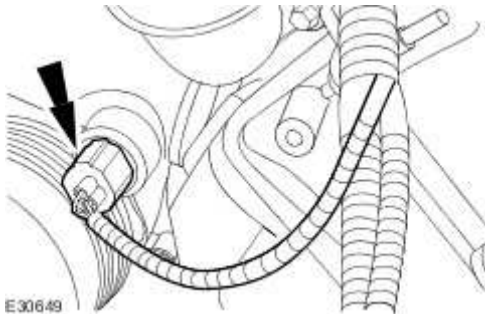
34 Detach the engine wiring harness.

- ▶ Disconnect the variable camshaft timing (VCT) solenoid electrical connector.
- ▶ Detach the engine wiring harness.



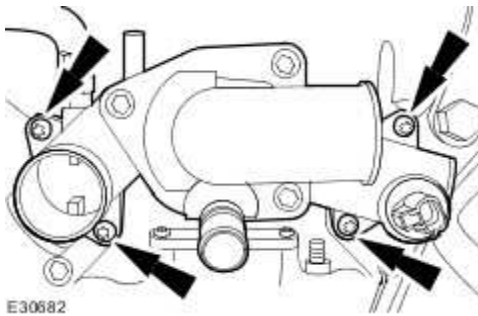
Vehicles without supercharger

35 . Disconnect the engine coolant temperature (ECT) sensor electrical connector.



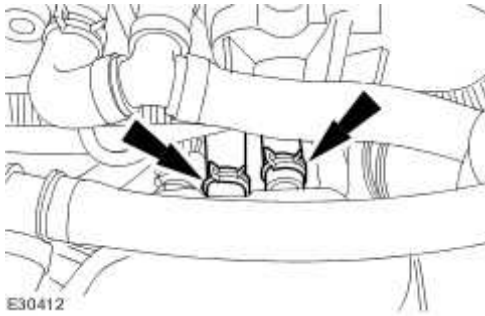
36 . Remove the thermostat housing.

▶ Remove and discard the O-ring seals.

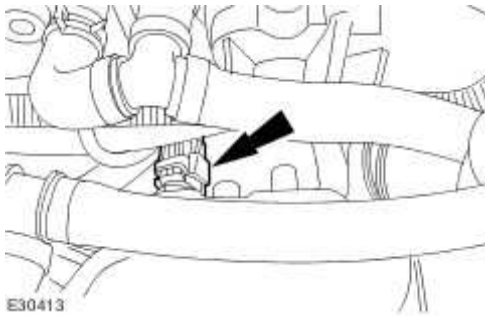


Vehicles with supercharger

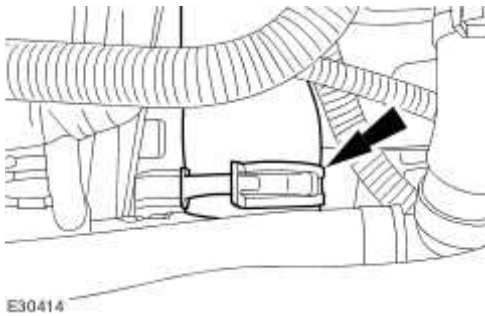
37 . Disconnect the thermostat housing hoses



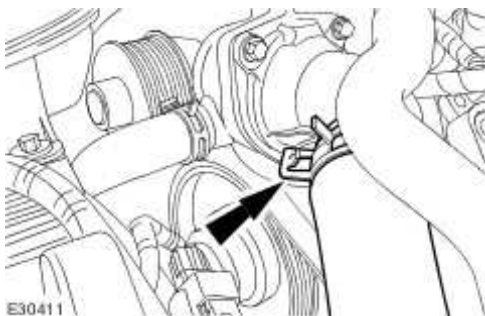
38 . Disconnect the ECT sensor electrical connector.



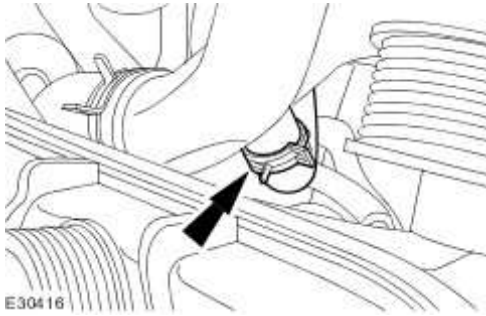
39 . Reposition the thermostat housing hose retaining clip.



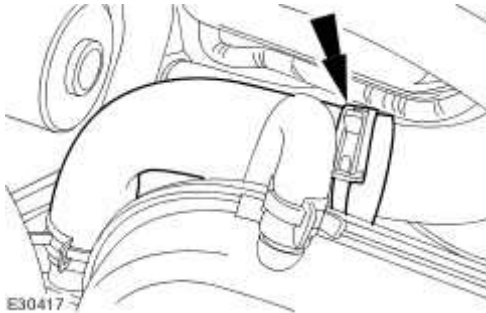
40 . Disconnect the hose.



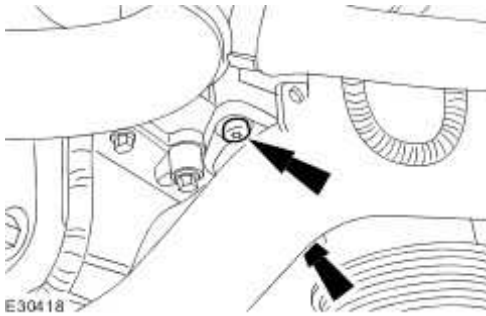
41 . Disconnect the heater supply hose from the thermostat housing.



42 . Disconnect the water pump outlet hose.

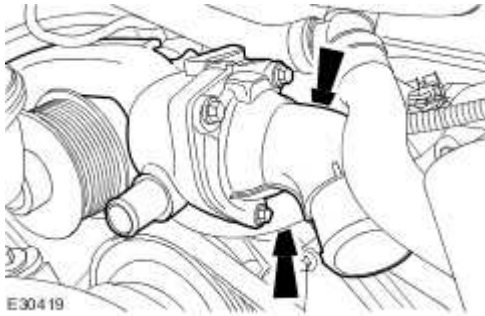


43 . Remove the thermostat housing retaining bolts.



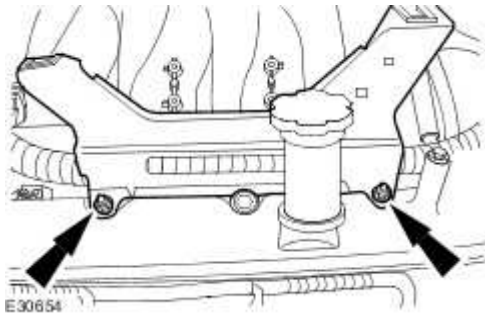
44 . Remove the thermostat housing.

► Remove and discard thermostat housing O-ring seals.

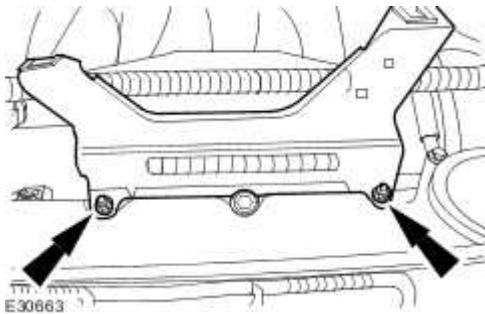


Vehicles without supercharger

45 . Remove the engine cover left-hand retaining bracket.



46 . Remove the engine cover right-hand retaining bracket.

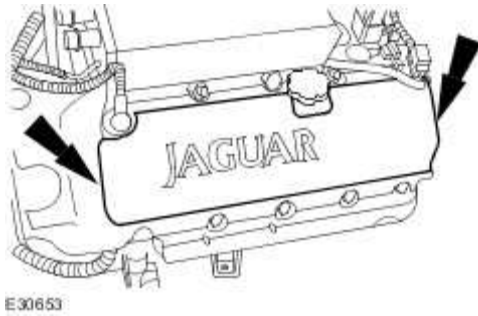


All vehicles

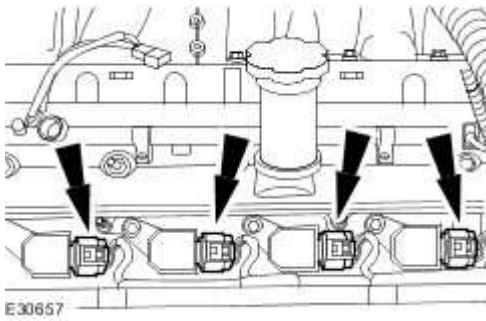
47 . **NOTE:**

Left-hand shown, right-hand similar.

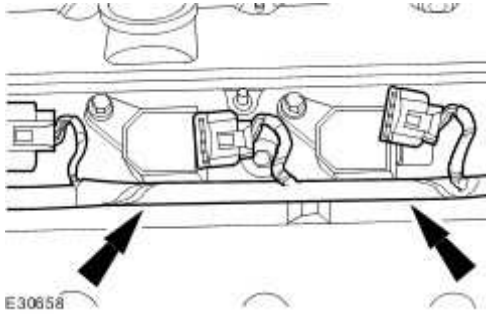
Remove both ignition coil covers.



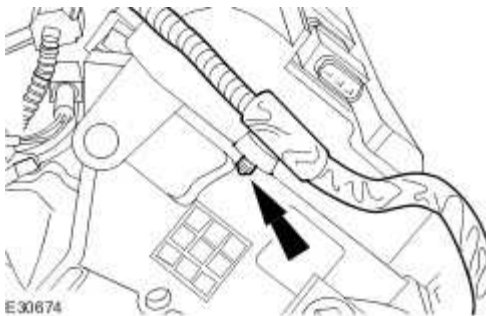
48 . Disconnect the left-hand ignition coil electrical connectors.



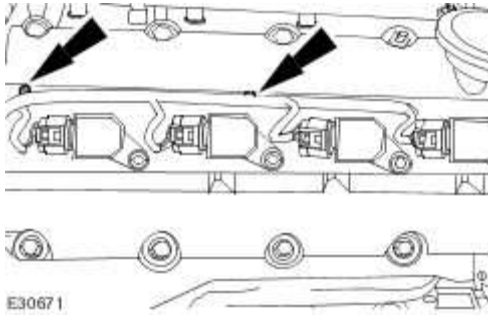
49 . Detach the left-hand ignition coil wiring harness.



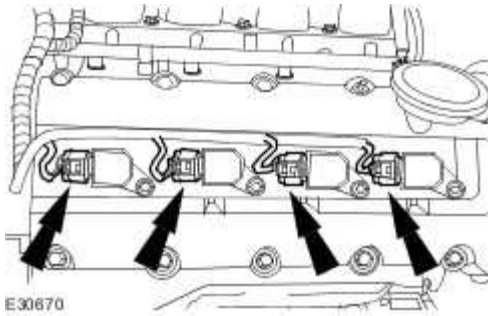
50 . Detach the left-hand ignition coil wiring harness.



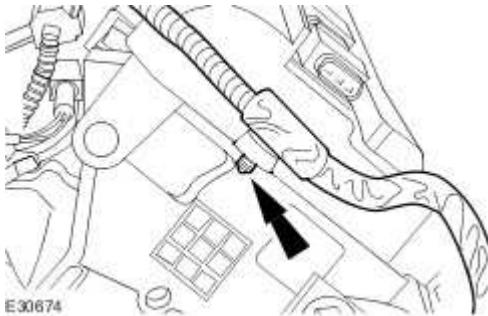
51 . Detach the right-hand ignition coil wiring harness.



52 . Disconnect the right-hand ignition coil electrical connectors.

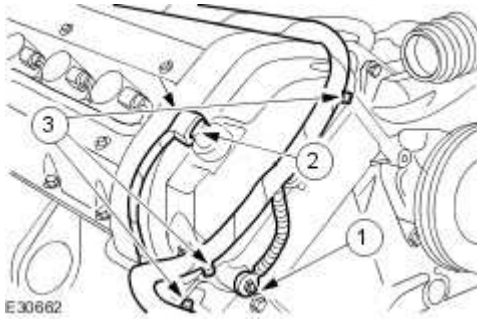


53 . Detach the right-hand ignition coil wiring harness.



54 Detach the engine wiring harness.

- ▶ Detach the ground cable.
- ▶ Disconnect the variable camshaft timing (VCT) solenoid electrical connector.
- ▶ Detach the engine wiring harness.

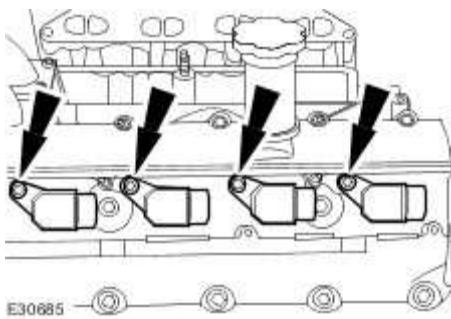


55 . **NOTE:**

Left-hand shown, right-hand similar.

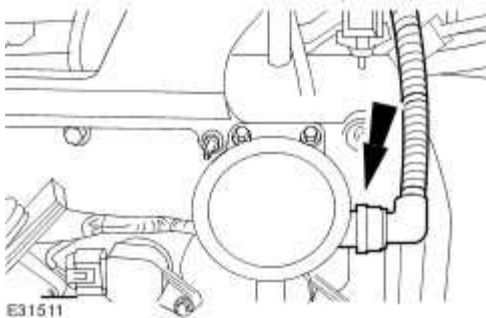
Remove the ignition coils.

▶ Remove the retaining bolts.



Vehicles without supercharger

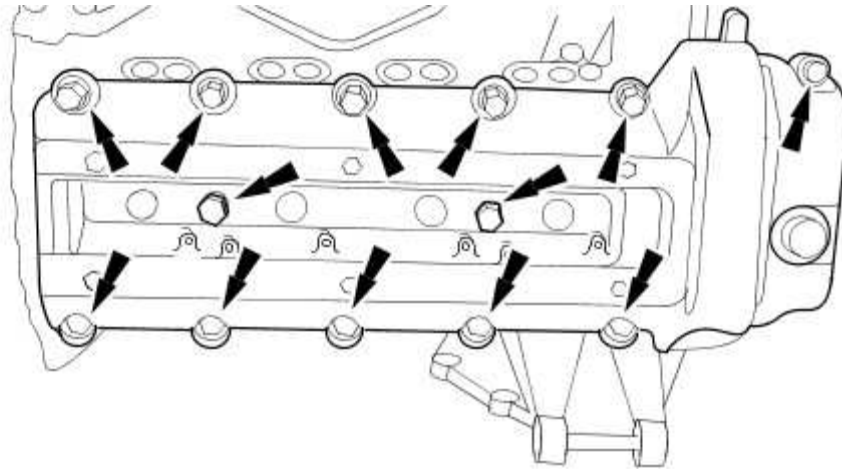
56 . Disconnect the positive crankcase ventilation (PCV) pipe.



All vehicles

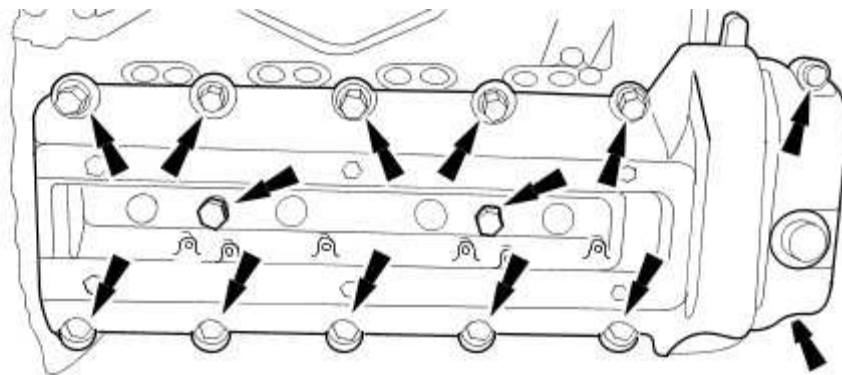
57 . Remove the right-hand valve cover.

➤ Remove and discard the valve cover gaskets.



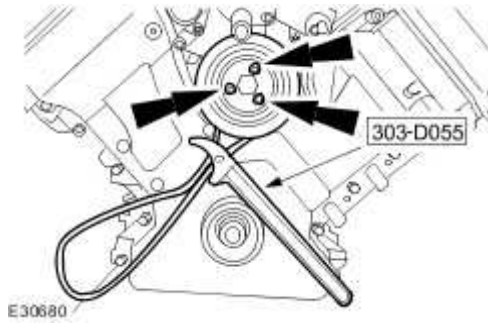
58 . Remove the left-hand valve cover.

➤ Remove and discard the valve cover gaskets.



59 . Using the special tool, remove the water pump pulley.

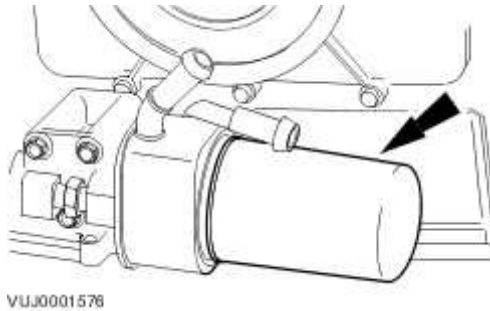
➤ Using the special tool, retain the water pump pulley.



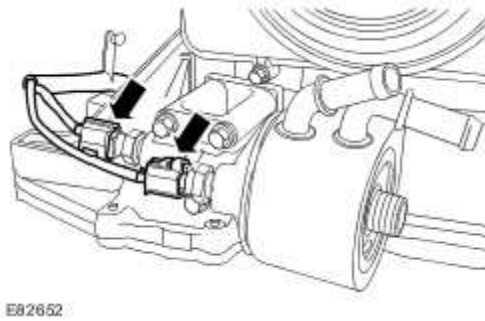
60 . **NOTE:**

Place a suitable container underneath the oil filter housing to prevent oil spillage.

Remove the oil filter.

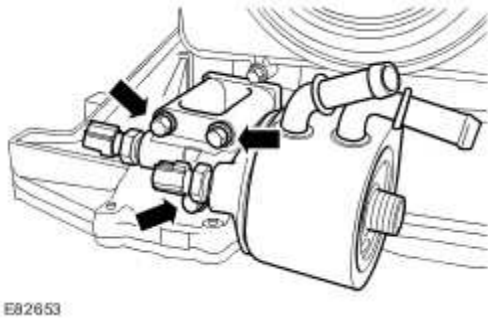


61 . Disconnect the oil pressure switch and oil temperature sensor electrical connectors.



62 . Remove the oil filter housing.

▶ Remove and discard the O-ring seal.



63



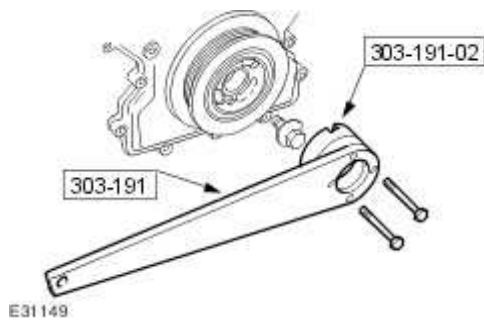
CAUTION: Under no circumstances should the crankshaft setting peg 303-645 be used in the following operations to lock the crankshaft.

NOTE:

The crankshaft retaining bolt will be very tight.

Using special tools, retain the crankshaft pulley.

▶ Remove and discard the crankshaft pulley bolt.



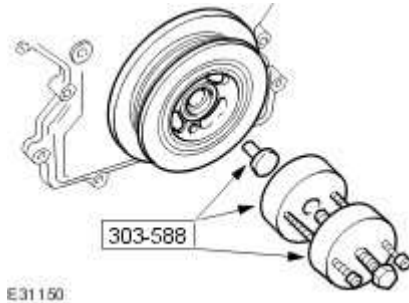
64 . Remove the special tools.

65 . **NOTE:**

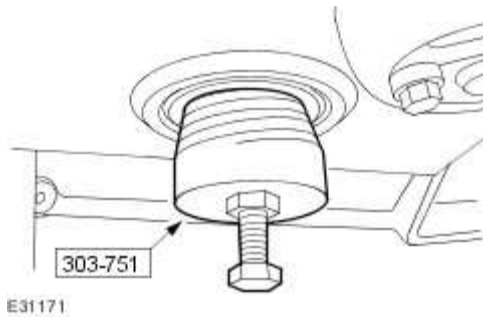
The crankshaft pulley will be very tight.


Using special tools, remove the crankshaft pulley.

- ▶ Collect the locking ring.
- ▶ Remove and discard the O-ring seal.



66 . Using the special tool, remove the crankshaft front seal.

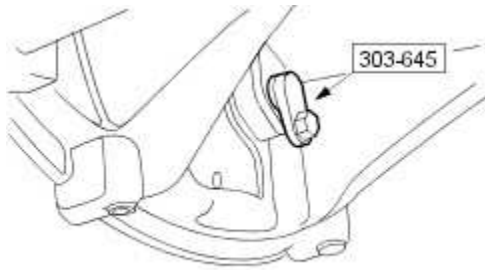


67  **CAUTION:** Make sure the spark plugs are removed to enable the engine to rotate freely.

 **CAUTION:** Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.

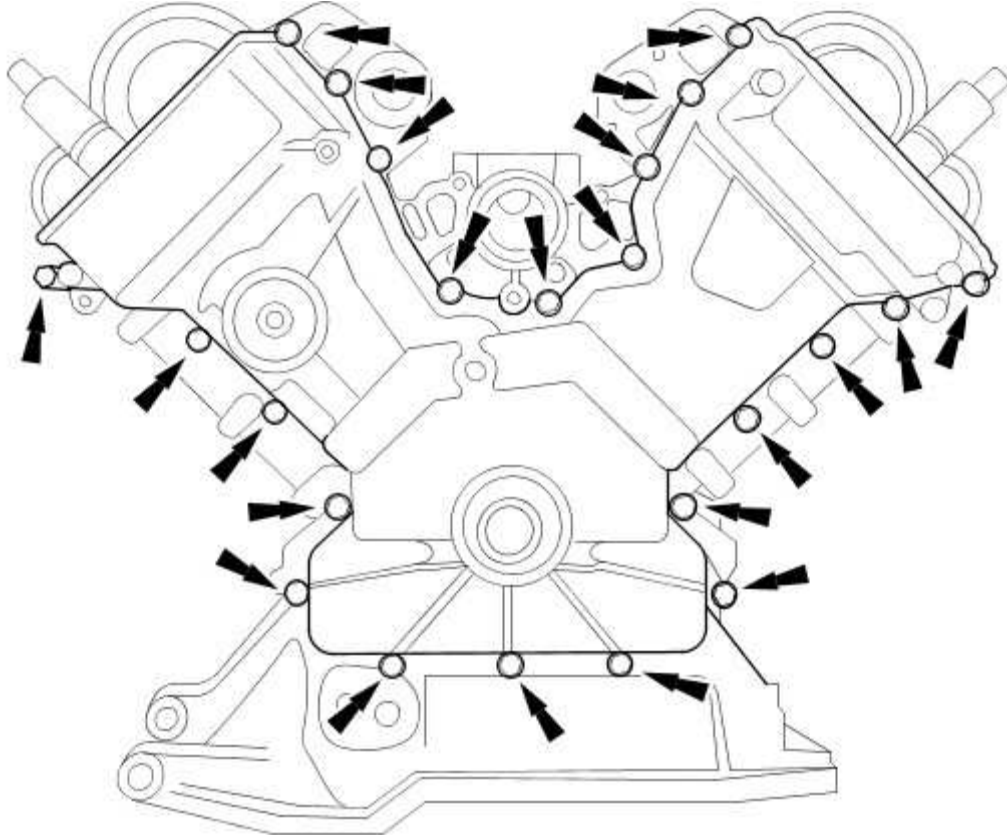
 **CAUTION:** Rotate the crankshaft clockwise to position the engine to top dead center (TDC) No. 1 cylinder

Install the special tool.



VUJ0002400

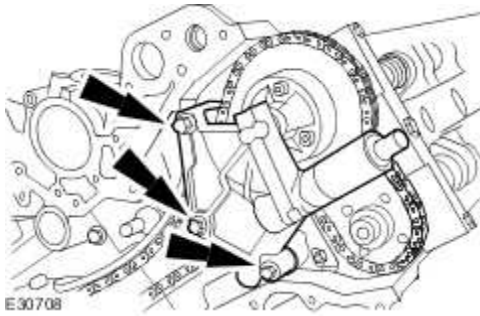
68 . Remove the engine front cover.



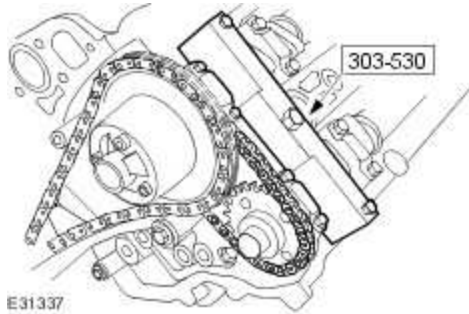
VUJ0002398

69 . Remove the left-hand VCT oil control unit housing.

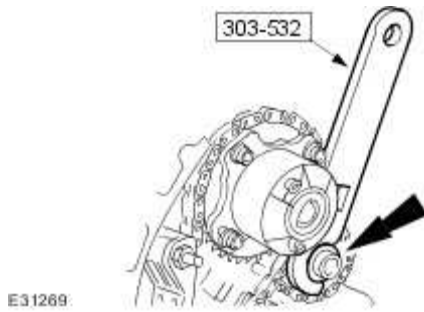
➤ Remove and discard the O-ring seals.



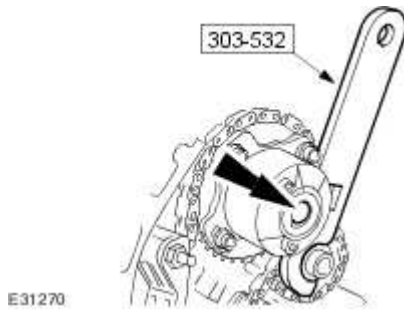
70 . Install the special tool to the left-hand cylinder head.



71 . Loosen the left-hand exhaust camshaft sprocket retaining bolt.

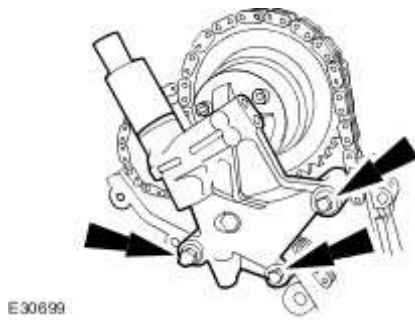


72 . Loosen the left-hand inlet camshaft sprocket retaining bolt.

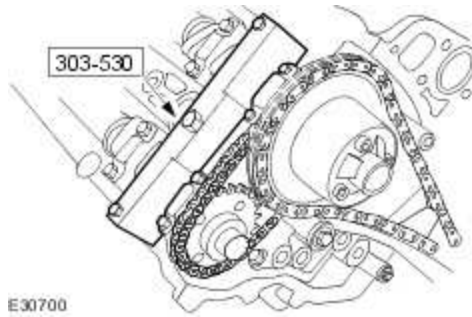


73 . Remove the right-hand VCT oil control unit housing.

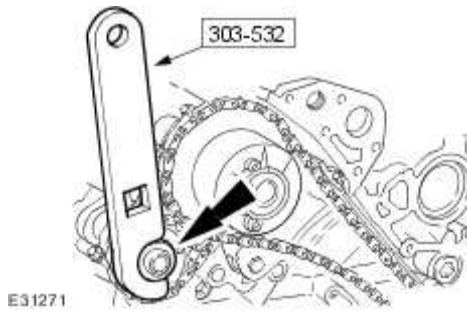
▶ Remove and discard the O-ring seals.



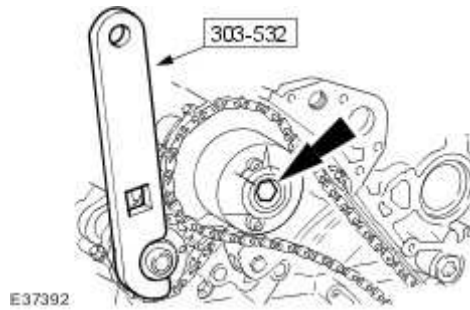
74 . Install the special tool to the right-hand cylinder head.



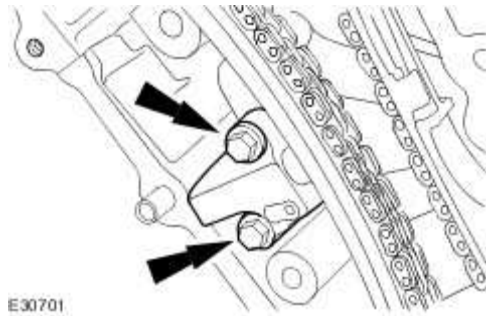
75 . Loosen the right-hand exhaust camshaft sprocket retaining bolt.



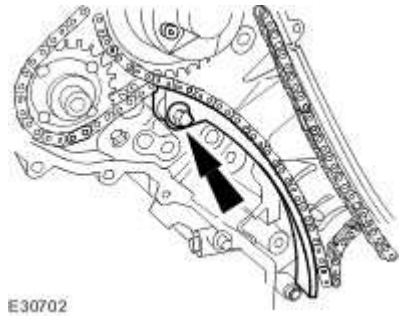
76 . Loosen the right-hand exhaust camshaft sprocket retaining bolt.



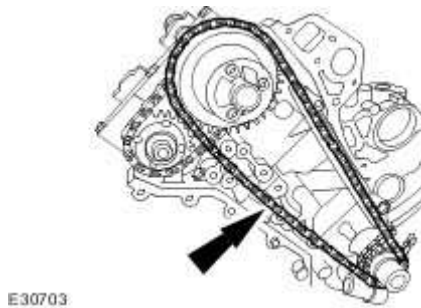
77 . Remove the right-hand primary timing chain tensioner assembly.



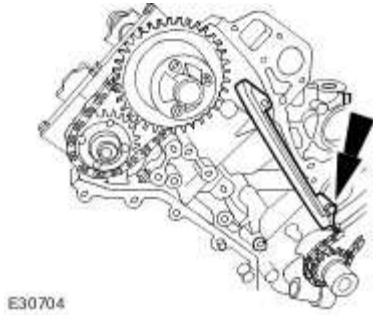
78 . Remove the right-hand primary timing chain tensioner guide.



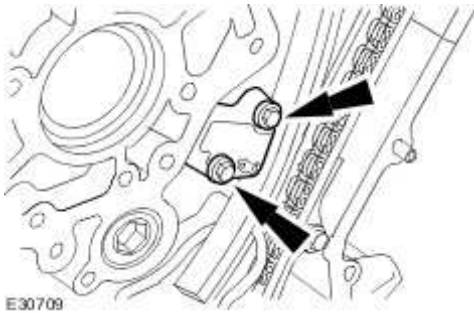
79 . Remove the right-hand primary timing chain.



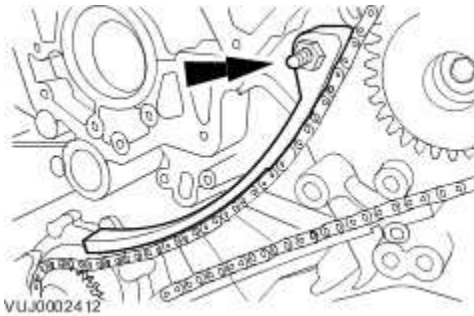
80 . Remove the right-hand primary timing chain guide.



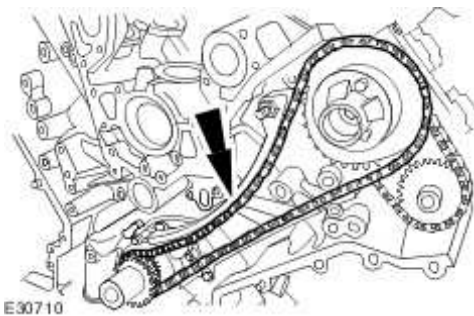
81 . Remove the left-hand primary timing chain tensioner assembly.



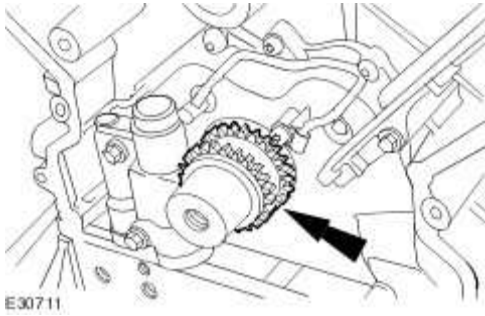
82 . Remove the left-hand primary timing chain tensioner guide.



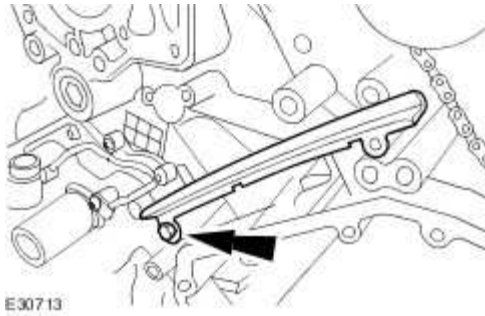
83 . Remove the left-hand primary timing chain.



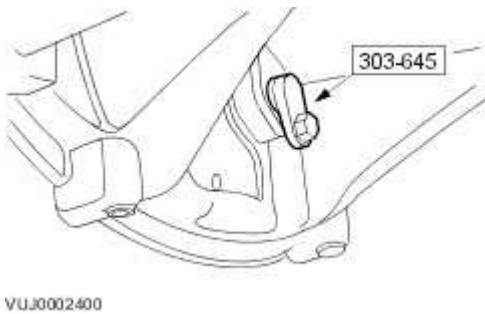
84 . Remove the crankshaft sprocket.



85 . Remove the left-hand primary timing chain tensioner guide.



86 . Remove the special tool.



87

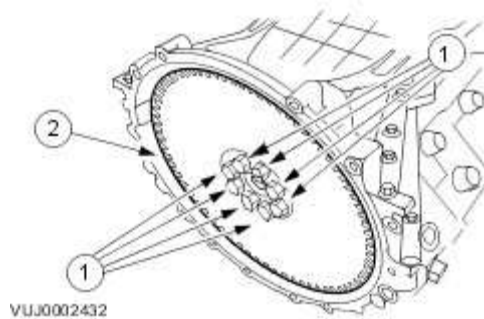


CAUTION: The bolts can only be used 3 times, mark the bolts with a center punch.
If 2 punch marks are visible, discard the bolts.

Remove the drive plate.

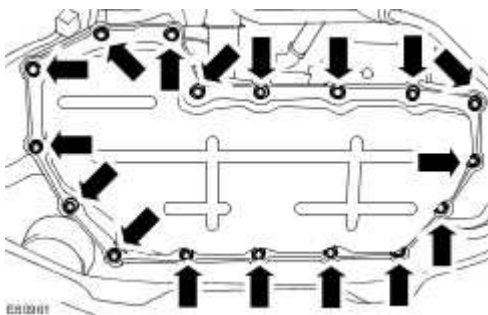


Remove the 8 bolts.



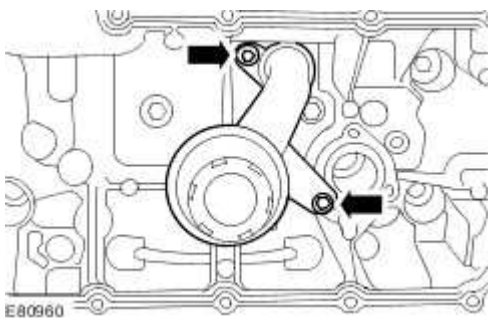
88 . Remove the lower oil pan.

▶ Remove and discard the gasket.

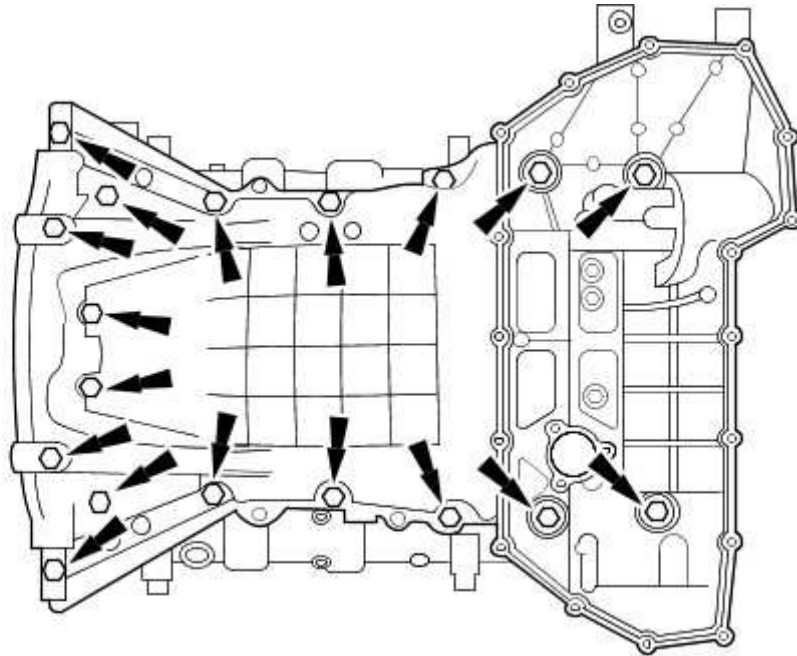


89 . Remove the oil strainer.

▶ Remove and discard the O-ring seal.



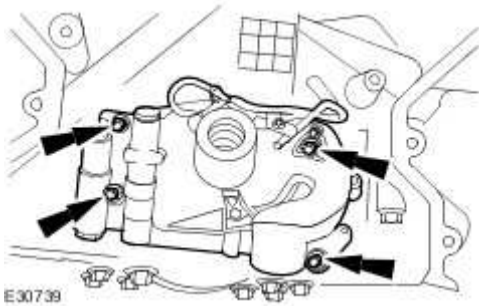
90 . Remove the upper oil pan.



VUJ0002435

91 . Remove the oil pump.

➤ Remove and discard the gasket.



E30739

92



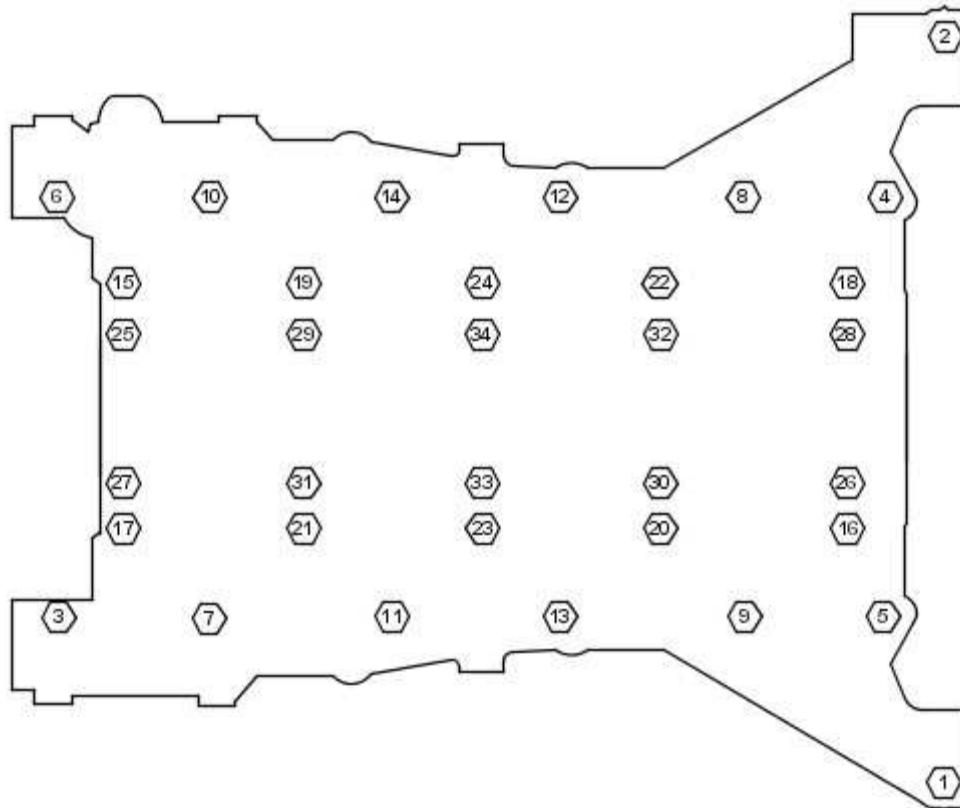
CAUTION: To make sure damage does not occur to the crankshaft and piston components, the engine must be inverted on the engine stand. Failure to follow this instruction may result in damage to the engine.

NOTE:

If the crankshaft main bearing carrier retaining bolts have been marked with a center punch dot, they must be discarded and new bolts installed.

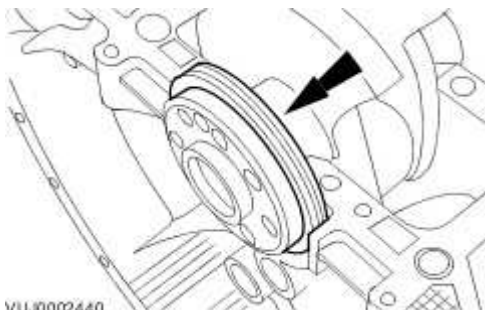
Remove the crankshaft main bearing carrier.

- ▶ Remove the crankshaft main bearing carrier retaining bolts in the indicated sequence.



VUJ0002439

93 . Discard the crankshaft rear main oil seal.



VUJ0002440

Installation

All vehicles

1



CAUTION: Use only a plastic scraper when removing the sealing material.



CAUTION: If any new bolts are to be installed to retain the crankshaft main bearing carrier, pre-stress the retaining bolts by installing the crankshaft main bearing carrier without any sealant and tightening the new retaining bolts to the specified torque. Remove the crankshaft main bearing carrier once the bolts have been pre-stressed. Failure to follow this instruction may result in damage to the vehicle.

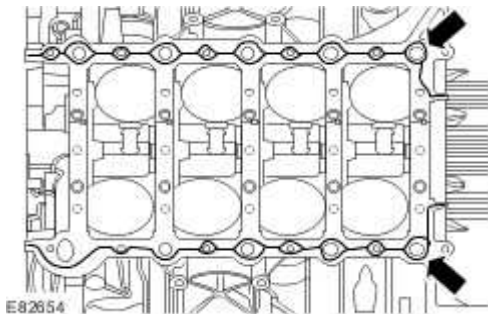
Clean all the mating faces and reusable parts thoroughly and check for damage.

2 NOTE:

Install the crankshaft main bearing carrier and tighten bolts to specification within twenty minutes of applying the sealant.

Apply a 2 mm bead of sealant to the cylinder block in the area shown.

▶ Use WSS-M4G323-A4-RTV sealant.

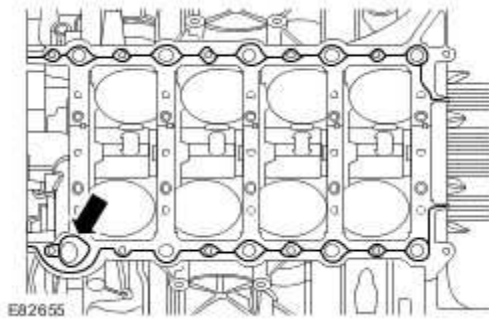


3 NOTE:

Install the crankshaft main bearing carrier and tighten bolts to specification within twenty minutes of applying the sealant.

Apply a 1 mm bead of sealant to the cylinder block in the area shown.

▶ Use WSS-M4G323-A4-RTV sealant.



4



CAUTION: Make sure all dowels are fully seated into the crankshaft main bearing carrier prior to tightening the bolts.

NOTE:

Do not lubricate the crankshaft main bearing carrier retaining bolts.

NOTE:

Do not rotate the crankshaft until all the retaining bolts are tightened to specification.

NOTE:

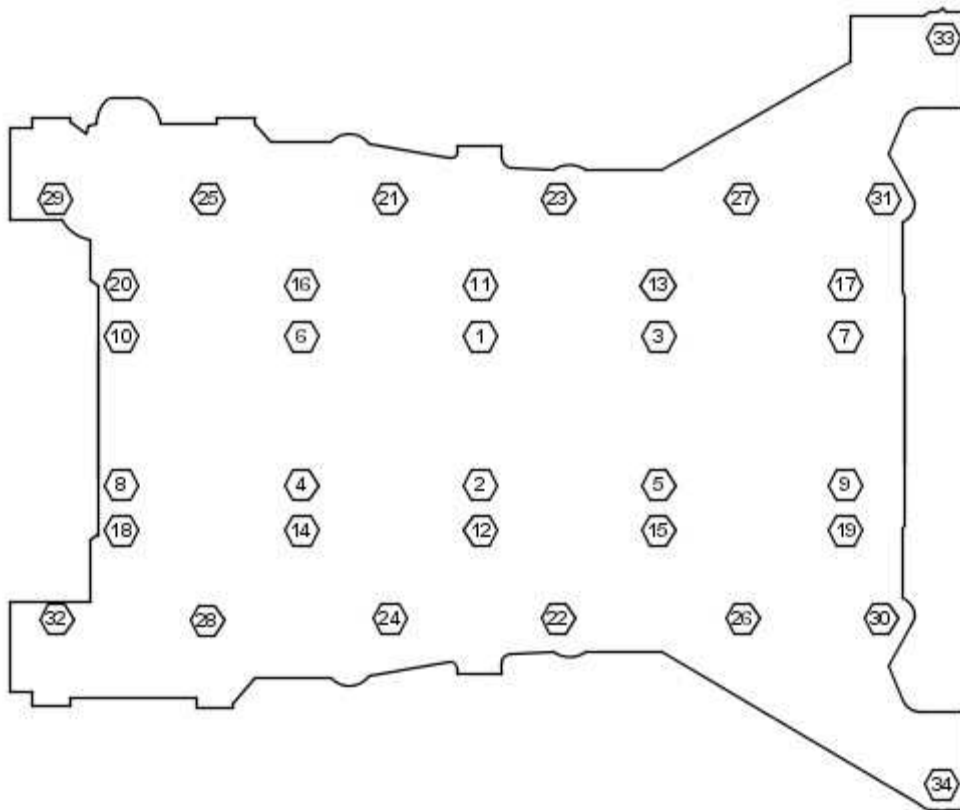
The retaining bolts must be tightened within twenty minutes of applying the sealant.

NOTE:

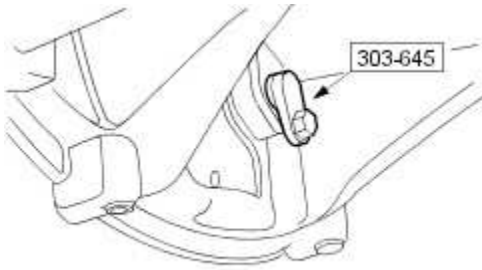
Tighten the retaining bolts in the sequence shown.

Install the crankshaft main bearing carrier to the cylinder block.

- ▶ Stage 1: Bolts 21 to 32, tighten to 15 Nm
- ▶ Stage 2: Bolts 33 to 34, tighten to 15 Nm
- ▶ Stage 3: Bolts 1 to 10, tighten to 25 Nm
- ▶ Stage 4: Bolts 11 to 20, tighten to 15 Nm
- ▶ Stage 5: Bolts 1 to 10, tighten to 35 Nm + 135 degrees
- ▶ Stage 6: Bolts 11 to 20, tighten to 20 Nm + 150 degrees
- ▶ Stage 7: Bolts 21 to 32, tighten to 20 Nm + 90 degrees
- ▶ Stage 8: Bolts 33 to 34, tighten to 20 Nm + 150 degrees
- ▶ Stage 9: Center punch each of the bolt heads to indicate it has been reused.

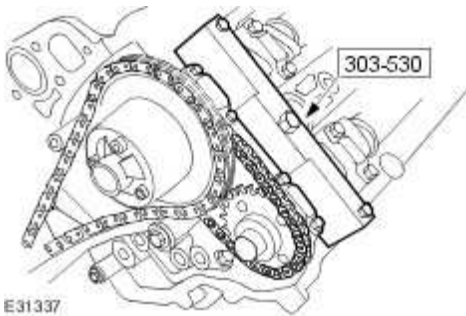


5 . Remove the special tool.



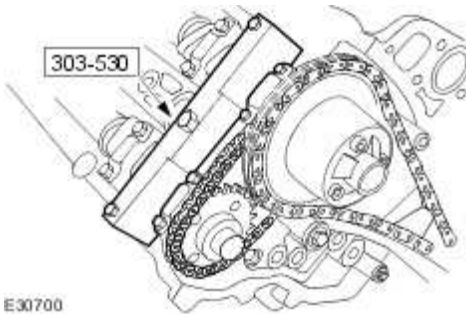
VUJ0002400

6 . Remove the special tool from the left-hand cylinder head.



E31337

7 . Remove the special tool from the right-hand cylinder head.



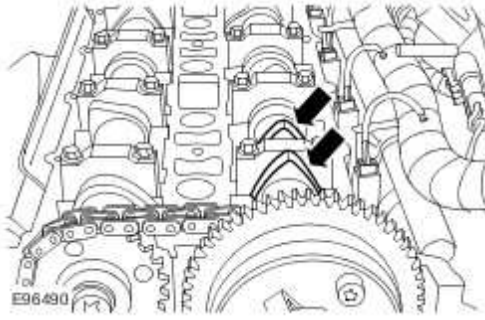
E30700

8



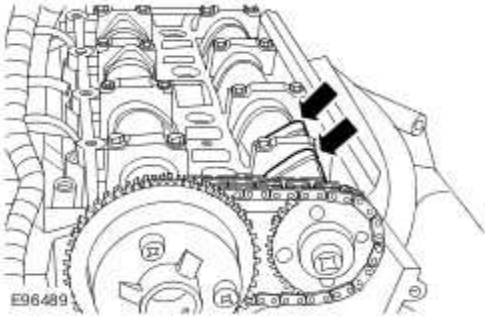
· **CAUTION: Make sure that number 1 cylinder intake camshaft lobes are vertical to the cylinder head face.**


Position the right-hand camshafts to the neutral position.



- 9  **CAUTION:** Make sure that number 2 cylinder exhaust camshaft lobes are vertical to the cylinder head face.

Position the left-hand camshafts to the neutral position.



- 10  **CAUTION:** Make sure no binding of the crankshaft occurs.

 **CAUTION:** Make sure the spark plugs are removed to enable the engine to rotate freely.

Carefully rotate the crankshaft two complete turns to check for correct operation.

- 11  **CAUTION:** Make sure the spark plugs are removed to enable the engine to rotate freely.

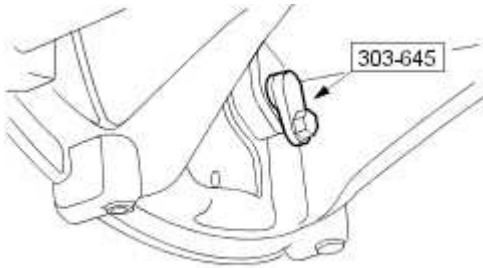


CAUTION: Do not rotate the crankshaft counterclockwise.



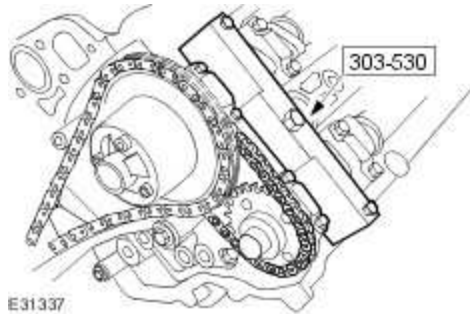
CAUTION: Rotate the crankshaft clockwise to position the engine to top dead center (TDC) No. 1 cylinder

Install the special tool.



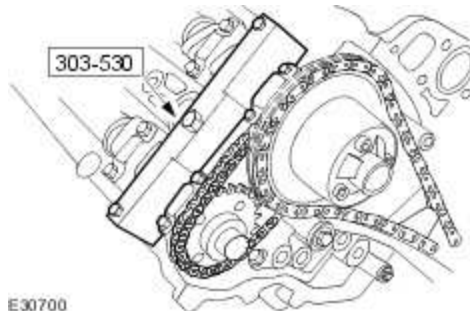
VUJ0002400

12 . Install the special tool to the left-hand cylinder head.



E31337

13 . Install the special tool to the right-hand cylinder head.



E30700

14 . Rotate the crankshaft to check correct operation.

15 . Remove excess sealant which may squeeze out at the front cover sealing surfaces.

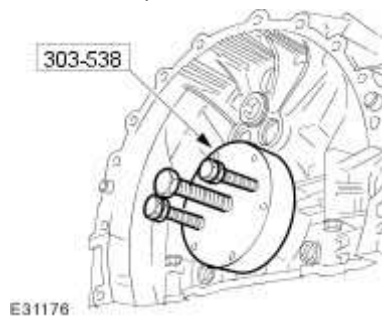
16 . **NOTE:**

Make sure the transit sleeve is correctly positioned.

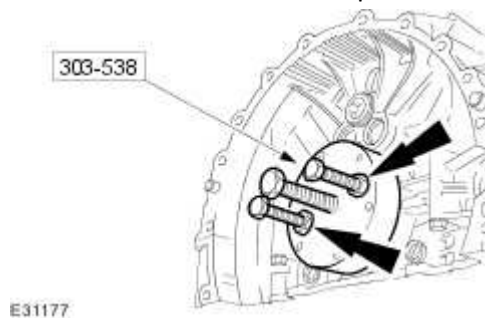
Align the rear crankshaft oil seal, to the crankshaft.

► Carefully remove the transit sleeve, leaving the seal in place.

17 . Install the special tool to the crankshaft.



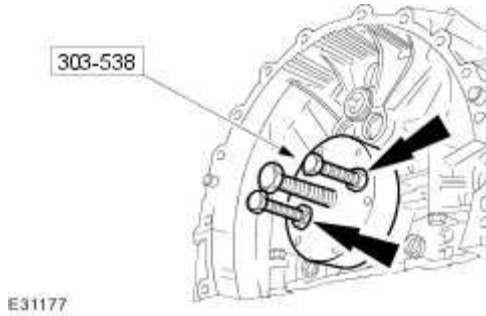
18 Reposition the nuts to hold the special tool against the crankshaft rear seal. Check that the
crankshaft rear seal and the special tool are parallel to the rear of the engine.



19 . **NOTE:**

Alternate nut tightening to correctly seat the crankshaft rear seal.

Using the special tool, install the crankshaft rear seal.



20 . Remove the special tool from the crankshaft.

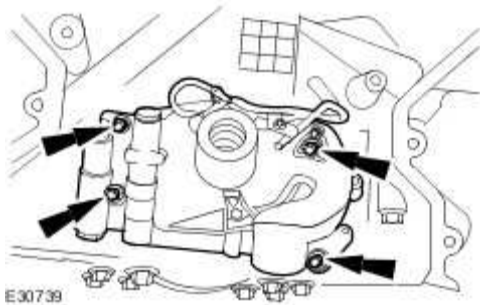
▶ Check that the seal is located correctly.

21 . **NOTE:**

Install a new gasket.

Install the oil pump.

▶ Tighten to 12 Nm.



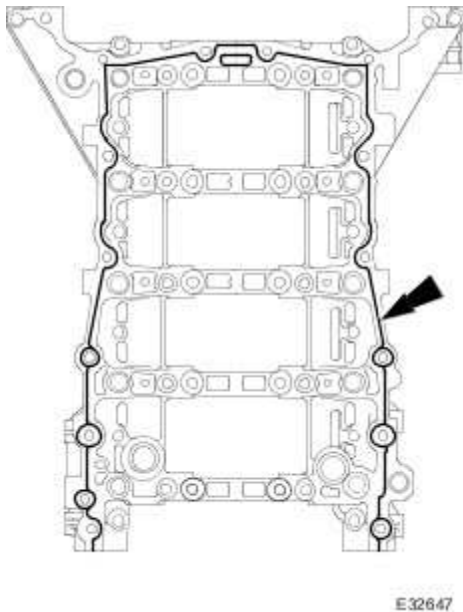
22 **NOTE:**

It is important that the oil pan extension is bolted to the crankshaft main bearing carrier within twenty minutes of applying the sealant.

Apply a continuous 3mm bead of sealant around the crankshaft main bearing carrier flange

OR around the oil pan body flange as shown.

► Use WSS-M4G323-A4-RTV sealant.

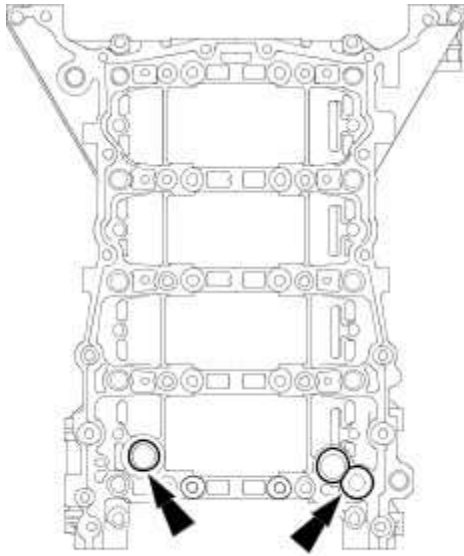


23 NOTE:

It is important that the oil pan extension is bolted to the crankshaft main bearing carrier within twenty minutes of applying the sealant.

Apply a continuous 2mm bead of sealant, around the diverter valve flange as shown.

► Use WSS-M4G323-A4-RTV sealant.



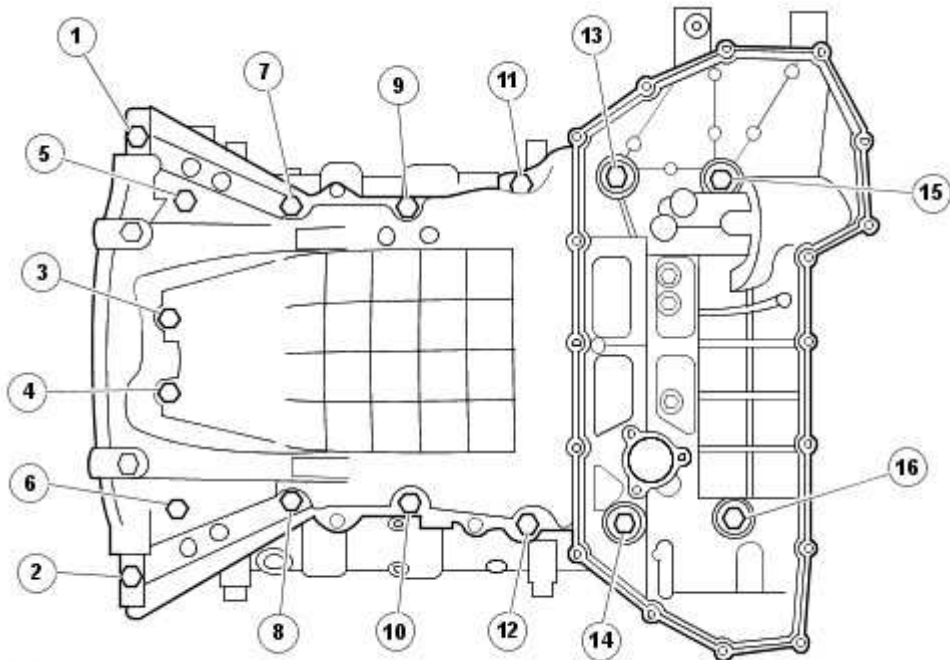
E32648

24 . NOTE:

Tighten the retaining bolts in the sequence shown.

Install the upper oil pan.

► Tighten to 21 Nm.



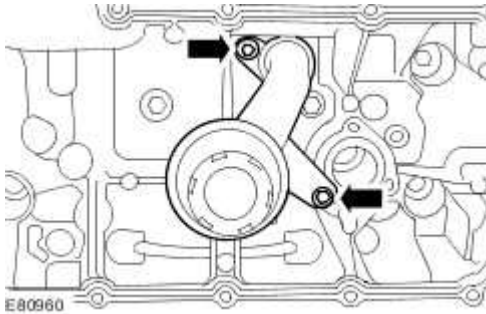
E81046

25 . **NOTE:**

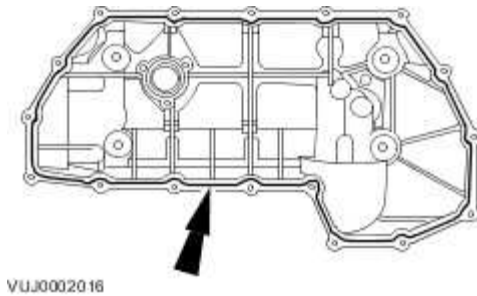
Install a new O-ring seal.

Install the oil strainer.

▶ Tighten to 12 Nm.

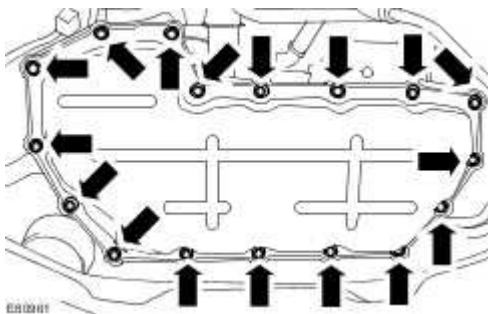


26 . Install the oil pan gasket to the oil pan body assembly.



27 . Install the lower oil pan.

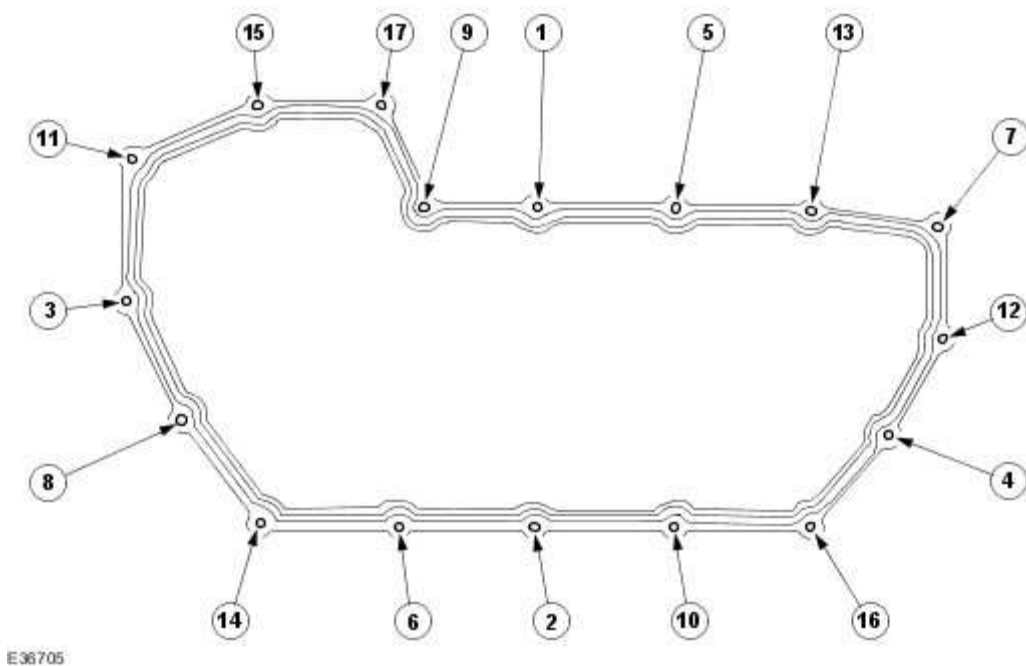
▶ Install, but do not fully tighten the retaining bolts.



28 . Tighten the retaining bolts in the indicated sequence in two stages.

► Stage 1: bolts 1 to 7, tighten to 5 Nm.

► Stage 2: bolts 1 to 17, tighten to 12 Nm.



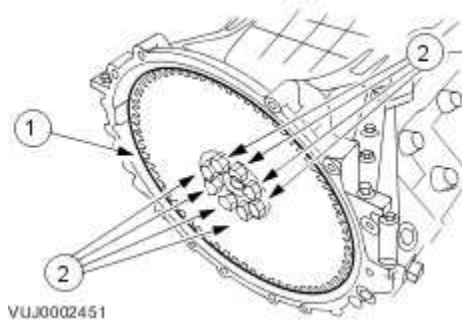
29 . Install the drive plate.

► Install the drive plate.

► Install the drive plate retaining bolts, and tighten in 2 stages.

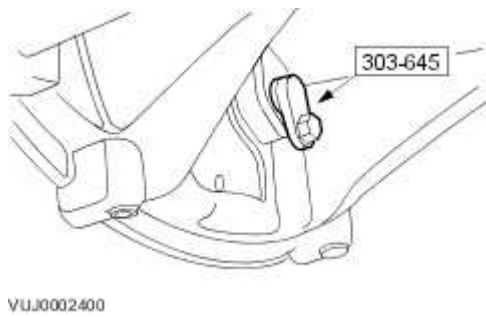
► Stage 1: Tighten to 15 Nm.

► Stage 2: Tighten to 110 Nm.



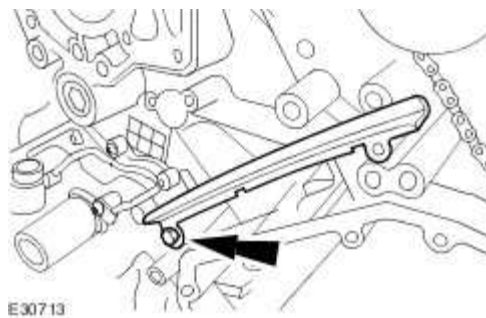
30 . Position the crankshaft.

► Install the special tool.

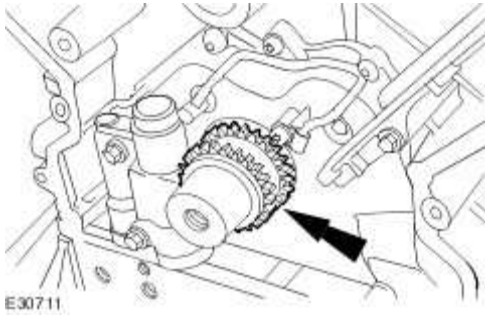


31 . Install the left-hand primary timing chain tensioner guide.

► Tighten to 12 Nm.



32 . Install the crankshaft sprocket.



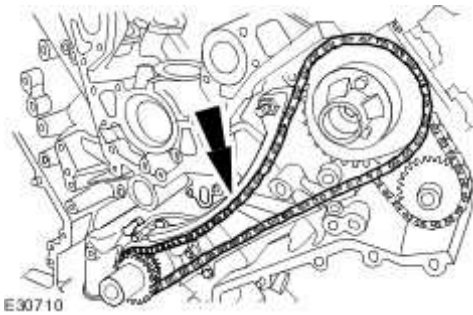
33



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

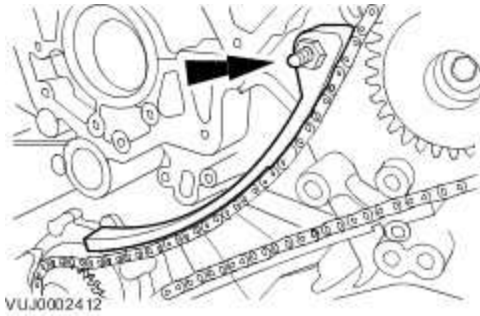
Install the left-hand primary timing chain.

▶ Install the primary chain over the crankshaft sprocket and the intake sprocket.



34 . Install the left-hand primary timing chain tensioner guide.

▶ Tighten to 12 Nm.

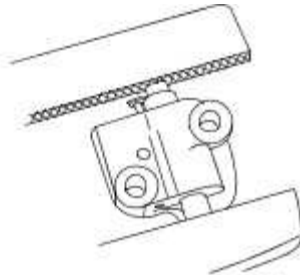


35



- **CAUTION:** Use suitable protective covers on the vice jaws to protect the timing chain tensioner.

Secure the left-hand timing chain tensioner in the vice jaws.

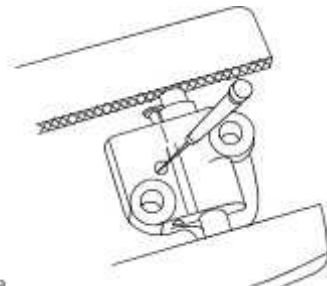


36



- **CAUTION:** During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the left-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



37 NOTE:

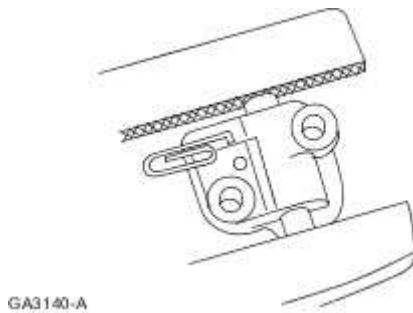
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the left-hand timing chain tensioner.

38 NOTE:

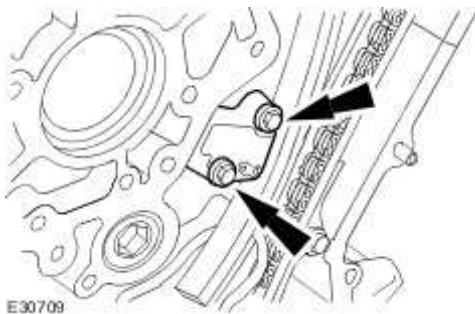
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the left-hand timing chain tensioner piston.



39 . Install the left-hand primary timing chain tensioner assembly.

▶ Tighten to 12 Nm.



40 . Release the tension in the left-hand timing chain tensioner.

▶ Remove the retaining tool.

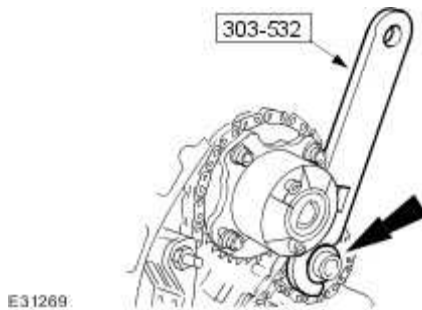
41



CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

Using the special tool apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

► Tighten to 120 Nm.



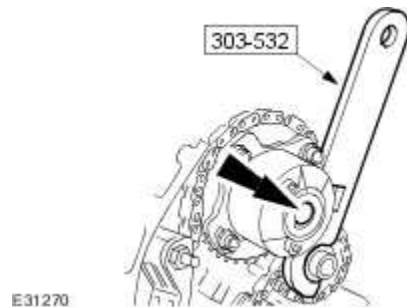
42



CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

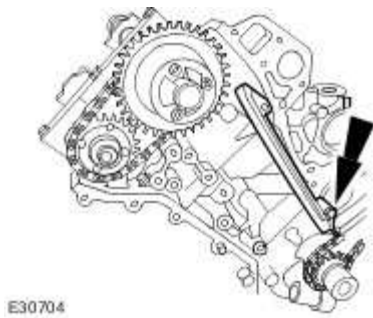
Using the special tool apply force to the tool in an anti-clockwise direction.

► Tighten to 120 Nm.



43 . Install the right-hand primary timing chain guide.

▶ Tighten to 12 Nm.



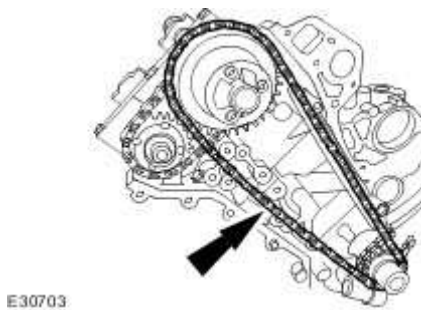
44



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

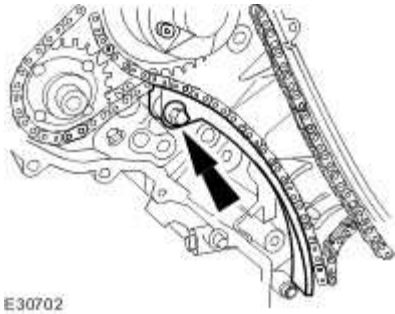
Install the right-hand primary timing chain.

▶ Install the primary chain over the crankshaft sprocket and the intake sprocket.



45 . Install the right-hand primary timing chain tensioner guide.

▶ Tighten to 12 Nm.

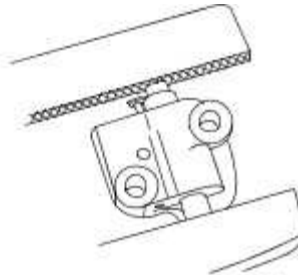


46



CAUTION: Use suitable protective covers on the vice jaws to protect the timing chain tensioner.

Secure the right-hand timing chain tensioner in the vice jaws.

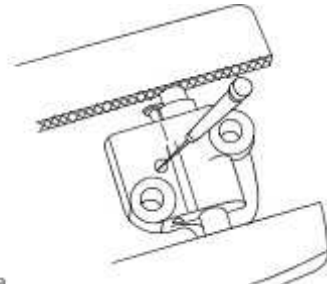


47



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the right-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



48 NOTE:

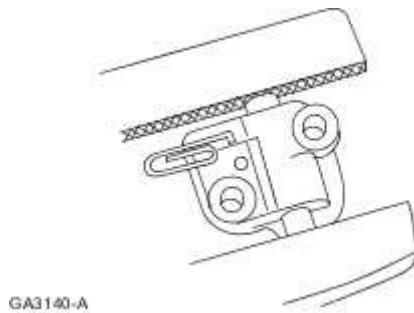
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the right-hand timing chain tensioner.

49 NOTE:

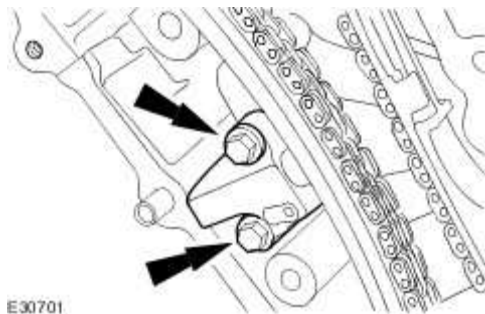
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the right-hand timing chain tensioner piston.



50 . Install the right-hand primary timing chain tensioner assembly.

▶ Tighten to 12 Nm.



51 . Release the tension in the right-hand timing chain tensioner.

▶ Remove the retaining tool.

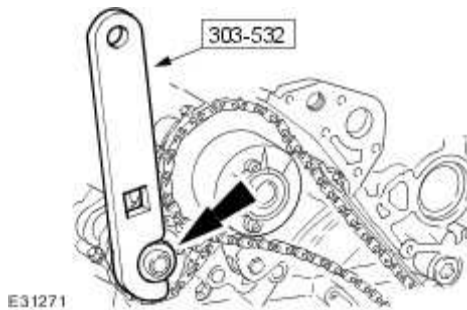
52



CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

Using the special tool apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

▶ Tighten to 120 Nm.



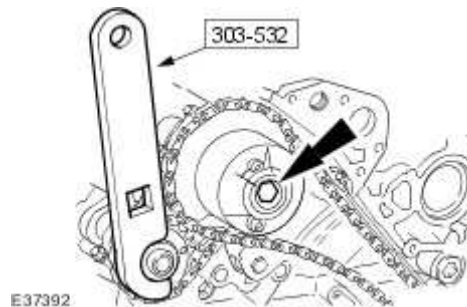
53



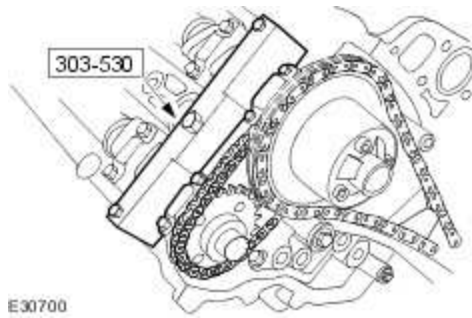
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

Using the special tool apply force to the tool in an anti-clockwise direction.

▶ Tighten to 120 Nm.



54 . Remove the special tool from the right-hand cylinder head.

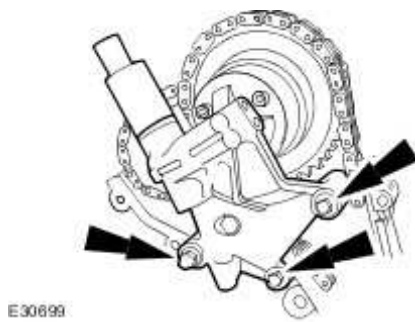


55 . **NOTE:**

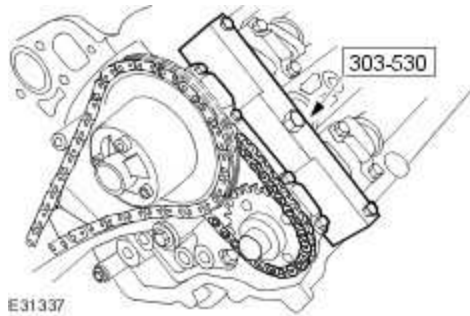
Install new O-ring seals.

Install the right-hand VCT oil control unit housing.

► Tighten to 22 Nm.



56 . Remove the special tool from the left-hand cylinder head.

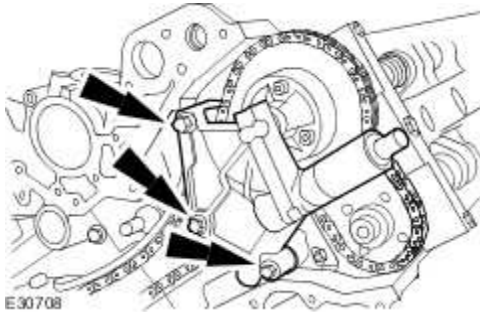


57 . **NOTE:**

Install new O-ring seals.

Install the left-hand VCT oil control unit housing.

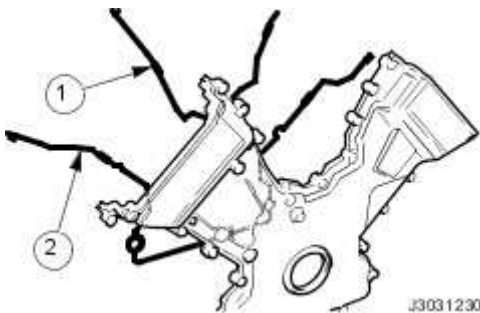
▶ Tighten to 22 Nm.



58 . Install new seals to the timing cover.

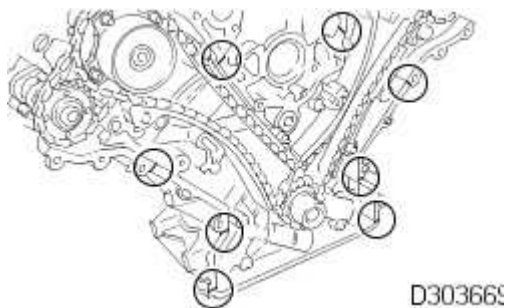
▶ Install the new seal to the inner groove on the face of the timing cover.

▶ Install the new seal to the outer groove on the face of the timing cover.



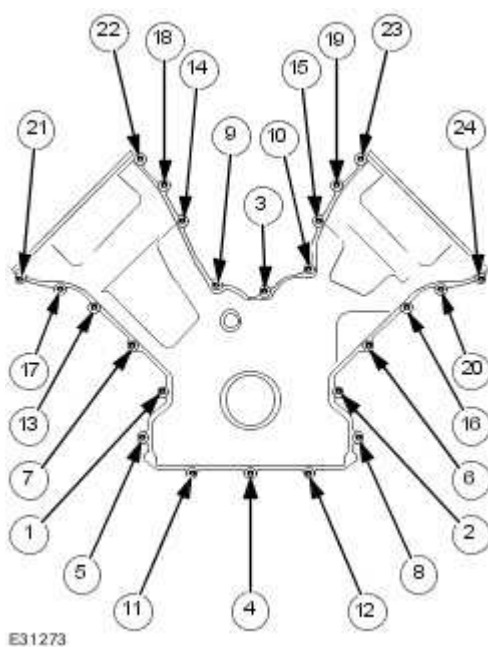
59 Apply sealant to the eight joints on the engine face.

▶ Sealant beads to be 3mm diameter and 12mm long. Cut the nozzle of the sealant tube to produce a 3 mm (0.12 in) bead. (Install and tighten the securing bolts within twenty minutes of sealant application).



60 . Install the timing cover.

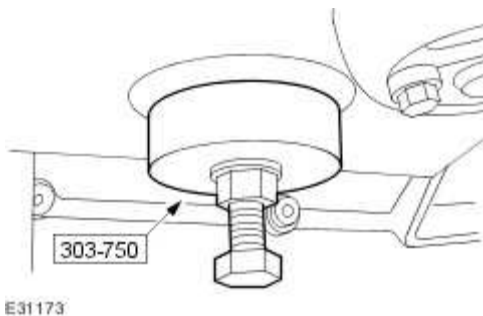
► Tighten in the sequence shown.



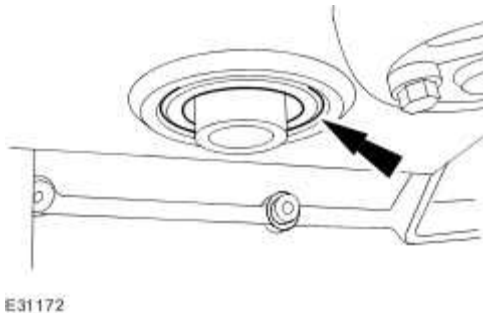
61 .  **CAUTION:** Make sure the crankshaft front seal mating faces are clean and dry.

 **CAUTION:** Do not remove the crankshaft front seal protector.

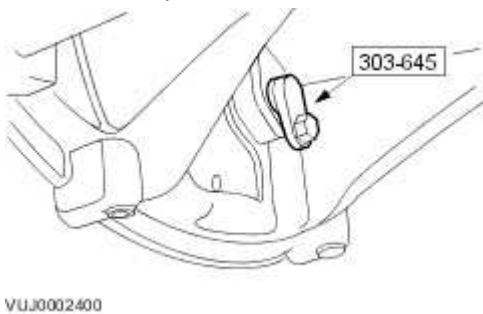
Using the special tool, install a new crankshaft front seal.



62 . Remove the crankshaft seal protector.



63 . Remove the special tool.



64 . Install the CKP sensor.

► Tighten to 12 Nm.



E30694

65 . Install a new O-ring seal to the crankshaft pulley.

► Lubricate the new O-ring.

66



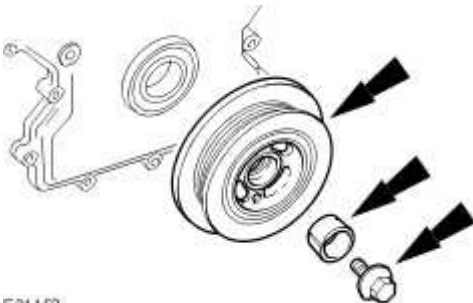
CAUTION: The screw thread in the crankshaft must be cleaned out before a new crankshaft pulley bolt is installed.



CAUTION: A new crankshaft pulley bolt must be used.

Install, but do not tighten, a new crankshaft pulley retaining bolt.

► Install the crankshaft pulley and locking ring to the crankshaft.



E31152

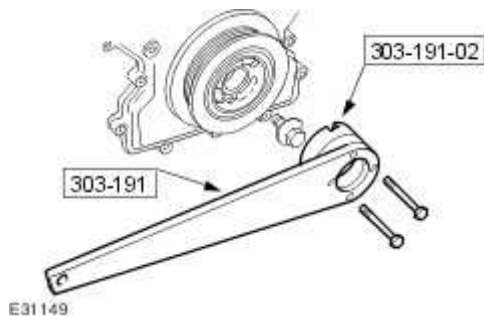
67



CAUTION: Under no circumstances should the crankshaft setting peg 303-645 be used in the following operations to lock the crankshaft.

Using special tools, retain the crankshaft pulley.

► Tighten the crankshaft pulley retaining bolt to 375 Nm.



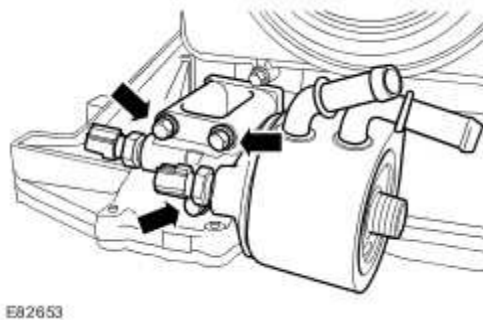
68 . Remove the special tools.

69 . **NOTE:**

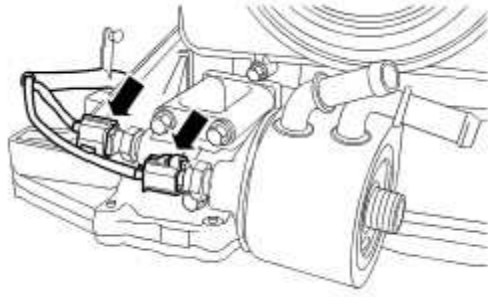
Install a new gasket.

Install the oil filter housing.

► Tighten to 21 Nm.



70 . Connect the oil pressure switch and oil temperature sensor electrical connectors.

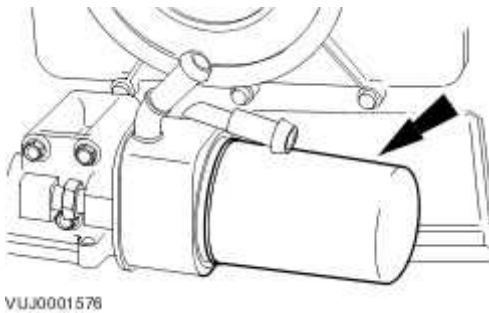


71 . **NOTE:**

Apply a suitable amount of clean engine oil to lubricate the oil filter O-ring seal.

Install a new oil filter.

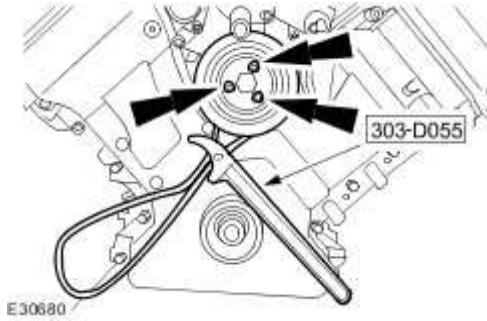
► Tighten to 18 Nm.



72 . Install the water pump pulley.

► Using the special tool, retain the water pump pulley.

► Tighten to 10 Nm + 45°.



73 NOTE:

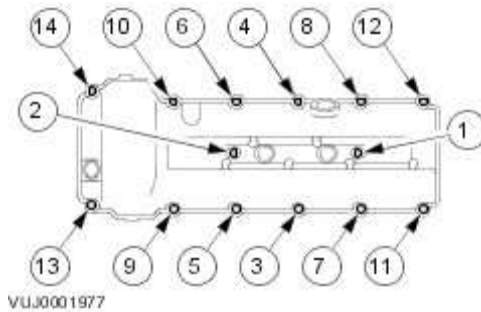
Install new valve cover gaskets.

NOTE:

Apply an 8mm diameter bead of silicone gasket sealant on the two places where the cylinder head and front cover join.

Install the left-hand valve cover.

► Tighten in the sequence shown to 10 Nm.



74 NOTE:

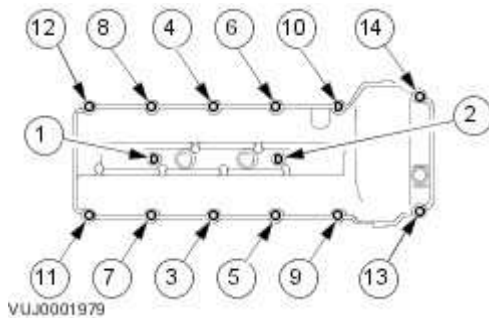
Install new valve cover gaskets.

NOTE:

Apply an 8mm diameter bead of silicone gasket sealant on the two places where the cylinder head and front cover join.

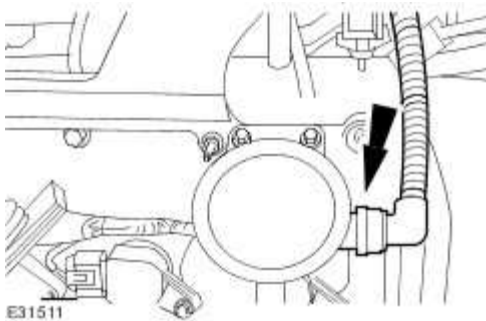
Install the left-hand valve cover.

► Tighten in the sequence shown to 10 Nm.



Vehicles without supercharger

75 . Connect the PCV pipe.



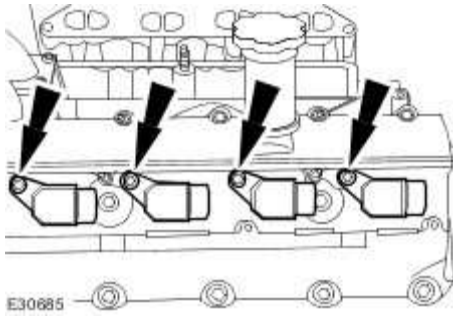
All vehicles

76 . **NOTE:**

Left-hand shown, right-hand similar

Install the ignition coils.

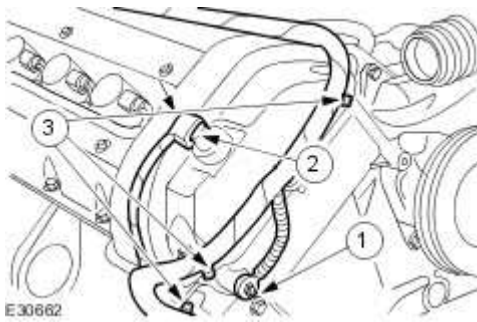
► Tighten to 5 Nm.



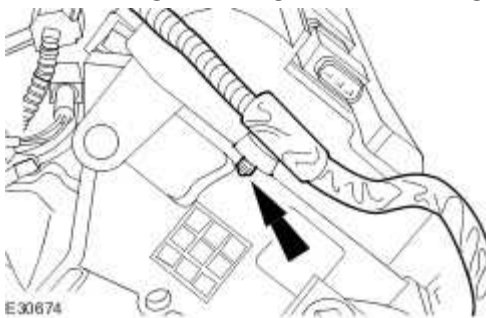
77 . Attach the engine harness.

▶ Connect the VCT solenoid electrical connector.

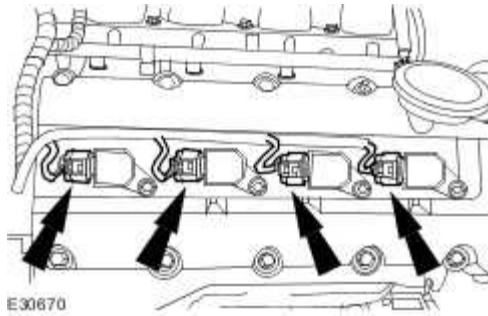
▶ Attach the engine harness.



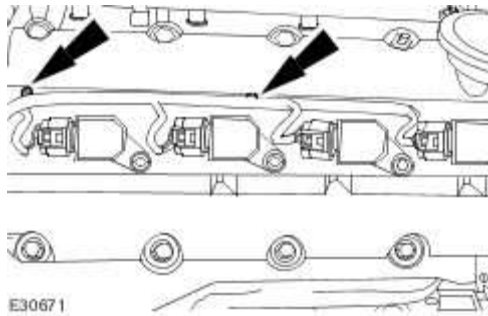
78 . Attach the right-hand ignition coil wiring harness



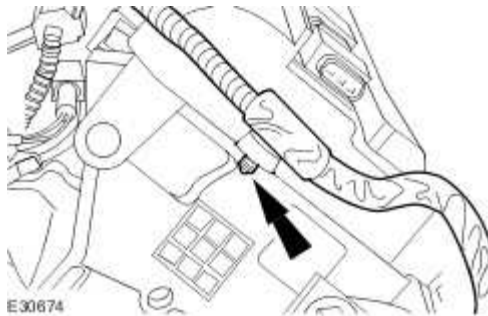
79 . Connect the right-hand ignition coil electrical connectors.



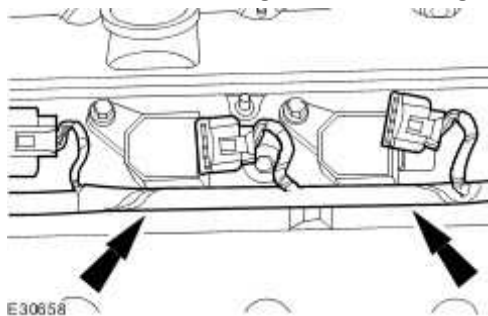
80 . Attach the right-hand ignition coil wiring harness.



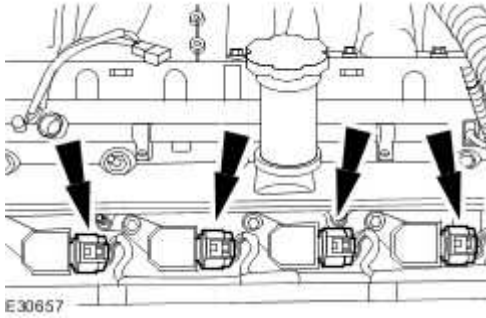
81 . Attach the left-hand ignition coil wiring harness.



82 . Attach the left-hand ignition coil wiring harness.



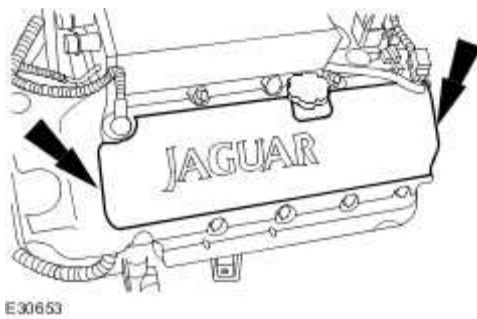
83 . Connect the left-hand ignition coil electrical connectors.



84 . **NOTE:**

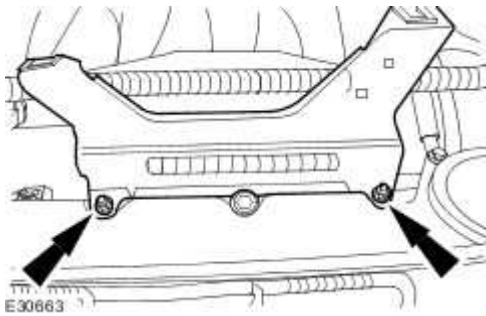
Left-hand shown, right-hand similar.

Install both ignition coil covers.

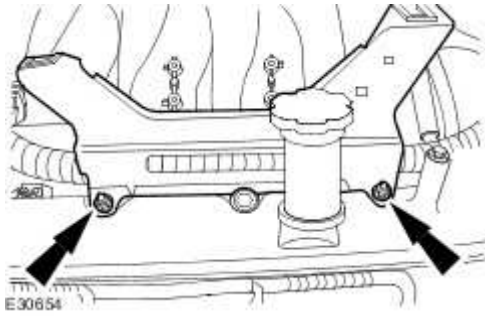


Vehicles without supercharger

85 . Install the right-hand engine cover retaining bracket.



86 . Install the left-hand engine cover retaining bracket.



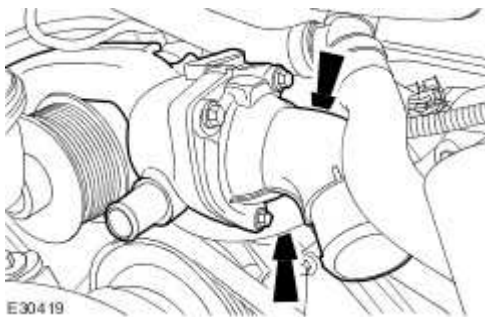
Vehicles with supercharger

87 . NOTE:

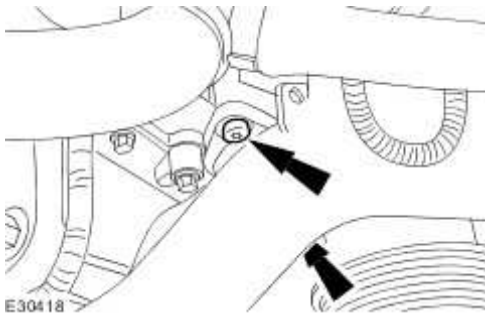
Install new O-ring seals to the thermostat housing.

Install thermostat housing.

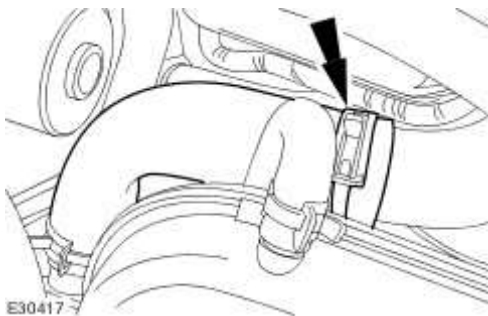
► Tighten to 10 Nm.



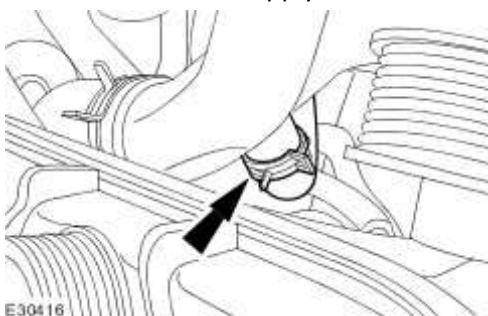
88 . Tighten to 10 Nm.



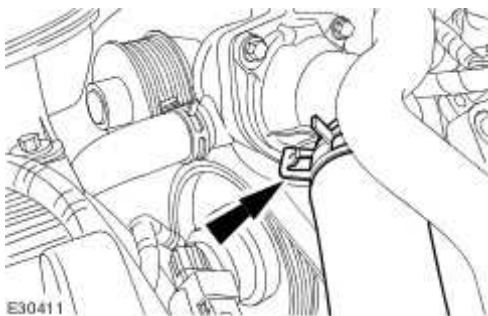
89 . Connect the water pump outlet to thermostat housing hose.



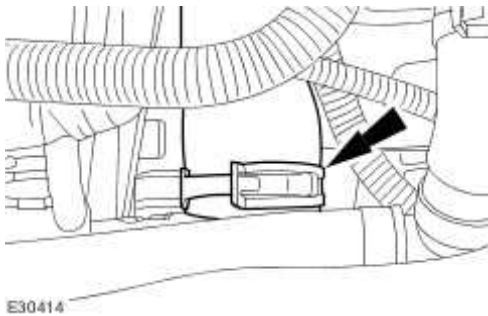
90 . Connect the heater supply hose to the thermostat housing.



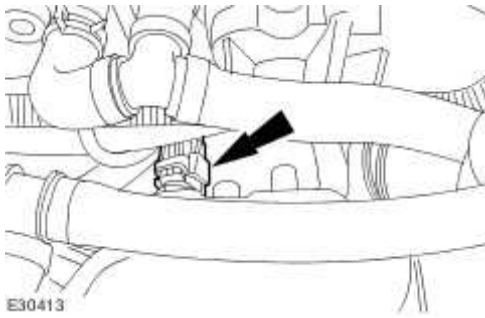
91 . Connect the thermostat outlet hose.



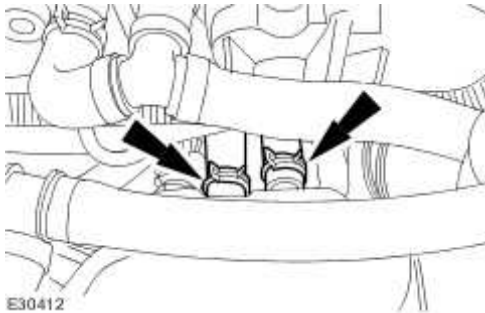
92 . Reposition the thermostat housing hose retaining clip.



93 . Connect the ECT sensor electrical connector.



94 . Connect the thermostat housing hoses



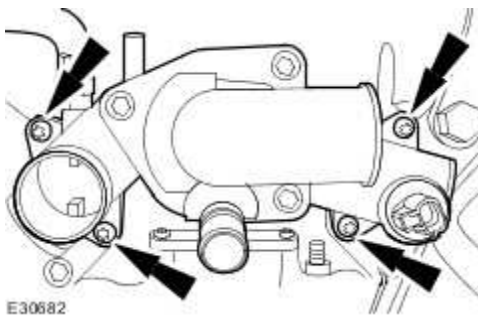
Vehicles without supercharger

95 . **NOTE:**

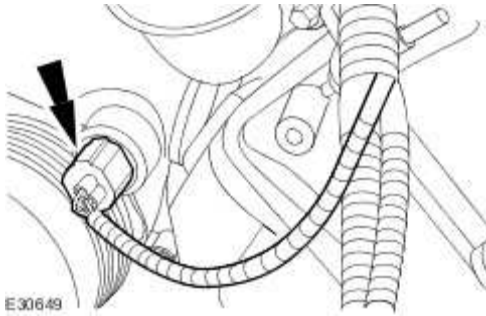
Install new O-ring seals.

Install the thermostat housing.

▶ Tighten to 10 Nm.



96 . Connect the ECT sensor electrical connector.

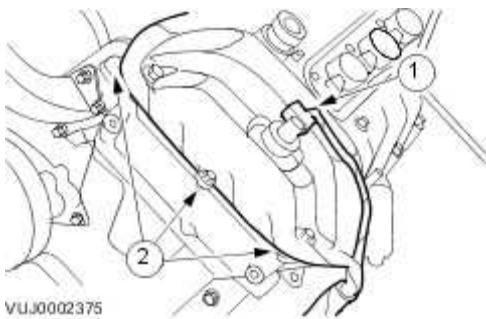


All vehicles

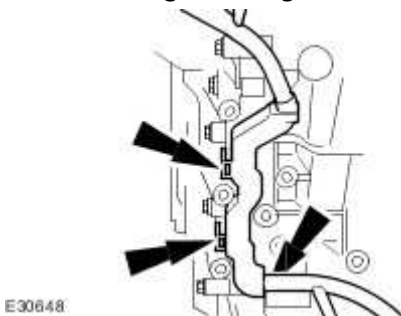
97 . Attach the engine wiring harness.

▶ Connect the VCT solenoid electrical connector.

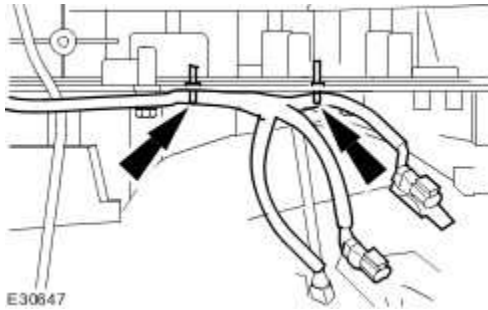
▶ Attach the engine wiring harness.



98 . Attach the engine wiring harness to the cylinder block.



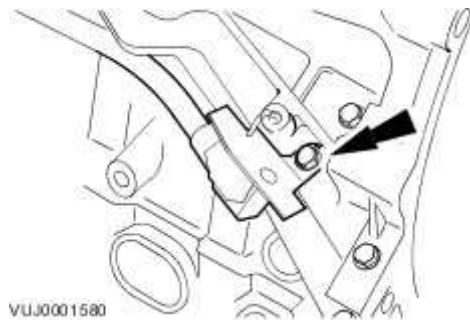
99 . Attach the engine wiring harness to the cylinder block.



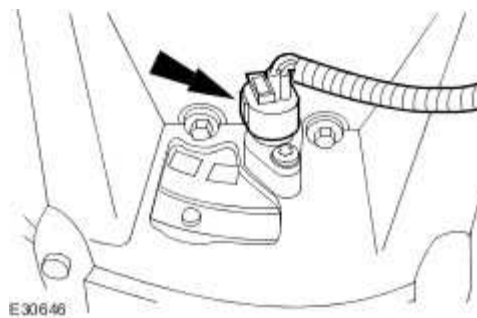
100 . Attach the left-hand HO2S wiring harness.

▶ Install the retaining bolt.

▶ Tighten to 10 Nm.



101 . Connect the CKP sensor electrical connector.

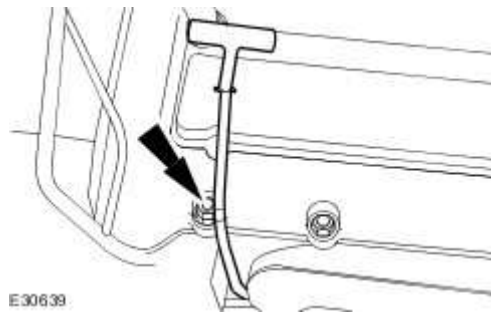


102 . **NOTE:**

Install a new O-ring seal.

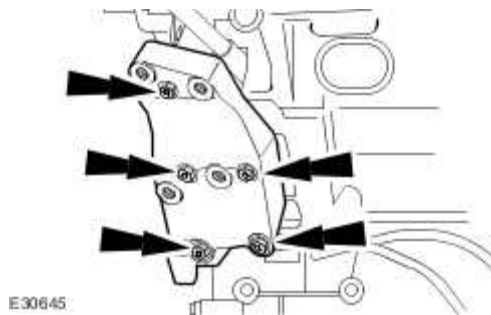
Install the oil level indicator and tube.

► Tighten to 6 Nm.



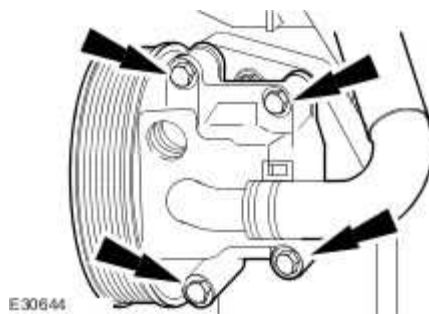
103 . Install the power steering pump mounting bracket.

► Tighten to 25 Nm.



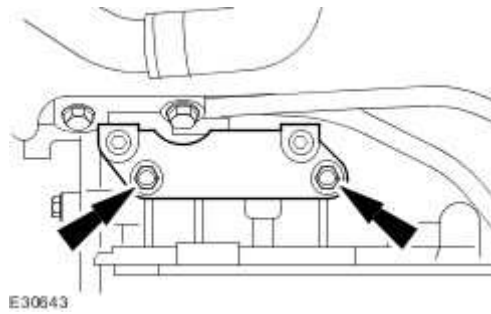
104 . Install the power steering pump.

► Tighten to 25 Nm.



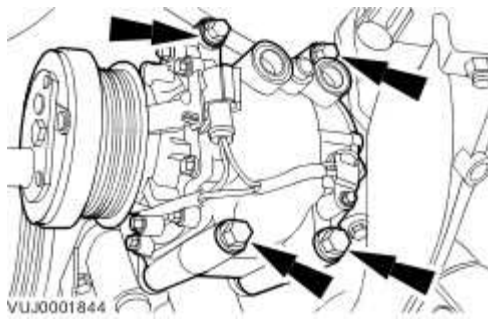
105 . Install the A/C compressor mounting bracket.

► Tighten to 25 Nm.



106 . Install the A/C compressor.

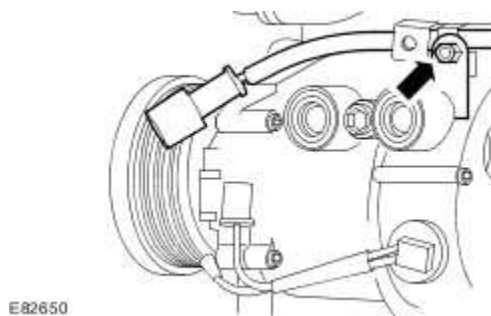
► Tighten to 25 Nm.



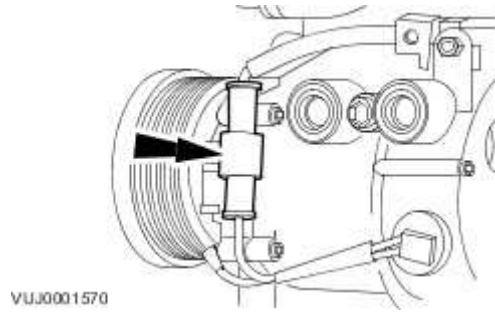
107 . Attach the A/C compressor harness.

► Install the retaining nut.

► Tighten to 10 Nm.



108 . Connect the A/C compressor electrical connector.

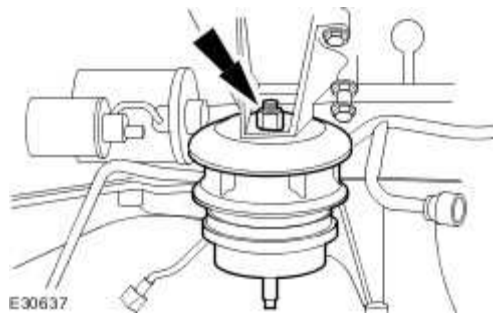


109 . **NOTE:**

Right-hand shown, left-hand similar.

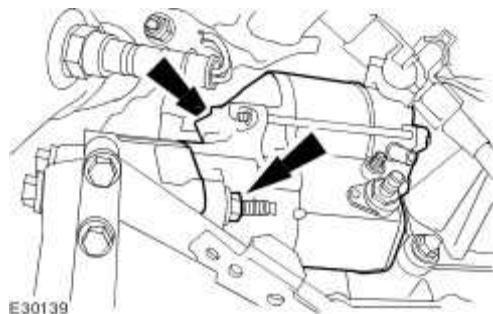
Install both engine mounts.

▶ Tighten to 43 Nm.

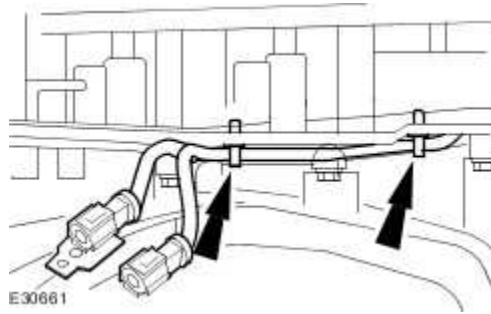


110 . Install the starter motor.

▶ Tighten to 45 Nm.



111 . Attach the right-hand HO2S wiring harness to the cylinder block.



Removal

Engine (12.41.01)

Special Service Tools



303-536

Engine lifting brackets

303-536



303-749

Engine lifting brackets

303-749



418-535

5 point security torx bit

418-535

Removal

All Vehicles

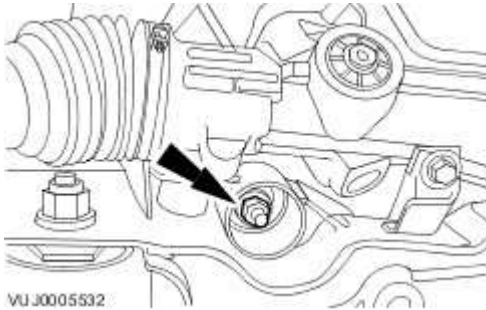
- 1 Reclaim the air conditioning (A/C) refrigerant.
 - . For additional information, refer to Air Conditioning (A/C) System Recovery, Evacuation and Charging (82.30.30)

- 2 . Remove the automatic transmission.
 - For additional information, refer to Transmission - 3.5L/4.2L (44.20.01)

3 . NOTE:

Left hand shown, right hand similar.

Remove the engine mount retaining nuts.



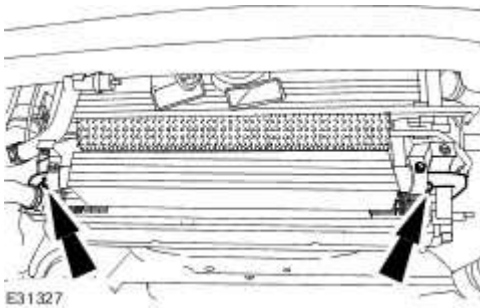
Vehicles with supercharger

4 . NOTE:

Place a suitable container underneath the oil cooler to prevent oil spillage.

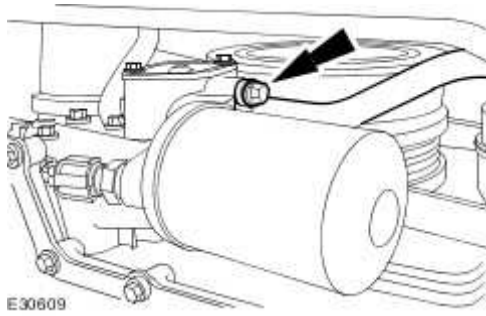
Detach the oil cooler lines.

▶ Remove and discard the oil cooler O-ring seals.



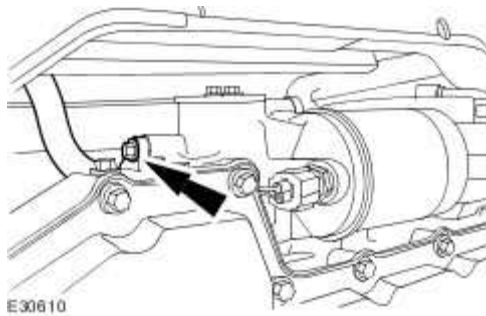
5 . Remove the oil cooler inlet line.

▶ Remove and discard the O-ring seals.



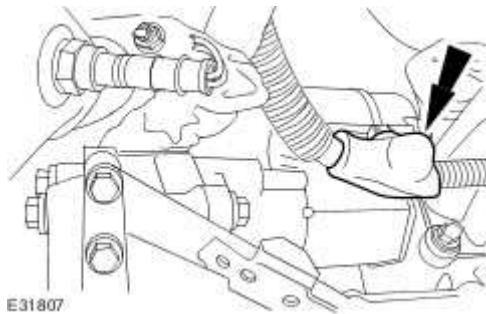
6 . Remove the oil cooler outlet line.

▶ Remove and discard the O-ring seals.

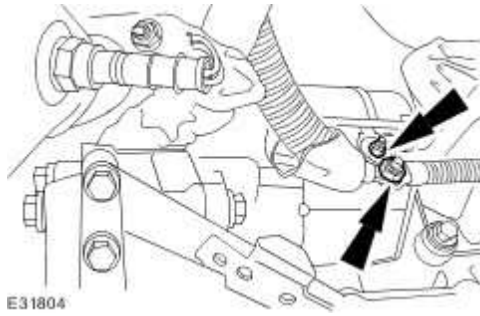


All vehicles

7 . Detach the starter motor positive cable cover.

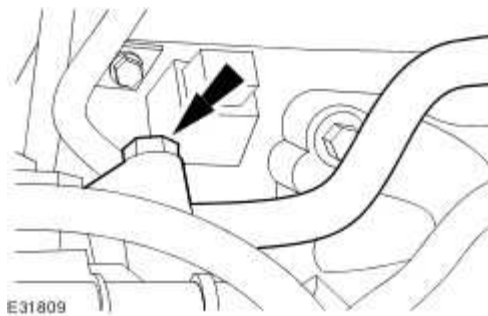


8 . Detach the starter motor positive cables.



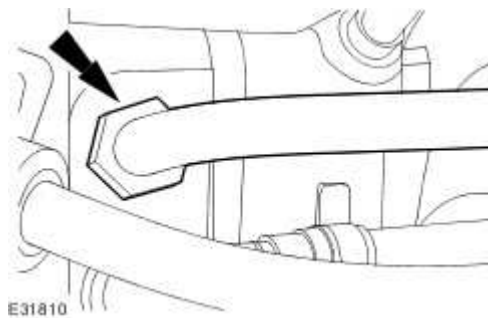
9 . Detach the A/C compressor return line.

▶ Remove and discard the O-ring seals



10 . Detach the power steering line.

▶ Remove and discard the O-ring seal.



11 . Lower the vehicle.

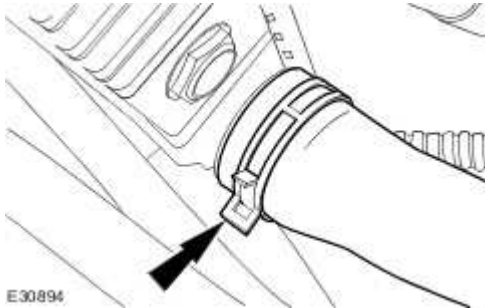
12 . Remove the hood.

For additional information, refer to Hood (76.16.01)

13 . Cooling Fan Motor and Shroud

For additional information, refer to Cooling Fan Motor and Shroud (26.25.25)

14 . Detach the lower coolant hose.



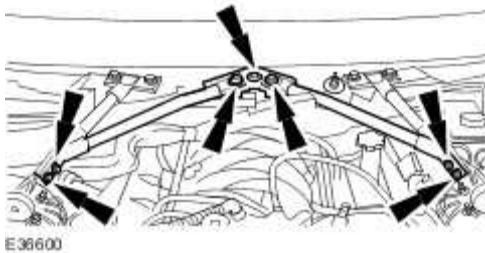
15 . Remove the cabin air filter.

For additional information, refer to Cabin Air Filter (76.10.09)

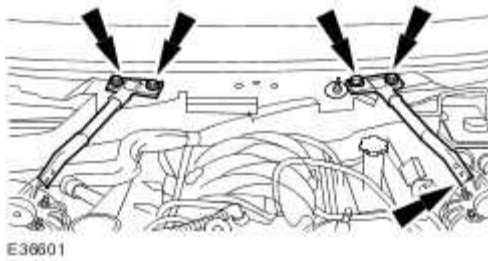
16 . Remove the cowl vent screen.

For additional information, refer to Cowl Vent Screen (76.10.01)

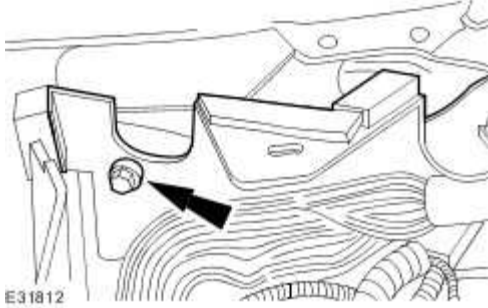
17 . Remove the engine compartment support.



18 . Remove the engine compartment support.



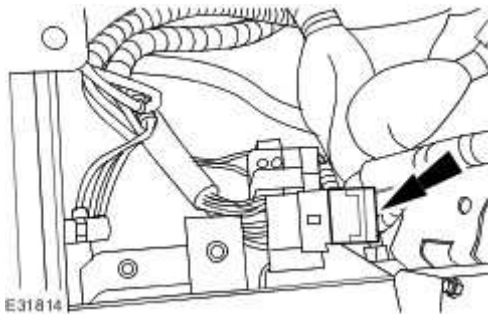
19 . Remove the engine compartment cover.



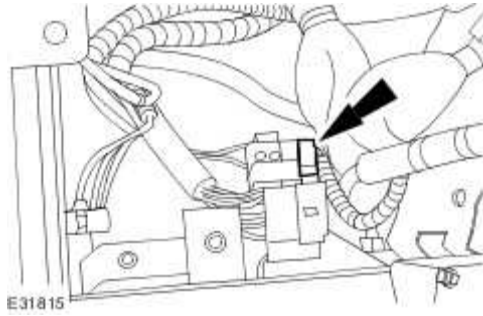
20 . Remove the cabin air filter housing.



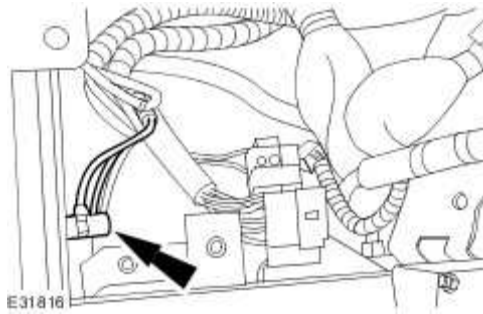
21 . Disconnect the engine harness electrical connector.



22 . Disconnect the engine harness electrical connector.



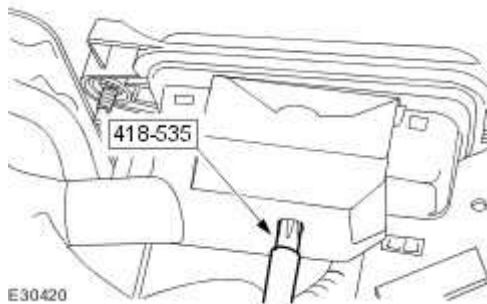
23 . Detach the engine harness earth.



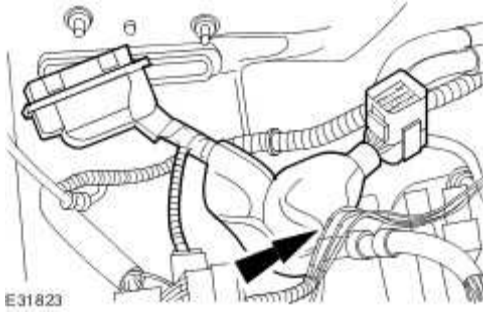
24 **NOTE:**

The engine control module (ECM) electrical connector retaining bolt remains captive in the electrical connector

Disconnect the ECM electrical connector.



25 . Detach the wiring harness retaining clip.



26 Remove the power steering fluid reservoir.

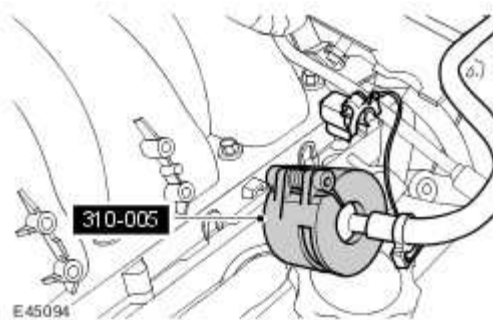
- For additional information, refer to Power Steering Fluid Reservoir - 3.0L/3.5L/4.2L (57.15.08)

27 **NOTE:**

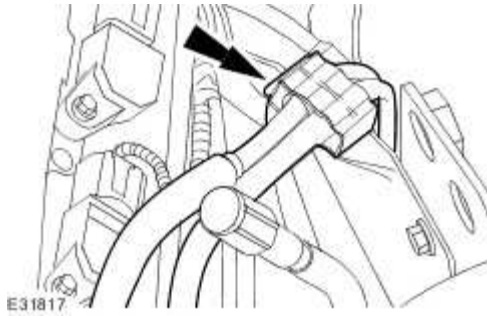
The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.

Using the special tool, disconnect the fuel line.

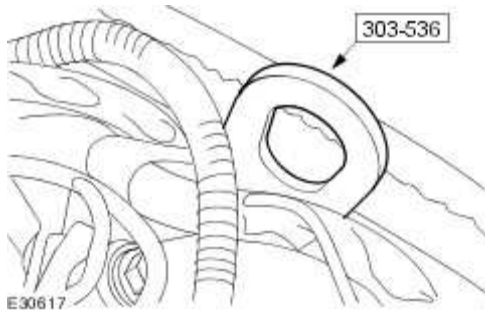
▶ Remove the clip.



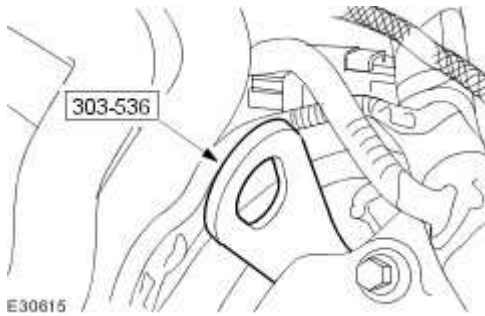
28 . Detach the fuel line retaining bracket.



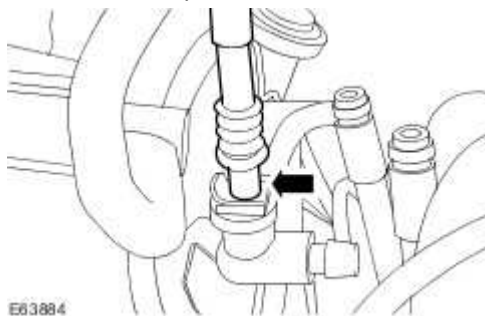
29 . Install the special tool to the left-hand rear of the engine.



30 . Install the special tool to the right-hand rear of the engine.



31 . Detach the evaporative emission canister purge valve hose.



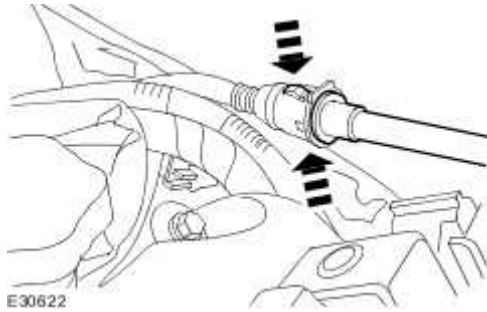
Vehicles without supercharger

32 Remove the throttle body.

- For additional information, refer to Throttle Body - Vehicles Without: Supercharger, VIN Range: G00442->G45703 (19.70.04)

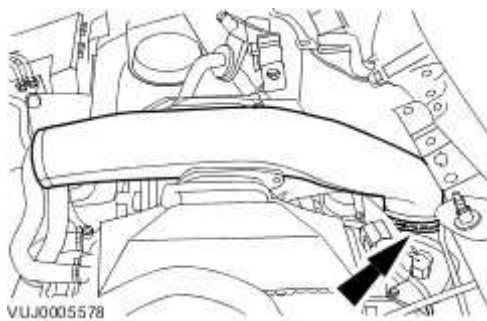
For additional information, refer to Throttle Body - Vehicles Without: Supercharger, VIN Range: G45704->G99999 (19.70.04)

33 . Detach the brake booster vacuum pipe.

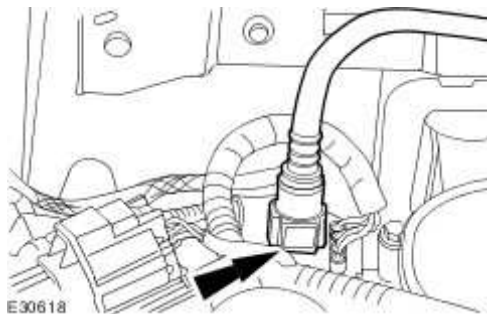


Vehicles with supercharger

34 . Remove the air intake tube.

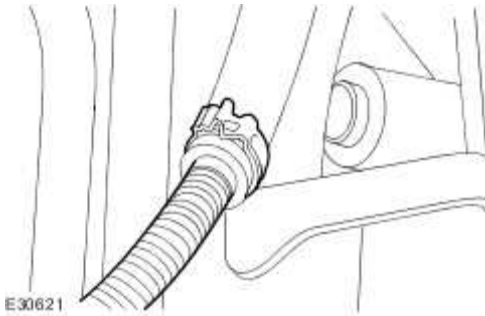


35 . Detach the brake booster vacuum pipe.



36 . Detach the fuel purge line.

▶ Remove and discard the retaining clip.

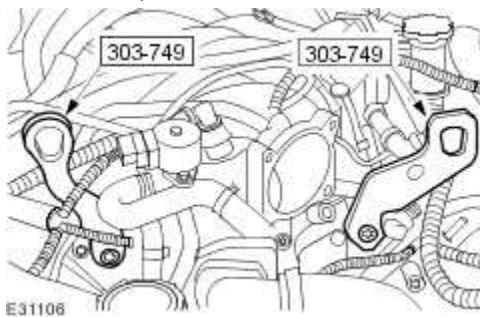


All vehicles

37 **NOTE:**

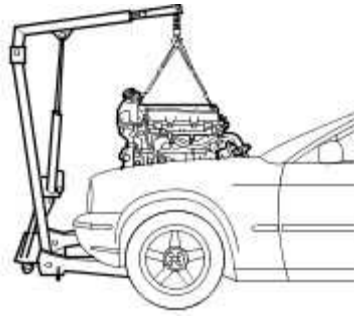
Vehicles with 3.5L or 4.2L engine without supercharger shown, vehicles with 4.2L engine with supercharger similar.

Install the special tools to the front of the engine.



38 . Remove the engine assembly.

▶ Using the special tools, remove the engine assembly.



E31824

Engine (12.41.01)

Special Service Tools



303-536

Engine lifting brackets
303-536



303-749

Engine lifting brackets
303-749



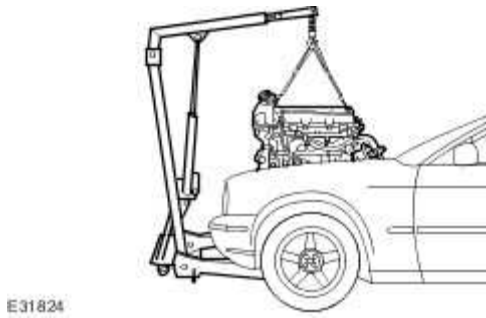
418-535

5 point security torx bit
418-535

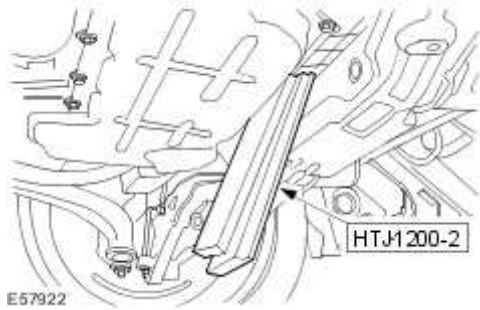
Installation

All Vehicles

- 1 . Install the engine using suitable hydraulic lift.



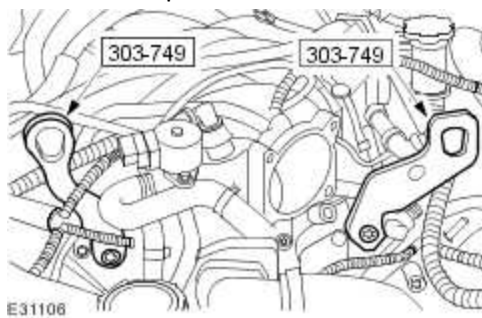
2 . Install the rubber blocks supplied with special tool HTJ1200-2.



3 NOTE:

Vehicles with 3.5L or 4.2L engine without supercharger shown, vehicles with 4.2L engine with supercharger similar.

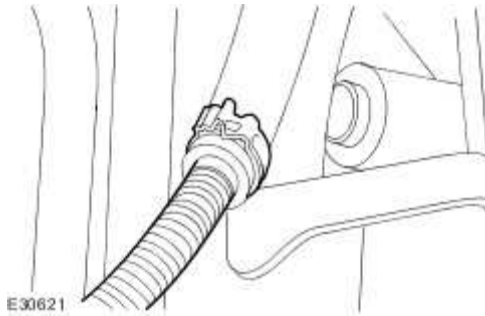
Remove the special tools from the front of the engine.



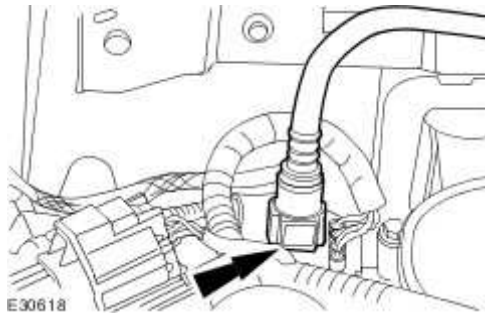
Vehicles with supercharger

4 . Attach the fuel purge line.

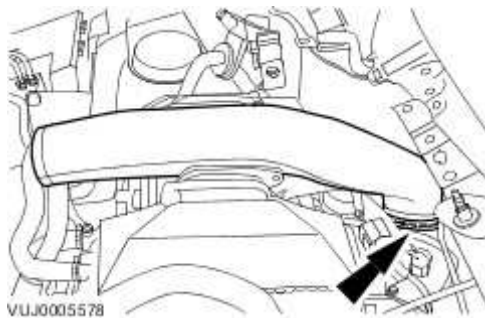
▶ Install a new retaining clip.



5 . Attach the brake booster vacuum pipe.

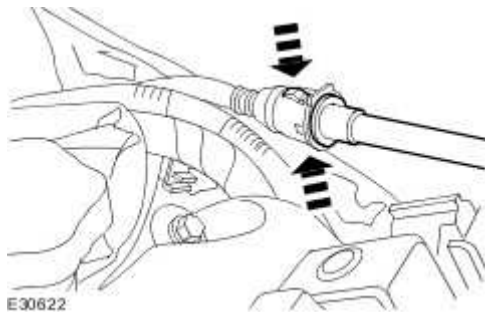


6 . Install the air intake tube.



Vehicles without supercharger

7 . Attach the brake booster vacuum pipe.



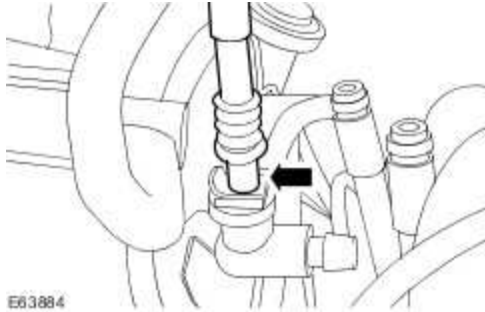
8 Install the throttle body.

. For additional information, refer to Throttle Body - Vehicles Without: Supercharger, VIN Range: G00442->G45703 (19.70.04)

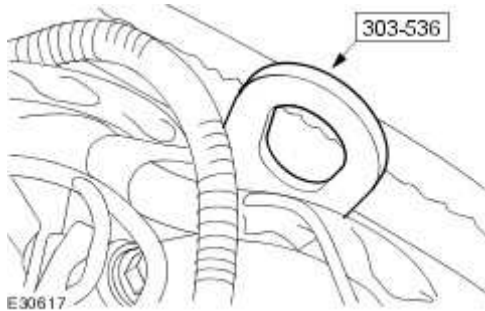
For additional information, refer to Throttle Body - Vehicles Without: Supercharger, VIN Range: G45704->G99999 (19.70.04)

All Vehicles

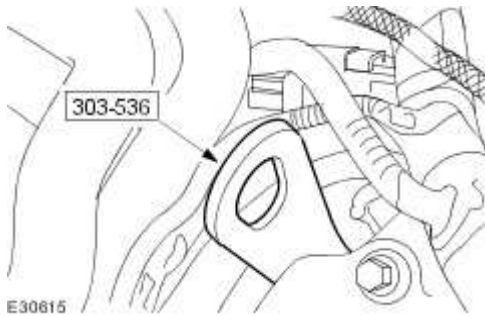
9 . Attach the evaporative emission canister purge valve hose.



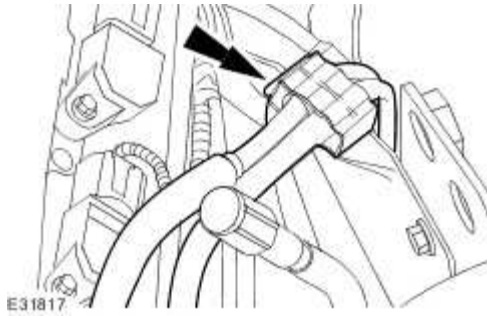
10 . Remove the special tool from the left-hand rear of the engine.



11 . Remove the special tool from the right-hand rear of the engine.



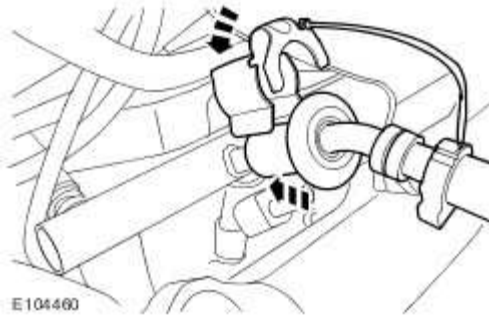
12 . Attach the fuel line retaining bracket.



13 . Connect the fuel line.

▶ Install new O-ring seals.

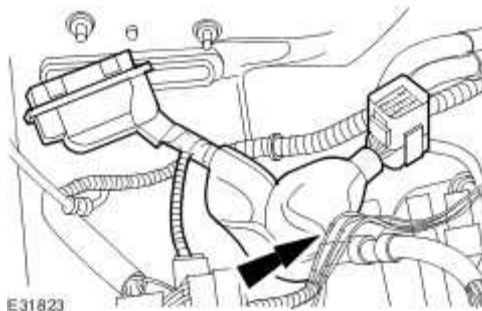
▶ Attach the fuel line retaining clip.



14 Install the power steering fluid reservoir.

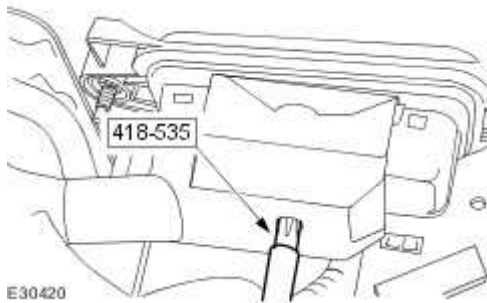
. For additional information, refer to Power Steering Fluid Reservoir - 3.0L/3.5L/4.2L (57.15.08)

15 . Attach the wiring harness retaining clip.

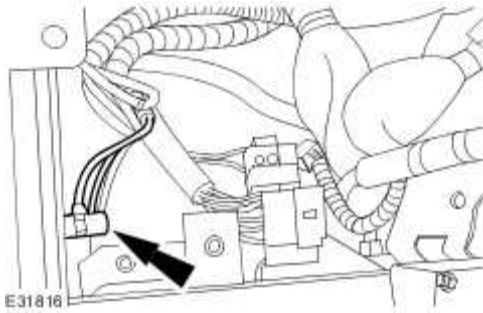


16 . Connect the engine control module (ECM) electrical connector.

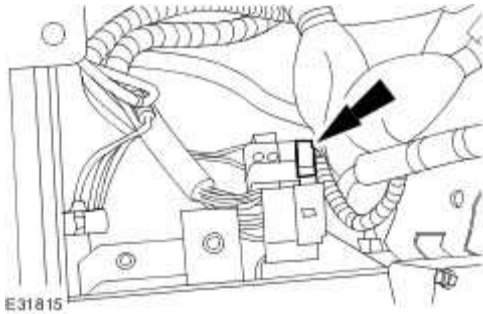
▶ Tighten to 6 Nm.



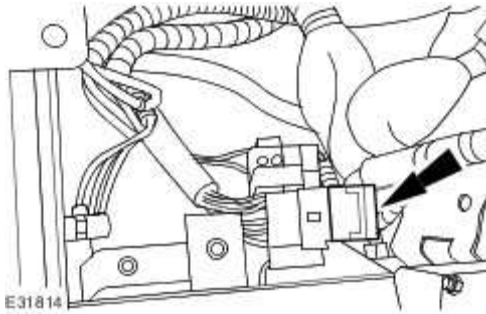
17 . Attach the engine harness earth.



18 . Connect the engine harness electrical connector.



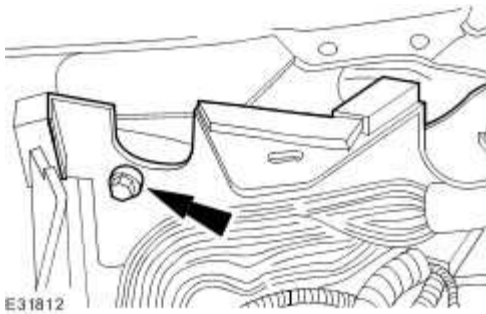
19 . Connect the engine harness electrical connector.



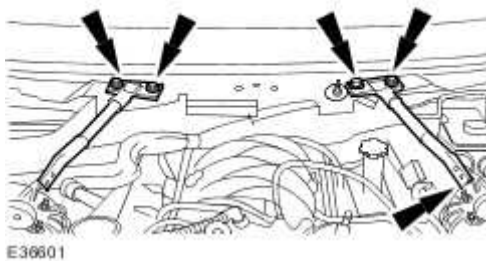
20 . Install the cabin air filter housing.



21 . Install the engine compartment cover.



22 . Install the engine compartment support.



23 . Install the engine compartment support.



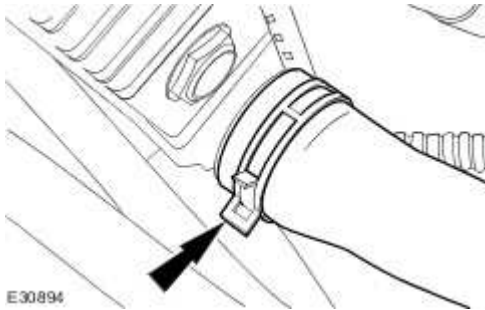
24 . Install the cabin air filter.

For additional information, refer to Cabin Air Filter (76.10.09)

25 . Install the cowl vent screen.

For additional information, refer to Cowl Vent Screen (76.10.01)

26 . Connect the lower coolant hose.



27 . Install the cooling fan motor and shroud.

For additional information, refer to Cooling Fan Motor and Shroud (26.25.25)

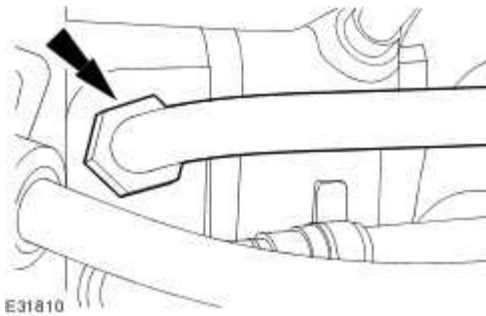
28 . Install the hood.

For additional information, refer to Hood (76.16.01)

29 . Raise the vehicle.

30 . Attach the power steering line.

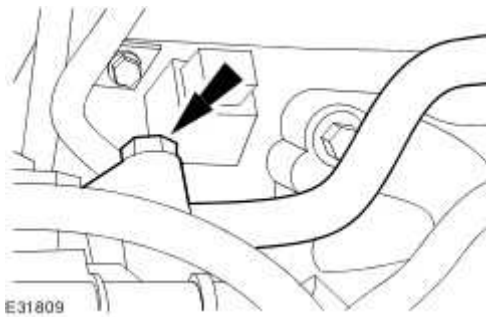
▶ Install a new O-ring seal.



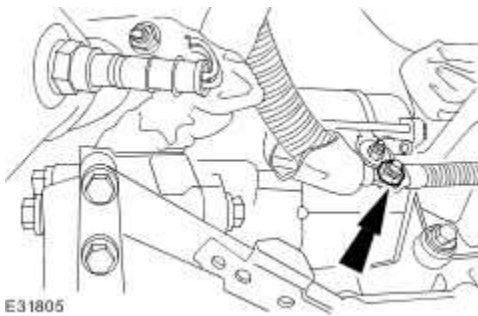
31 . Connect the A/C compressor return line.

▶ Install new O-ring seals.

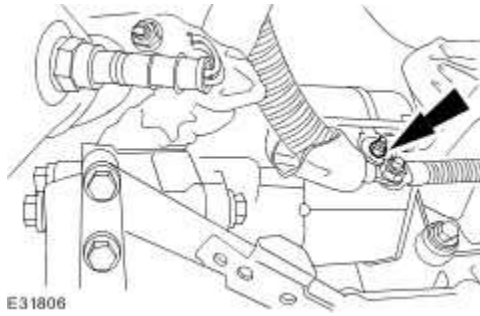
▶ Tighten to 20 Nm.



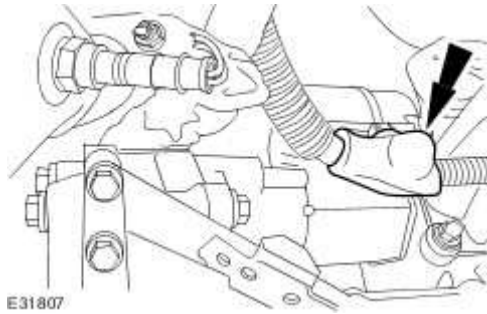
32 . Tighten to 10 Nm.



33 . Tighten to 7 Nm.



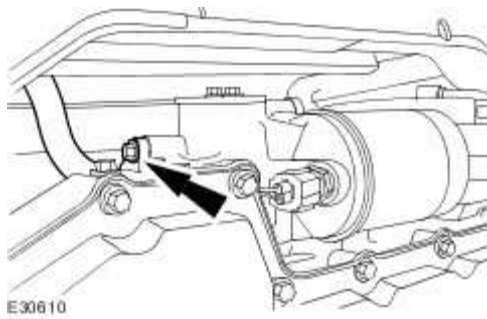
34 . Attach the starter motor positive cable cover.



Vehicles with supercharger

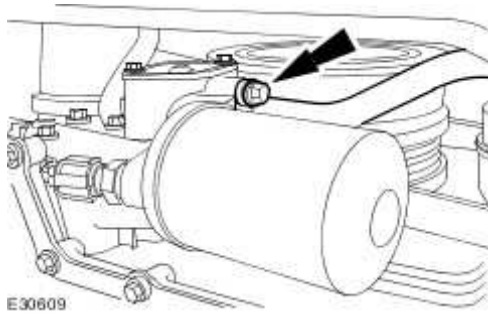
35 . Tighten to 12 Nm.

► Install new O-ring seals.



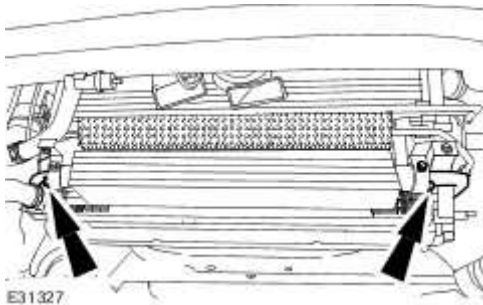
36 . Tighten to 12 Nm.

► Install new O-ring seals.



37 . Tighten to 12 Nm.

► Install new O-ring seals.

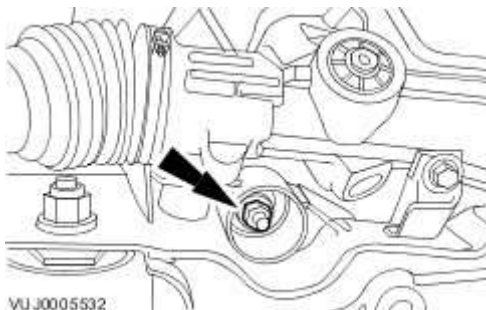


All vehicles

38 . **NOTE:**

Left hand shown, right hand similar.

Tighten to 63 Nm.



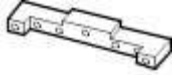
39 . Install the automatic transmission.

For additional information, refer to Transmission - 3.5L/4.2L (44.20.01)

- 40 Carry out the A/C system evacuation and charging procedure.
For additional information, refer to Air Conditioning (A/C) System Recovery, Evacuation and Charging (82.30.30)
- 41 . Carry out the A/C system fluorescent dye leak detection procedure.
For additional information, refer to Fluorescent Dye Leak Detection

Camshafts RH - VIN Range: G00442- >G45703 (12.13.18)

Special Service Tools



303-530

Camshaft setting/locking tool

303-530



303-532

Timing chain tensioning tool

303-532



303-645

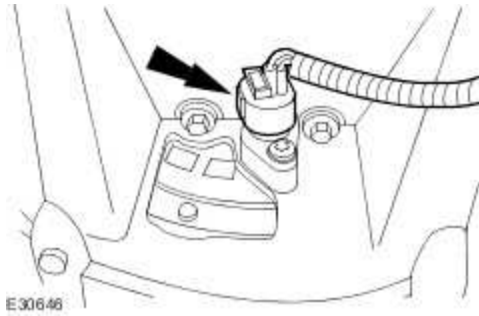
Crankshaft setting, main tool

303-645

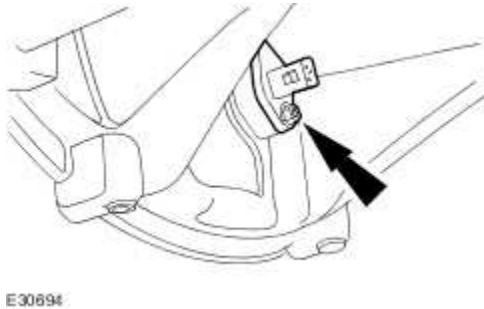
Removal

All vehicles

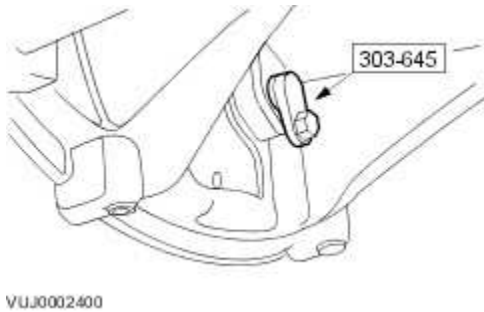
- 1 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)
- 2 . Disconnect the crankshaft position sensor electrical connector.



3 . Remove the crankshaft position sensor.



4 . Install the special tool.



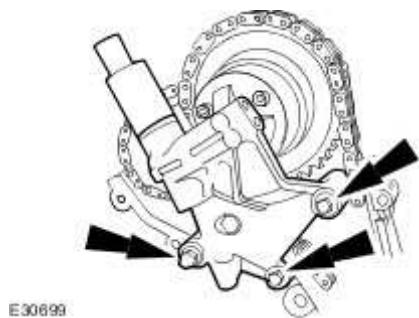
5 Remove the engine front cover.

- . For additional information, refer to Engine Front Cover - VIN Range: G00442->G45703 (12.65.01)

Vehicles without supercharger

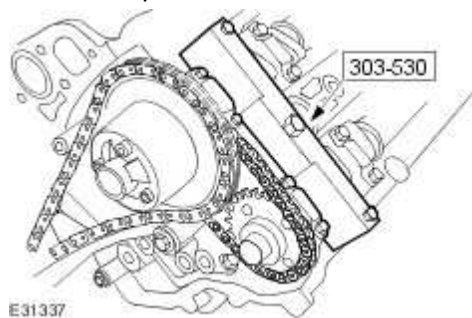
6 . Remove the right-hand variable camshaft timing oil control unit housing.

- ▶ Remove and discard the O-ring seals.

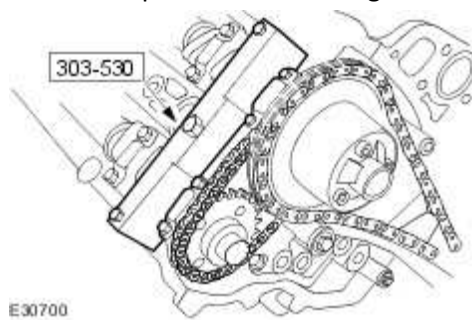


All vehicles

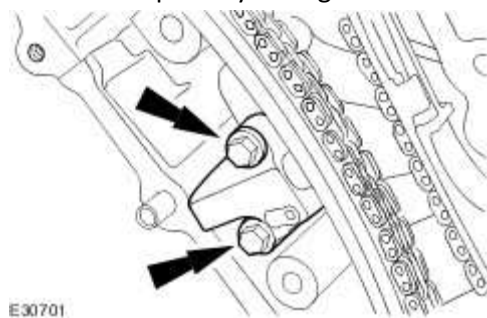
- 7 . Install the special tool to the left-hand cylinder head.



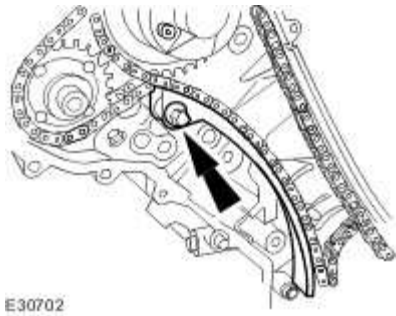
- 8 . Install the special tool to the right-hand cylinder head.



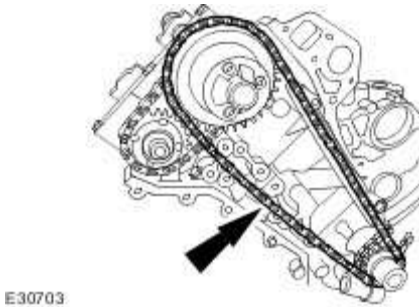
- 9 . Remove the primary timing chain tensioner assembly.



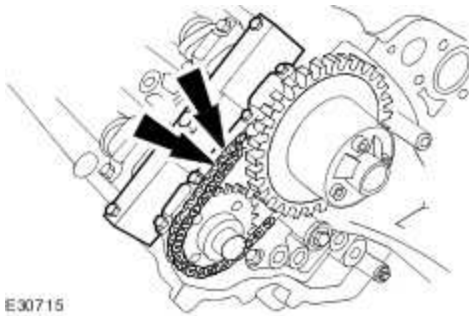
10 . Remove the primary timing chain tensioner guide.



11 . Remove the primary timing chain.

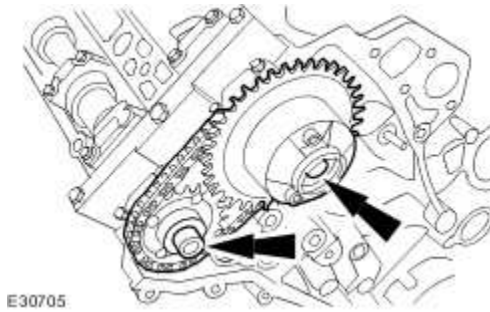


12 . Remove the secondary timing chain tensioner retaining bolts.

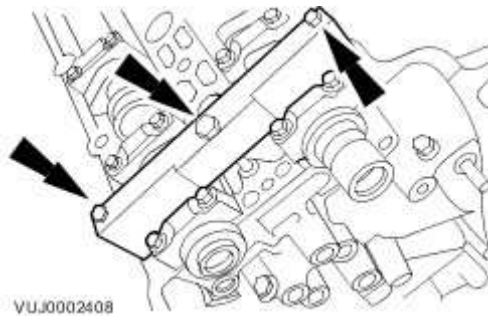


13 Remove the camshaft sprockets.

Remove the secondary timing chain tensioner and secondary timing chain from the camshaft sprockets.

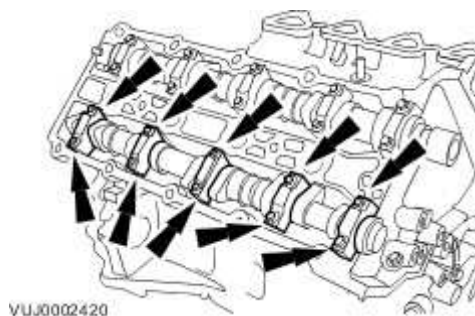


14 . Remove the camshaft setting tool.

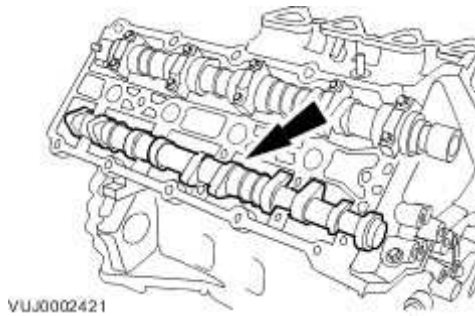


15 Remove the camshaft bearing caps.

- ▶ Remove the camshaft bearing cap retaining bolts evenly and in stages.
- ▶ Remove the camshaft bearing caps. Note their orientation and markings, each is marked with its position (a number) and orientation (an arrow).

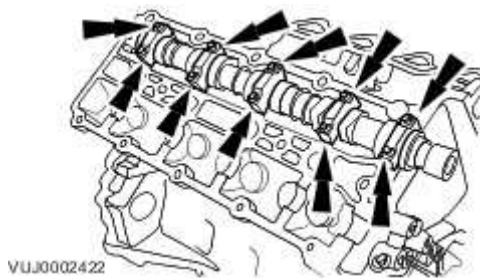


16 . Remove the right-hand exhaust camshaft.

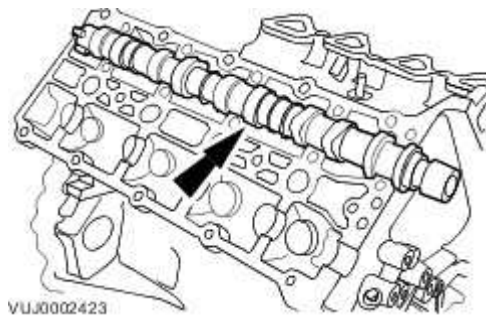


17 Remove the camshaft bearing caps.

- ▶ Remove the camshaft bearing cap retaining bolts evenly and in stages.
- ▶ Remove the camshaft bearing caps. Note their orientation and markings, each is marked with its position (a number) and orientation (an arrow).



18 . Remove the right-hand intake camshaft.



Installation

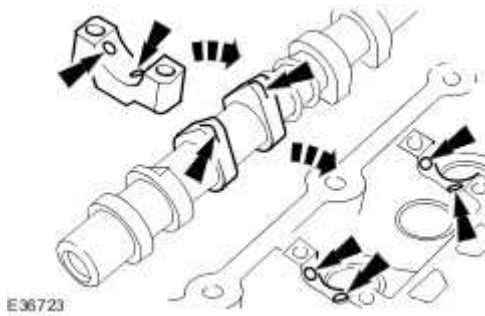
All vehicles

1 . NOTE:

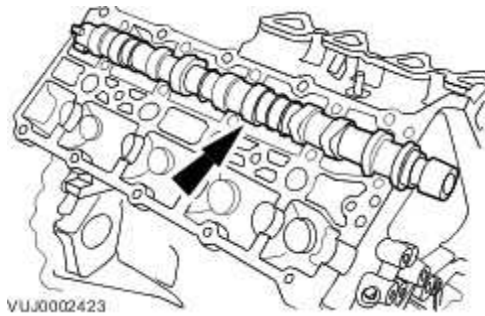
Make sure all components are clean.

Apply oil (EP-90) to the camshaft and bearing surfaces, as follows:

- ▶ To the upper face of each bearing surface in the cylinder head.
- ▶ To the upper face of each bearing surface in each bearing cap.
- ▶ On the cam lobes ONLY, not on the base circle area.



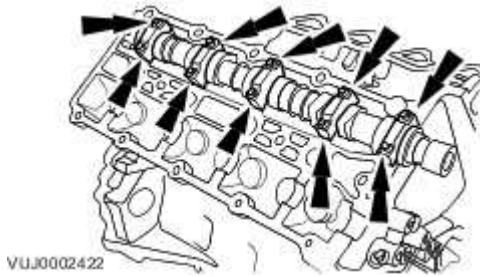
2 . Install the right-hand inlet camshaft.



3 .  **CAUTION: Alternate bolt tightening to correctly seat the camshaft bearing caps.**

Install the camshaft bearing cap bolts evenly.

- ▶ Tighten to 10 Nm.

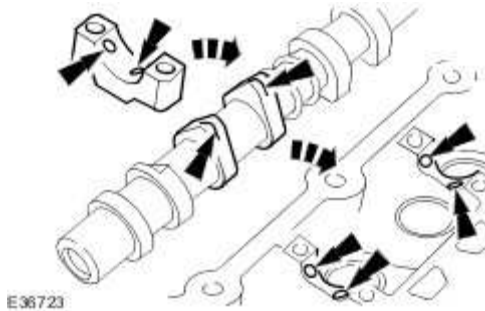


4 . NOTE:

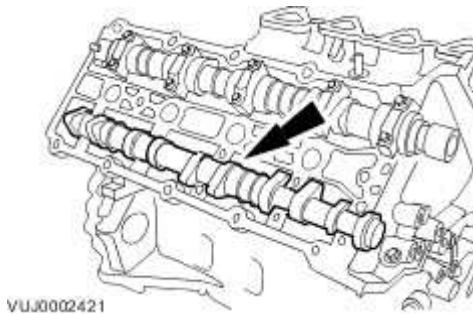
Make sure all components are clean.

Apply oil (EP-90) to the camshaft and bearing surfaces, as follows:

- ▶ To the upper face of each bearing surface in the cylinder head.
- ▶ To the upper face of each bearing surface in each bearing cap.
- ▶ On the cam lobes ONLY, not on the base circle area.



5 . Install the right-hand exhaust camshaft.



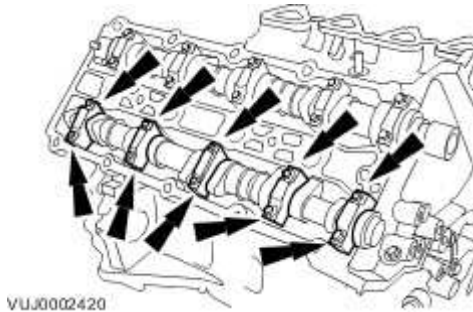
6 .



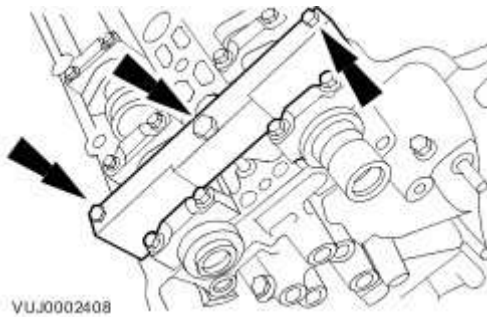
CAUTION: Alternate bolt tightening to correctly seat the camshaft bearing caps.

Install the camshaft bearing cap bolts evenly.

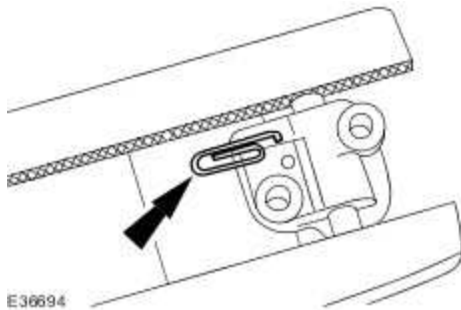
▶ Tighten to 10 Nm.



7 . Install the camshaft setting tool.



8 . Using a suitable tool, retain the right-hand timing chain tensioner piston.



9



CAUTION: Do not tighten the camshaft sprocket retaining bolts.

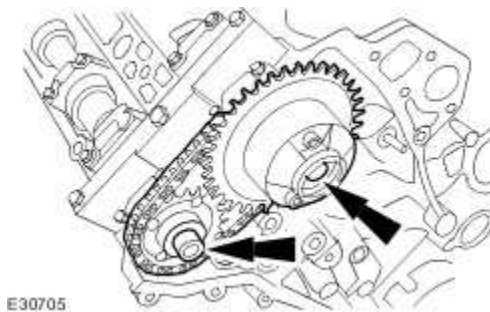


CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

Install the camshaft sprockets.



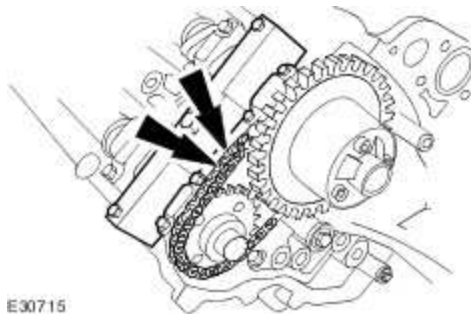
Install the secondary timing chain tensioner and secondary timing chain to the camshaft sprockets.



10 . Install the secondary timing chain tensioner retaining bolts.



Tighten to 12 Nm.



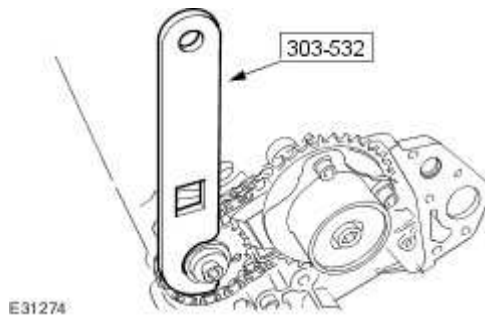
11 . Release the tension in the right-hand timing chain tensioner.



Remove the retaining tool.

12 Install the timing chain tensioning tool 303-532 to the exhaust camshaft sprocket.

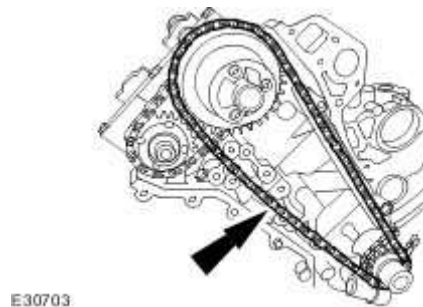
- ▶ Reposition the camshaft sprockets for the most advantageous position for use of the tool.



- 13 .  **CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.**

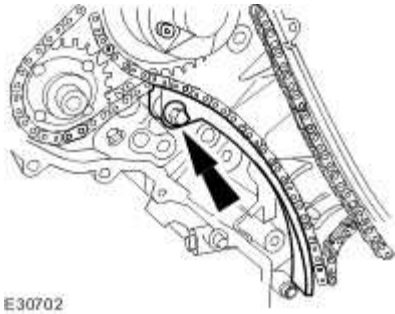
Install the primary timing chain.

- ▶ Install the primary chain over the crankshaft sprocket and the intake sprocket.



- 14 . Install the primary timing chain tensioner guide.

- ▶ Tighten to 12 Nm.

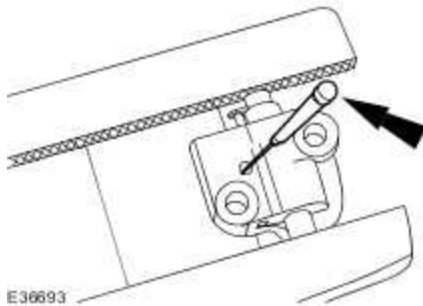


15



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the right-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



16 **NOTE:**

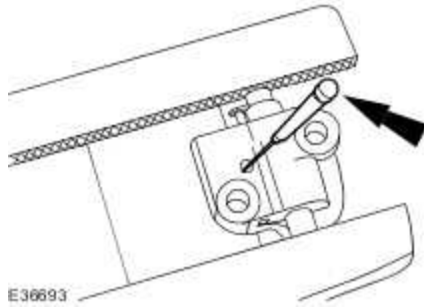
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the right-hand timing chain tensioner.

17 **NOTE:**

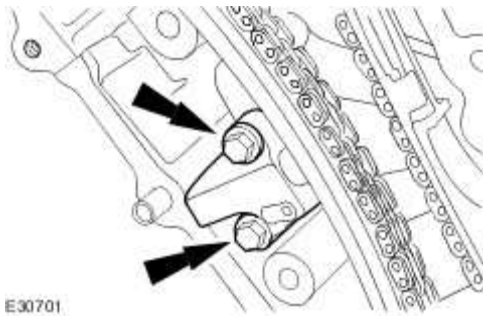
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the right-hand timing chain tensioner piston.



18 . Install the primary timing chain tensioner assembly.

▶ Tighten to 12 Nm.



19 . Release the tension in the right-hand timing chain tensioner.

▶ Remove the retaining tool.

20



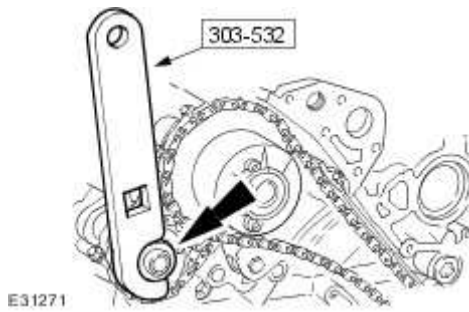
· **CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.**



CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

► Tighten to 20 Nm + 90 deg.



21



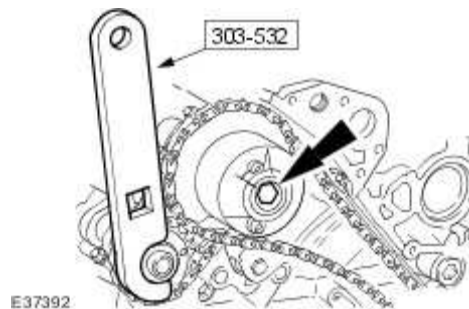
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



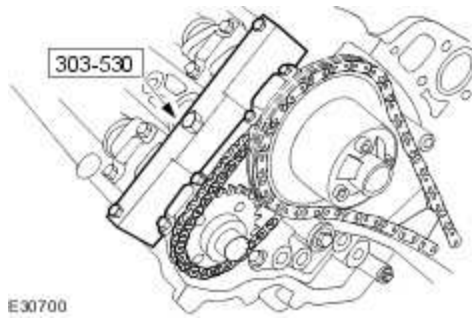
CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction.

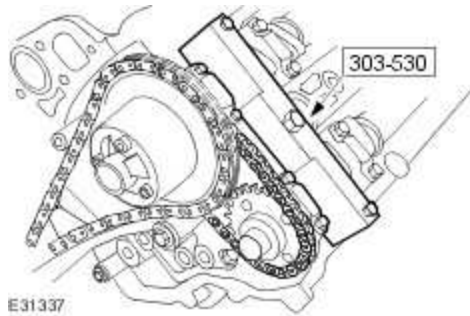
► Tighten to 20 Nm + 90 deg.



22 . Remove the special tool from the right-hand cylinder head.



23 . Remove the special tool from the left-hand cylinder head.

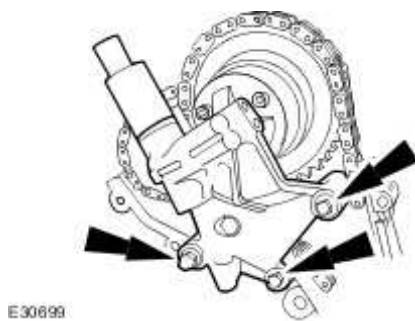


Vehicles without supercharger

24 . Install the right-hand variable camshaft timing oil control unit housing.

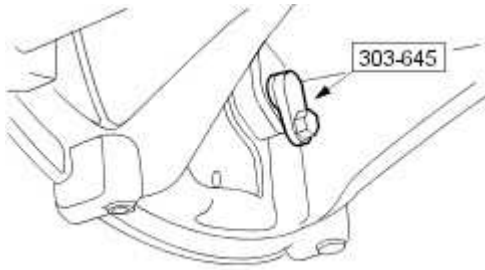
▶ Install new O-ring seals.

▶ Tighten to 22 Nm.



All vehicles

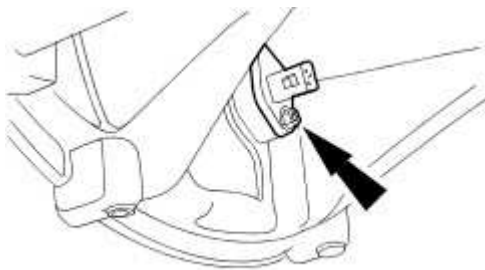
25 . Remove the special tool.



VUJ0002400

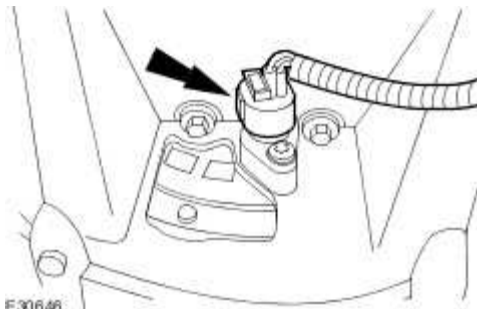
26 . Install the crankshaft position sensor.

► Tighten to 10 Nm.



E30694

27 . Connect the crankshaft position sensor electrical connector.



E30646

28 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

29 Install the engine front cover.

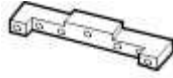
. For additional information, refer to Engine Front Cover - VIN Range: G00442->G45703 (12.65.01)

30 . Carry out the valve clearance check.

For additional information, refer to Valve Clearance Check (12.29.47)

Camshafts RH - VIN Range: G45704->G99999 (12.13.18)

Special Service Tools



303-530

Camshaft setting/locking tool

303-530



303-532

Timing chain tensioning tool

303-532



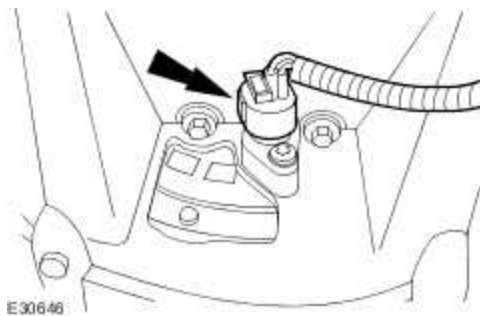
303-645

Crankshaft setting, main tool

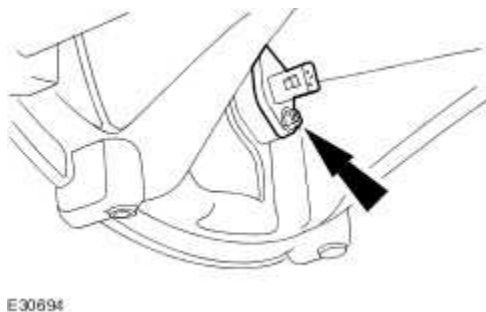
303-645

Removal

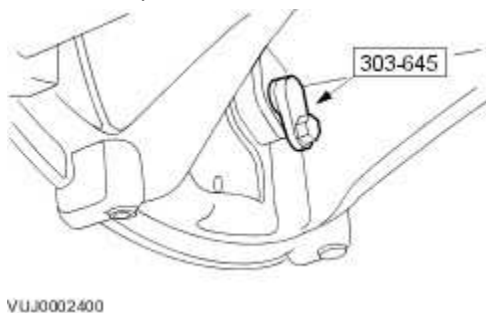
- 1 Remove the engine front cover.
 - . For additional information, refer to Engine Front Cover - VIN Range: G45704->G99999 (12.65.01)
- 2 . Raise the vehicle.
- 3 . Disconnect the crankshaft position (CKP) sensor electrical connector.



4 . Remove the CKP sensor.



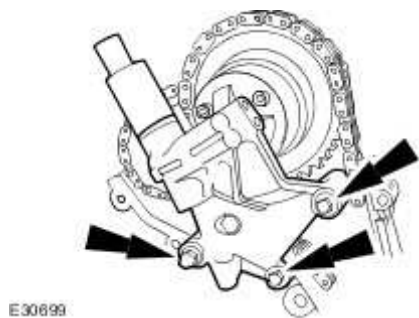
5 . Install the special tool.



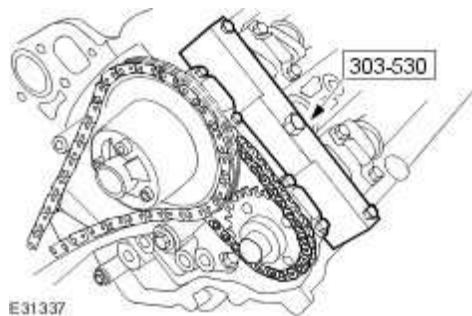
6 . Lower the vehicle.

7 . Remove the right-hand variable camshaft timing oil control unit housing.

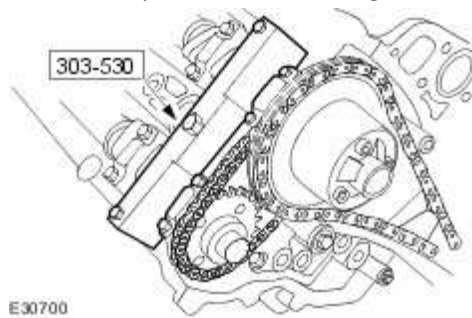
▶ Remove and discard the O-ring seals.



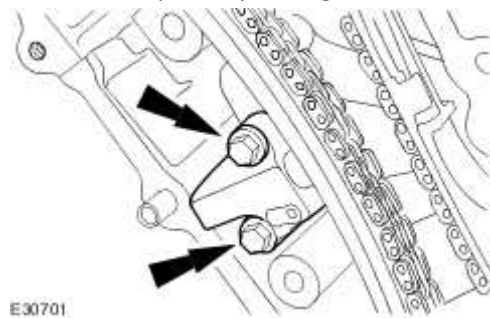
8 . Install the special tool to the left-hand cylinder head.



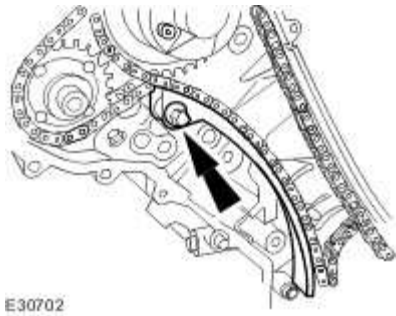
9 . Install the special tool to the right-hand cylinder head.



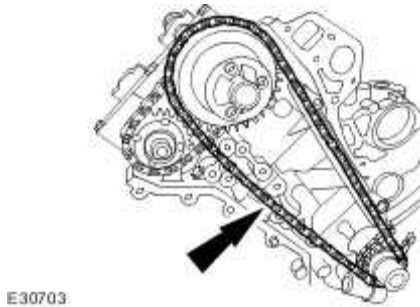
10 . Remove the primary timing chain tensioner assembly.



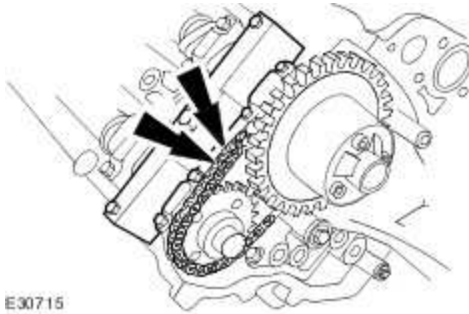
11 . Remove the primary timing chain tensioner guide.



12 . Remove the primary timing chain.

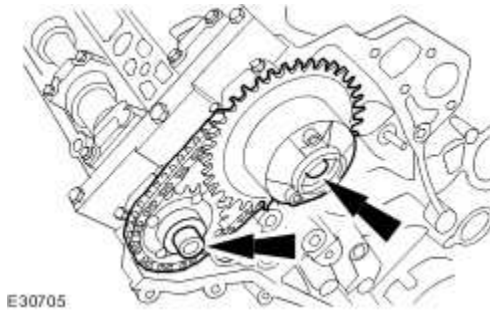


13 . Remove the secondary timing chain tensioner retaining bolts.

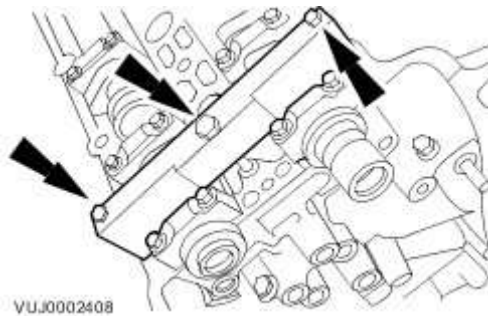


14 Remove the camshaft sprockets.

- ▶ Remove the secondary timing chain tensioner and secondary timing chain from the camshaft sprockets.

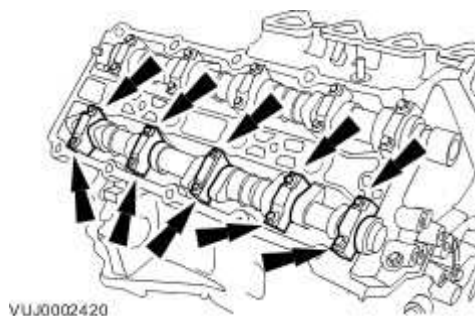


15 . Remove the camshaft setting tool.

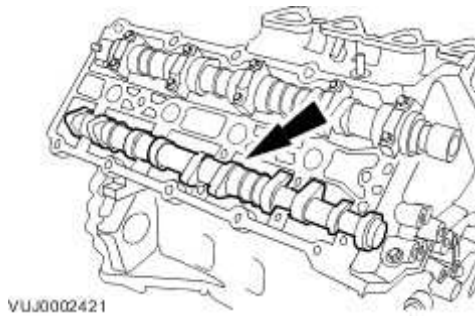


16 Remove the camshaft bearing caps.

- ▶ Remove the camshaft bearing cap retaining bolts evenly and in stages.
- ▶ Remove the camshaft bearing caps. Note their orientation and markings, each is marked with its position (a number) and orientation (an arrow).

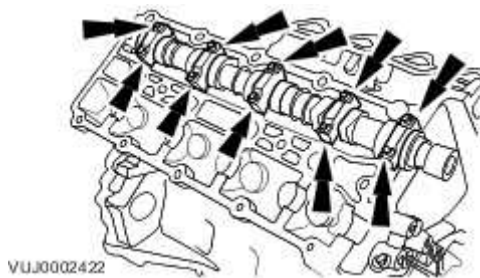


17 . Remove the right-hand exhaust camshaft.

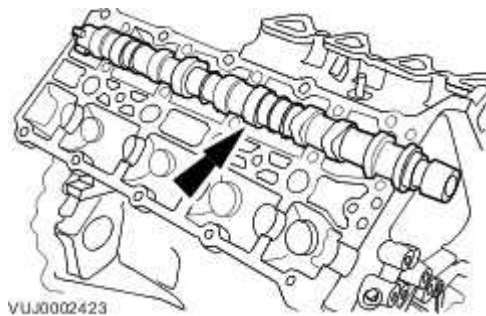


18 Remove the camshaft bearing caps.

- ▶ Remove the camshaft bearing cap retaining bolts evenly and in stages.
- ▶ Remove the camshaft bearing caps. Note their orientation and markings, each is marked with its position (a number) and orientation (an arrow).



19 . Remove the right-hand intake camshaft.



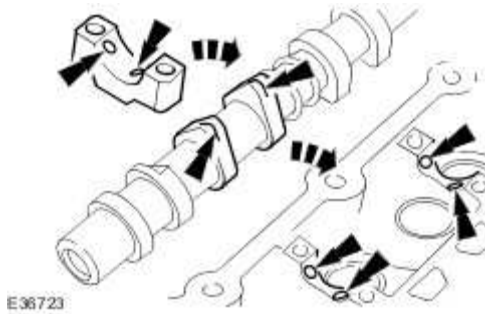
Installation

1 . **NOTE:**

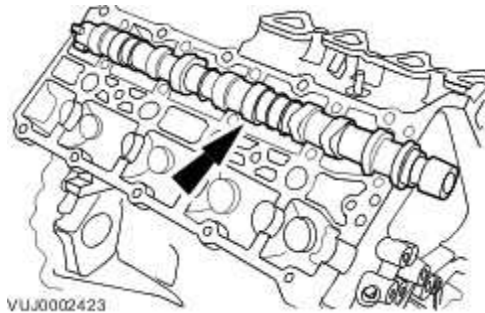
Make sure all components are clean.

Apply oil (EP-90) to the camshaft and bearing surfaces, as follows:

- ▶ To the upper face of each bearing surface in the cylinder head.
- ▶ To the upper face of each bearing surface in each bearing cap.
- ▶ On the cam lobes ONLY, not on the base circle area.



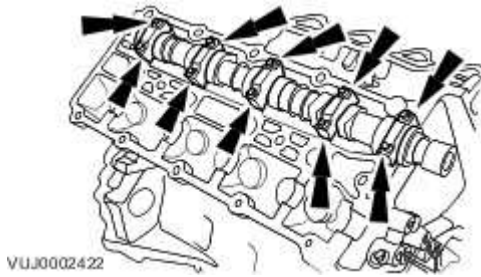
2 . Install the right-hand inlet camshaft.



3 .  **CAUTION: Alternate bolt tightening to correctly seat the camshaft bearing caps.**

Install the camshaft bearing cap bolts evenly.

- ▶ Tighten to 10 Nm.

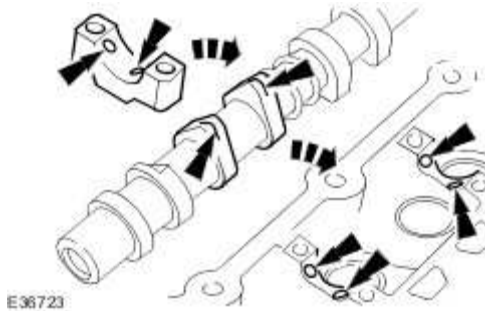


4 . NOTE:

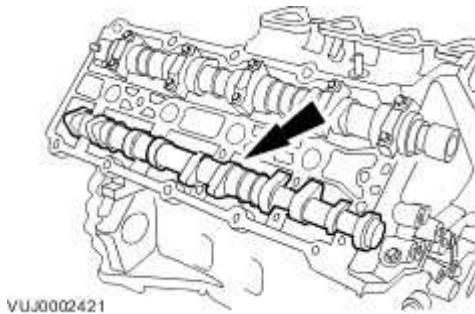
Make sure all components are clean.

Apply oil (EP-90) to the camshaft and bearing surfaces, as follows:

- ▶ To the upper face of each bearing surface in the cylinder head.
- ▶ To the upper face of each bearing surface in each bearing cap.
- ▶ On the cam lobes ONLY, not on the base circle area.



5 . Install the right-hand exhaust camshaft.



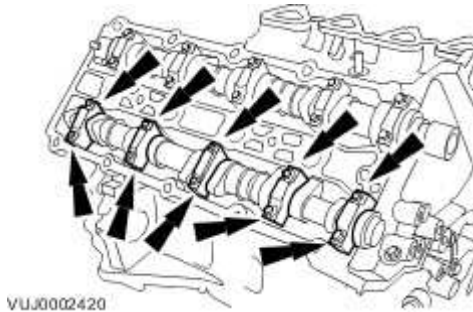
6 .



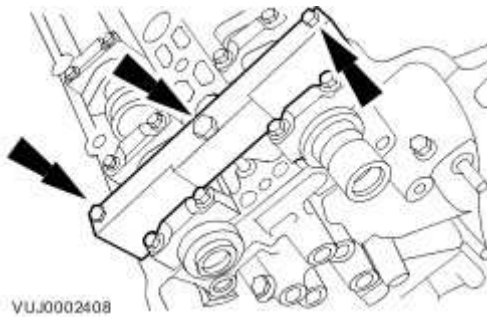
CAUTION: Alternate bolt tightening to correctly seat the camshaft bearing caps.

Install the camshaft bearing cap bolts evenly.

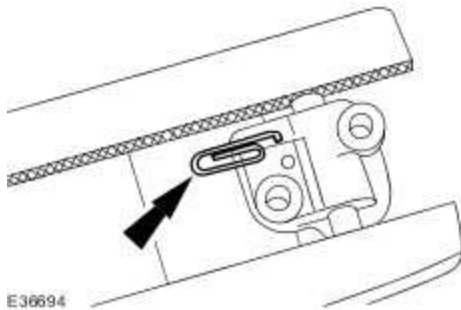
▶ Tighten to 10 Nm.



7 . Install the camshaft setting tool.



8 . Using a suitable tool, retain the right-hand timing chain tensioner piston.



9



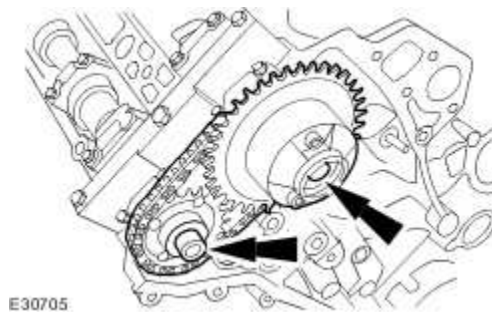
CAUTION: Do not tighten the camshaft sprocket retaining bolts.



CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

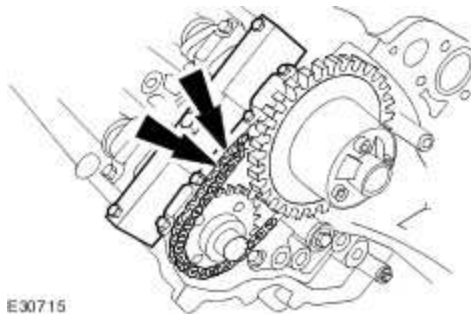
Install the camshaft sprockets.

- ▶ Install the secondary timing chain tensioner and secondary timing chain to the camshaft sprockets.



10 . Install the secondary timing chain tensioner retaining bolts.

- ▶ Tighten to 12 Nm.

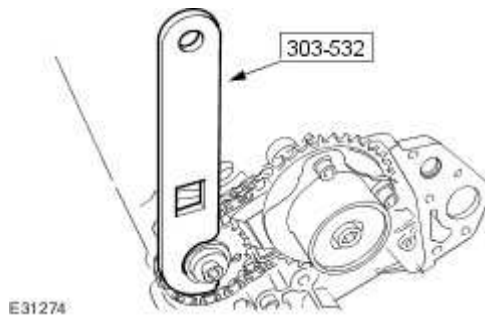


11 . Release the tension in the right-hand timing chain tensioner.

- ▶ Remove the retaining tool.

12 Install the timing chain tensioning tool 303-532 to the exhaust camshaft sprocket.

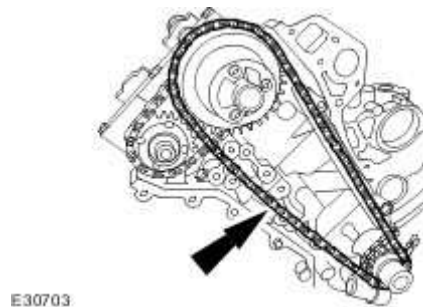
- ▶ Reposition the camshaft sprockets for the most advantageous position for use of the tool.



- 13
- ▶  **CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.**

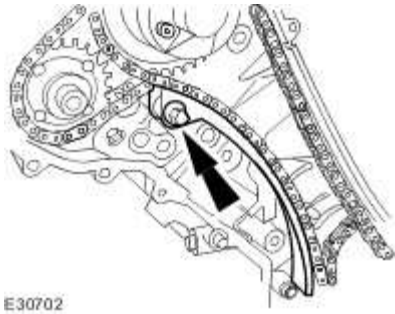
Install the primary timing chain.

- ▶ Install the primary chain over the crankshaft sprocket and the intake sprocket.



- 14 . Install the primary timing chain tensioner guide.

- ▶ Tighten to 12 Nm.

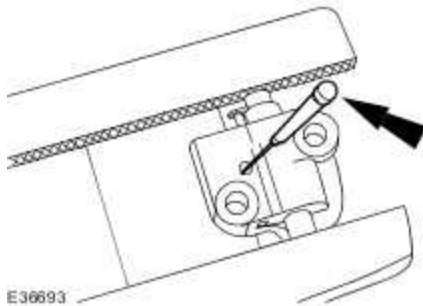


15



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the right-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



16 **NOTE:**

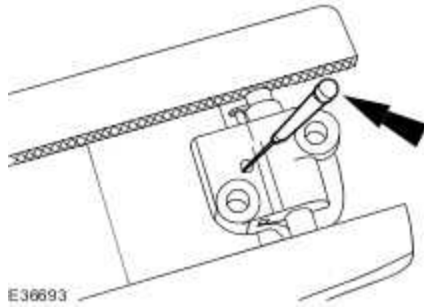
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the right-hand timing chain tensioner.

17 **NOTE:**

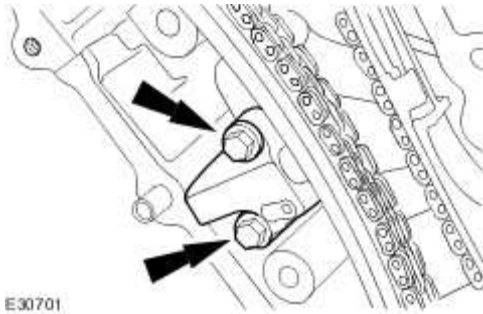
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the right-hand timing chain tensioner piston.



18 . Install the primary timing chain tensioner assembly.

► Tighten to 12 Nm.



19 . Release the tension in the right-hand timing chain tensioner.

► Remove the retaining tool.

20



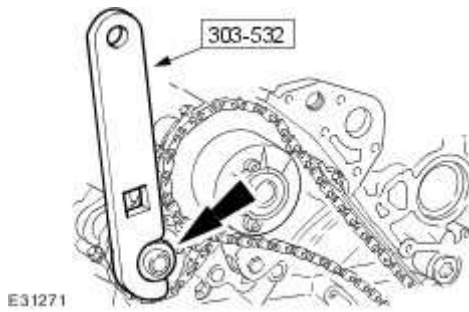
· **CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.**



CAUTION: Make sure that a new bolt is installed.

Using the special tool, apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

► Tighten to 20 Nm + 90 deg.



21



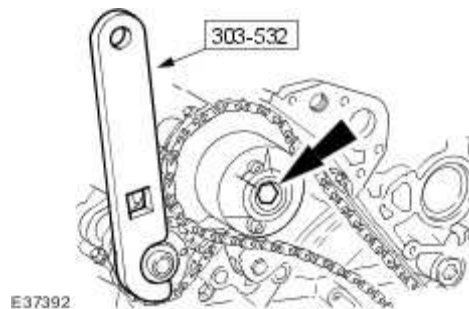
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



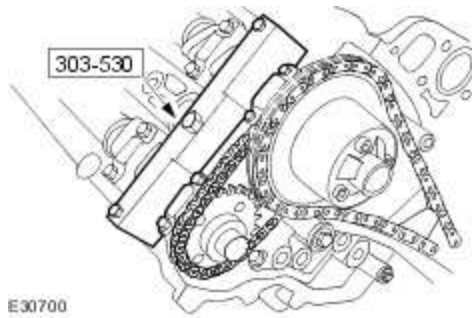
CAUTION: Make sure that a new bolt is installed.

Using the special tool, apply force to the tool in an anti-clockwise direction.

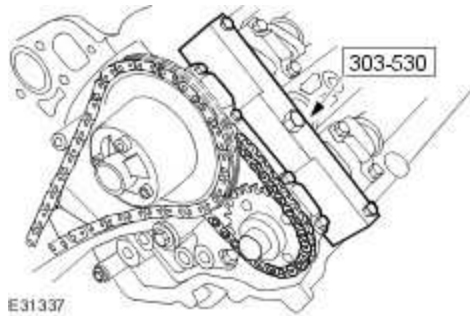
► Tighten to 20 Nm + 90 deg.



22 . Remove the special tool from the right-hand cylinder head.



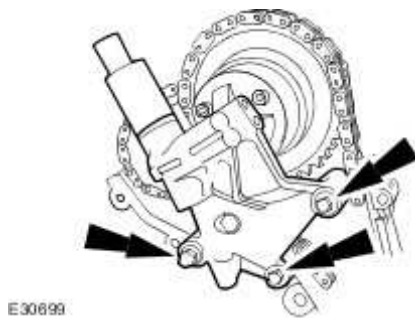
23 . Remove the special tool from the left-hand cylinder head.



24 . Install the right-hand variable camshaft timing oil control unit housing.

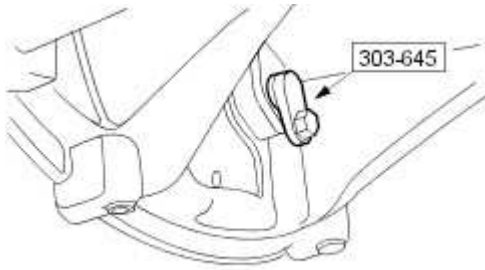
▶ Install new O-ring seals.

▶ Tighten to 22 Nm.



25 . Raise the vehicle.

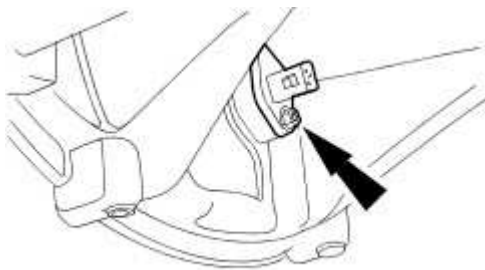
26 . Remove the special tool.



VUJ0002400

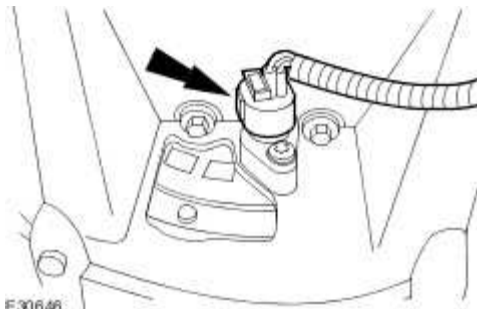
27 . Install the CKP sensor.

► Tighten to 10 Nm.



E30694

28 . Connect the CKP sensor electrical connector.



E30646

29 . Lower the vehicle.

30 . Carry out the valve clearance check.

For additional information, refer to Valve Clearance Check (12.29.47)

31 Install the engine front cover.

- . For additional information, refer to Engine Front Cover - VIN Range: G45704->G99999 (12.65.01)

Crankshaft Front Seal - VIN Range: G00442->G45703 (12.21.14)

Special Service Tools



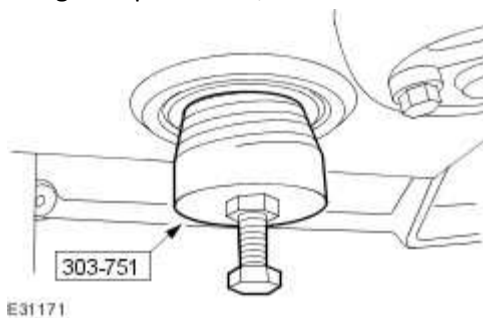
Installer, crankshaft front seal
303-750



Remover, crankshaft front seal
303-751

Removal

- 1 . Remove the crankshaft pulley.
For additional information, refer to
- 2 . Using the special tool, remove the crankshaft front seal.



Installation

1 .

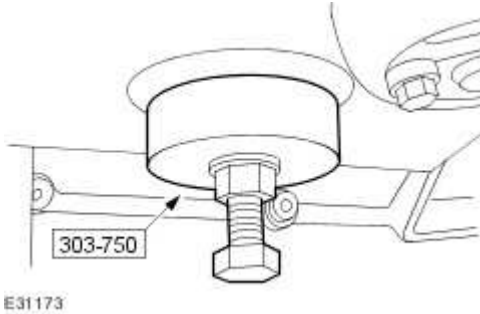


CAUTION: Make sure the crankshaft front seal mating faces are clean and dry.

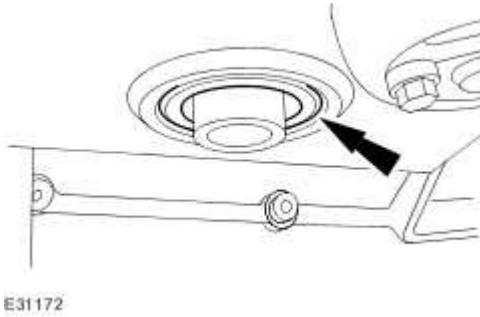


CAUTION: Do not remove the crankshaft front seal protector.

Using the special tool, install the crankshaft front seal.



2 . Remove the crankshaft seal protector.



3 . Install the crankshaft pulley.

For additional information, refer to

Crankshaft Front Seal - VIN Range: G45704->G99999 (12.21.14)

Special Service Tools



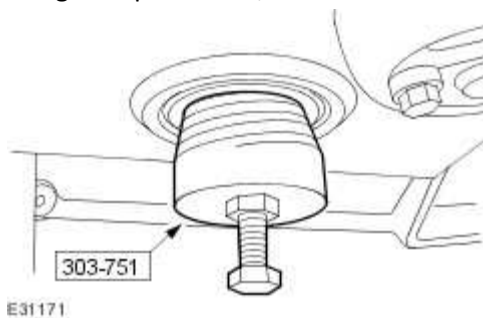
Installer, crankshaft front seal
303-750



Remover, crankshaft front seal
303-751

Removal

- 1 . Remove the crankshaft pulley.
For additional information, refer to
- 2 . Using the special tool, remove the crankshaft front seal.



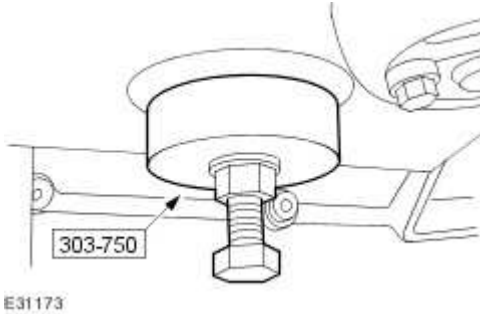
Installation

- 1 .  **CAUTION:** Make sure the crankshaft front seal mating faces are clean and dry.

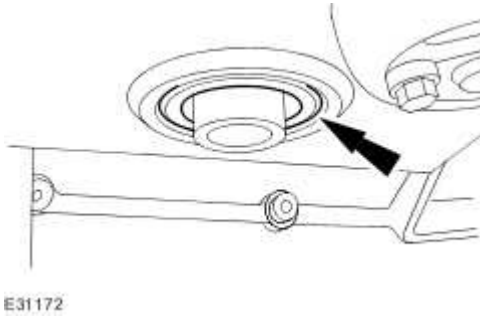


CAUTION: Do not remove the crankshaft front seal protector.

Using the special tool, install the crankshaft front seal.



2 . Remove the crankshaft seal protector.



3 . Install the crankshaft pulley.

For additional information, refer to

Crankshaft Pulley (12.21.09)

Special Service Tools



303-191

Locking Tool, Crankshaft Pulley

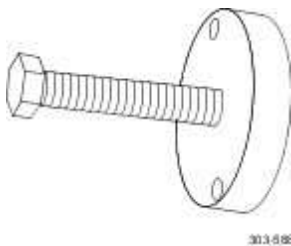
303-191



303-191-02

Adapter for 303-191/303-588

303-191-02



303-588

Remover, Crankshaft Pulley

303-588



303-752

Installer/remover, Oil Filter

303-752

Removal

All vehicles

- 1 . Remove the cooling fan motor and shroud.

For additional information, refer to Cooling Fan Motor and Shroud (26.25.25)

2 . Remove the accessory drive belt .

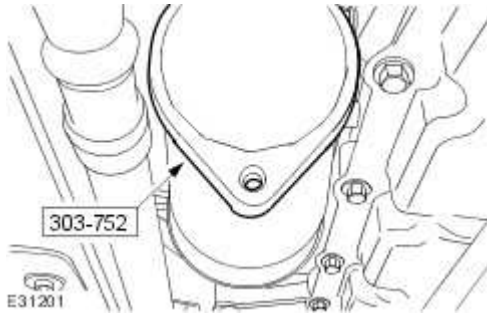
For additional information, refer to Accessory Drive Belt - 3.5L/4.2L (12.10.40)

Vehicles without supercharger

3 . **NOTE:**

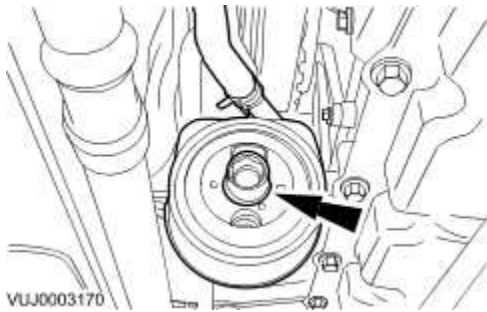
Place a suitable container underneath the filter to prevent oil spillage.

Using the special tool, remove and discard the oil filter element.



4 . Detach the oil cooler.

▶ Remove and discard the O-ring seal.



5 . Lower the vehicle

All vehicles

6



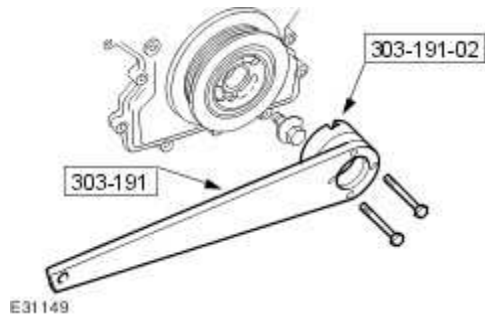
· **CAUTION:** Under no circumstances should the crankshaft setting peg 303-645 be used in the following operations to lock the crankshaft.

NOTE:

The crankshaft retaining bolt will be very tight.

Using special tools, retain the crankshaft pulley.

- ▶ Remove and discard the crankshaft pulley bolt.



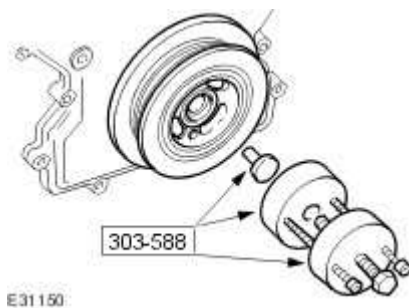
7 . Remove the special tools.

8 . NOTE:

The crankshaft pulley will be very tight.

Using special tools, remove the crankshaft pulley.

- ▶ Collect the locking ring.
- ▶ Remove and discard the O-ring seal.



9 . Remove the special tools.

10 Remove the crankshaft front seal.

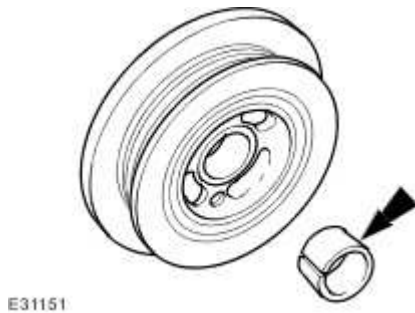
. For additional information, refer to Crankshaft Front Seal - VIN Range: G00442->G45703 (12.21.14)

For additional information, refer to Crankshaft Front Seal - VIN Range: G45704->G99999 (12.21.14)

11 . **NOTE:**

Check crankshaft pulley and locking ring for damage.

Clean all crankshaft pulley mating faces.



Installation

All vehicles

1 Install a new crankshaft front seal.

. For additional information, refer to Crankshaft Front Seal - VIN Range: G00442->G45703 (12.21.14)

For additional information, refer to Crankshaft Front Seal - VIN Range: G45704->G99999 (12.21.14)

2 . Install a new O-ring seal to the crankshaft pulley.

▶ Lubricate the new O-ring.

3



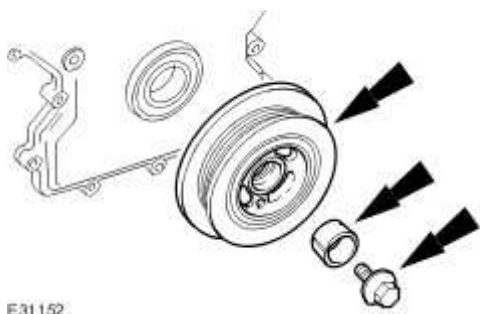
CAUTION: The screw thread in the crankshaft must be cleaned out before a new crankshaft pulley bolt is installed.



CAUTION: A new crankshaft pulley bolt must be used.

Install, but do not tighten, a new crankshaft pulley retaining bolt.

▶ Install the crankshaft pulley and locking ring to the crankshaft.



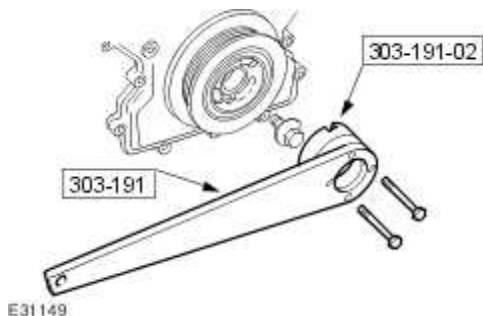
4



CAUTION: Under no circumstances should the crankshaft setting peg 303-645 be used in the following operations to lock the crankshaft.

Using special tools, retain the crankshaft pulley.

▶ Tighten the crankshaft pulley retaining bolt to 320 Nm.



5 . Remove the special tools.

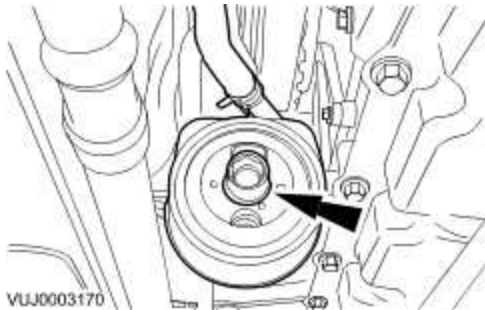
Vehicles without supercharger

6 . Raise the vehicle.

7 . Attach the oil cooler.

▶ Install a new O-ring seal.

▶ Tighten to 55 Nm.

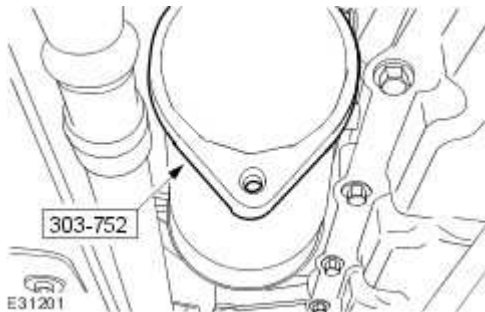


8 . NOTE:

Apply a suitable amount of clean engine oil to lubricate the oil filter O-ring seal.

Using special tool, install a new oil filter.

▶ Tighten to 18 Nm.



All vehicles

- 9 . Install the accessory drive belt.

For additional information, refer to Accessory Drive Belt - 3.5L/4.2L (12.10.40)

- 10 . Install the cooling fan motor and shroud.

For additional information, refer to Cooling Fan Motor and Shroud (26.25.25)

- 11 . Check and top up the engine oil to the correct level on the oil level indicator.

Crankshaft Rear Seal (12.21.20)

Special Service Tools

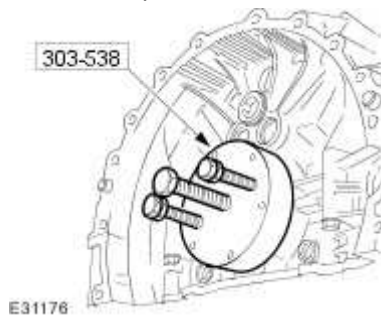


Crankshaft rear seal remover/replacer
303-538

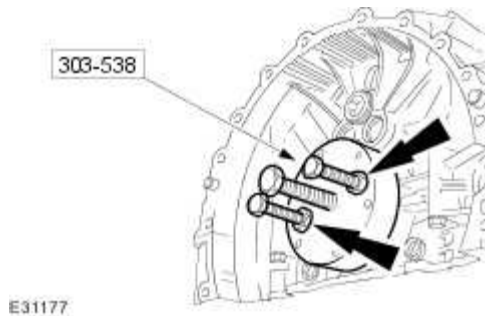
Removal

- 1 . Remove the flexplate.
For additional information, refer to Flexplate (12.53.13)

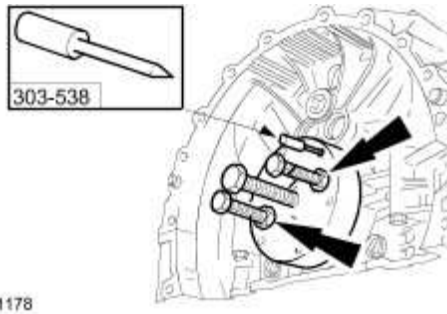
- 2 . Install the special tool.



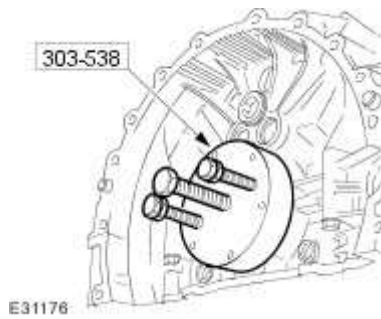
- 3 . Reposition the special tool retaining nuts.




- 4 . Using the special tool pierce the seal face and provide a pilot hole for the self-tapping screws.

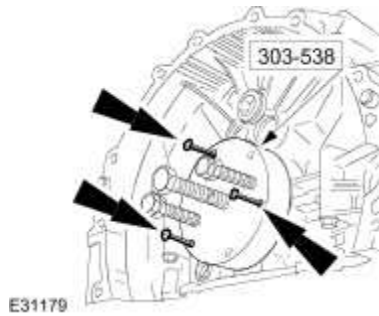


5 . Loosen the special tool retaining nuts.

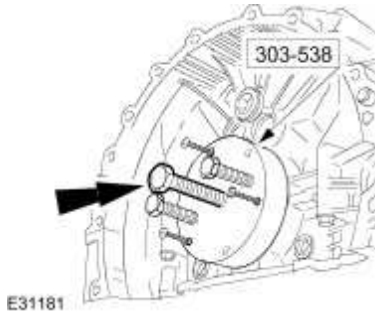


- 6  **CAUTION:** To prevent damage to special tool do not tighten screws more than one and a half turns.

Install the special tool self-tapping screws.



7 . Using the special tool remove and discard the crankshaft rear seal.



Installation

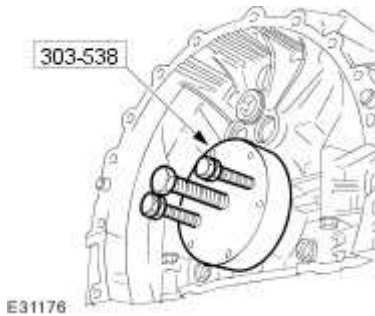
1 NOTE:

Make sure all components are clean and dry.

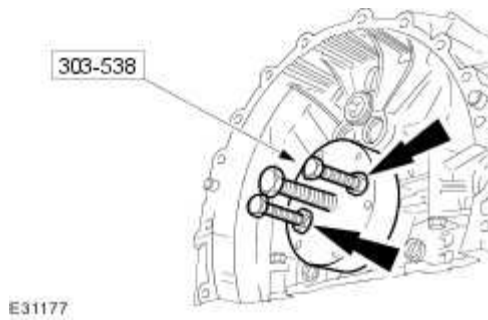
Make sure the transit sleeve is correctly in place and install the new seal over the crankshaft. Do not use any lubricant on the seal, the transit sleeve or the crankshaft.


2 . Carefully remove the transit sleeve, leaving the seal in place.

3 . Install the special tool to the crankshaft.

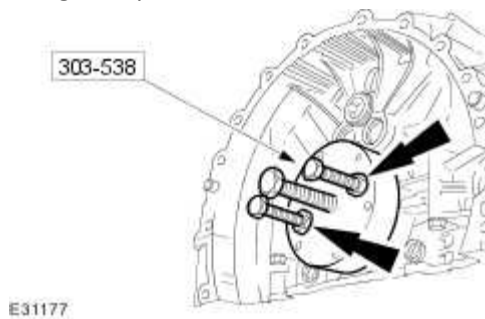


4 Reposition the nuts to hold the special tool against the crankshaft rear seal. Check that the crankshaft rear seal and the special tool are parallel to the rear of the engine.




- 5 .  **CAUTION: Alternate nut tightening to correctly seat the crankshaft rear seal.**

Using the special tool, install the crankshaft rear seal.



- 6 . Remove the special tool from the crankshaft.

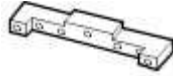
 Check that the seal is located correctly.

- 7 . Install the flexplate.

For additional information, refer to Flexplate (12.53.13)

Cylinder Head LH - VIN Range: G00442- >G45703 (12.29.02)

Special Service Tools



303-530

Camshaft setting/locking Tool

303-530



303-532

Timing chain tensioning tool

303-532



303-645

Crankshaft setting, main tool

303-645

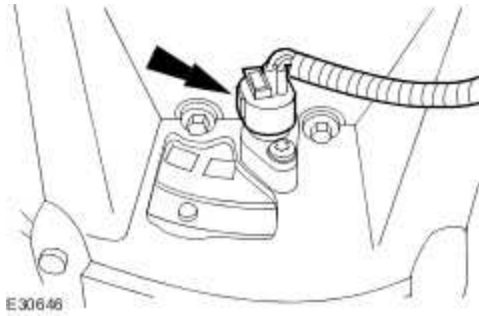
Removal

All vehicles

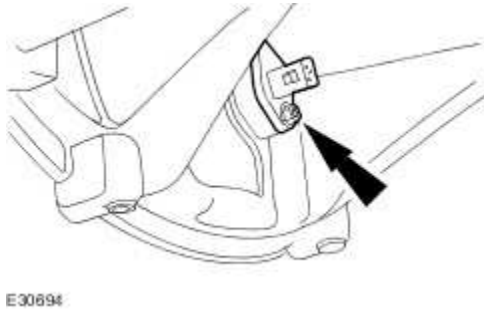


CAUTION: If a replacement cylinder head is to be installed to a vehicle with variable camshaft timing (VCT) the cylinder head must have the oil gallery blind rivet removed before installation.

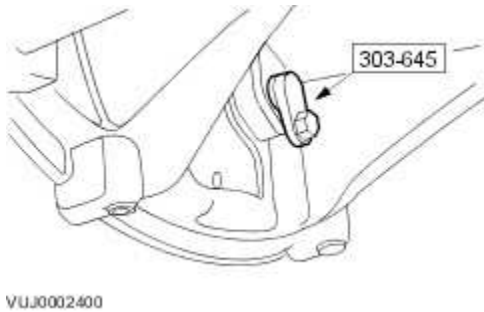
- 1 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)
- 2 . Disconnect the crankshaft position sensor electrical connector.



3 . Remove the crankshaft position sensor.



4 . Install the special tool.



Vehicles without supercharger

5 . Remove the intake manifold.

For additional information, refer to Intake Manifold - VIN Range: G00442->G45703 (30.15.01)

Vehicles with supercharger

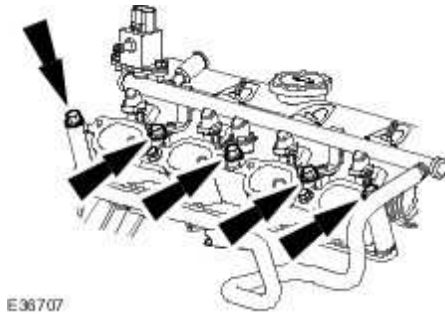
6 . Remove the charge air cooler.

For additional information, refer to Charge Air Cooler

7 . NOTE:

Left-hand shown, right-hand similar.

Remove the lower intake manifold.



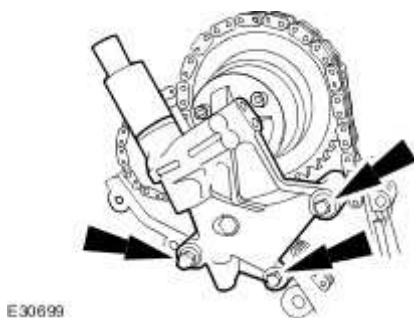
All vehicles

- 8 Remove the engine front cover.
 - . For additional information, refer to Engine Front Cover - VIN Range: G00442->G45703 (12.65.01)

Vehicles without supercharger

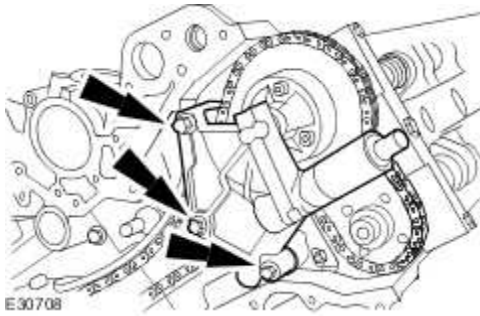
- 9 . Remove the right-hand variable camshaft timing oil control unit housing.

▶ Remove and discard the O-ring seals.



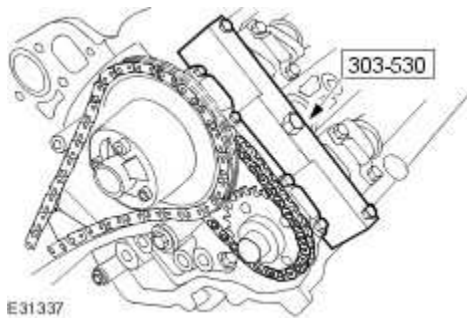
- 10 . Remove the left-hand variable camshaft timing oil control unit housing.

▶ Remove and discard the O-ring seals.

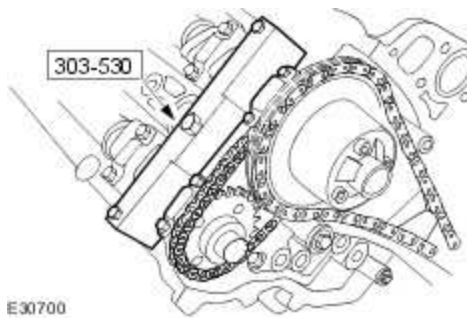


All vehicles

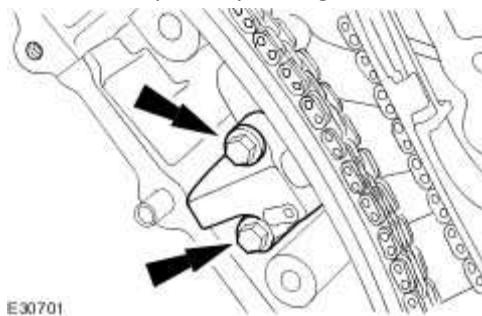
11 . Install the special tool to the left-hand cylinder head.



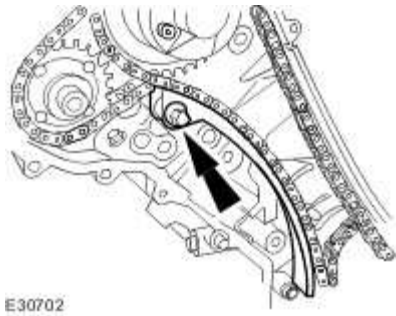
12 . Install the special tool to the right-hand cylinder head.



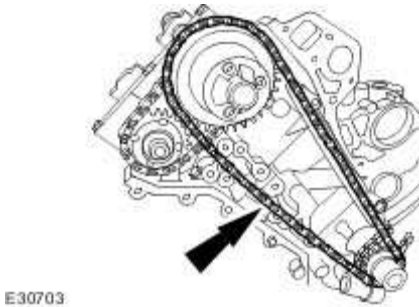
13 . Remove the primary timing chain tensioner assembly.



14 . Remove the primary timing chain tensioner guide.



15 . Remove the primary timing chain.

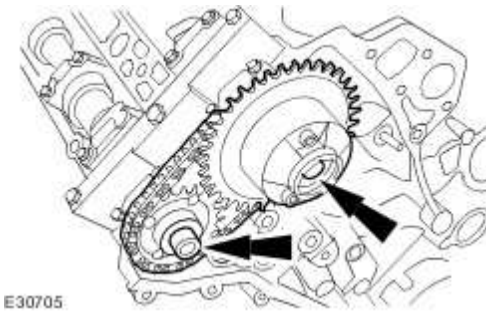


16

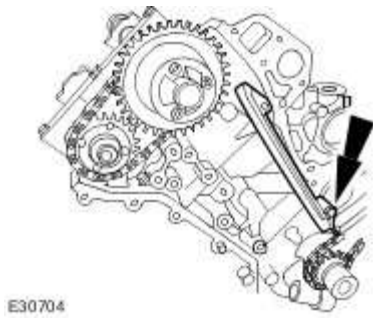


CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

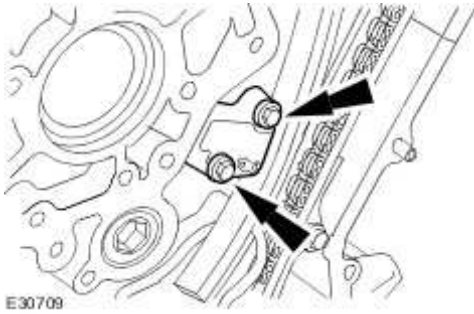
Loosen the camshaft sprockets.



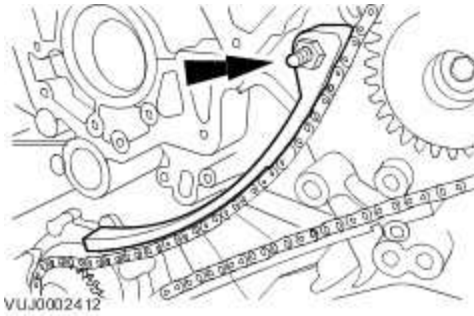
17 . Remove the primary timing chain guide.



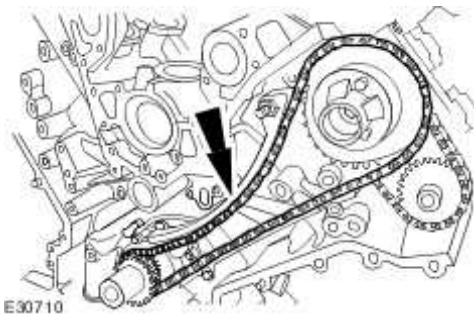
18 . Remove the primary timing chain tensioner assembly.



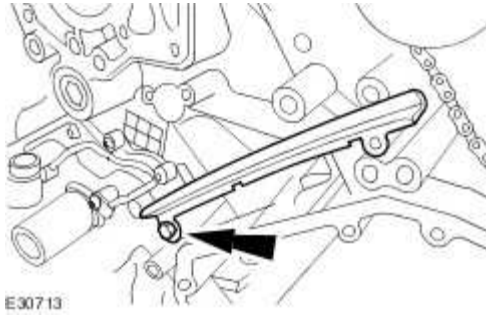
19 . Remove the primary timing chain tensioner guide.



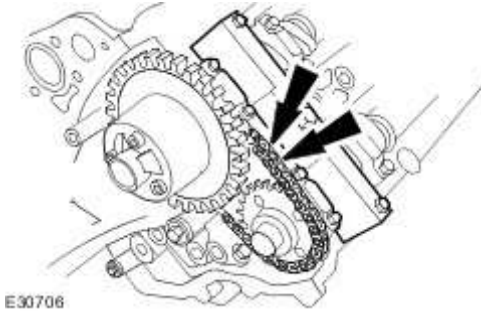
20 . Remove the primary timing chain.



21 . Remove the primary timing chain tensioner guide.

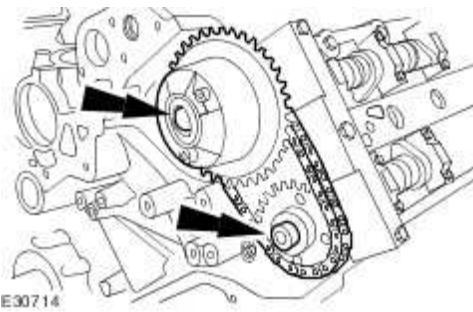


22 . Remove the secondary timing chain tensioner retaining bolts.

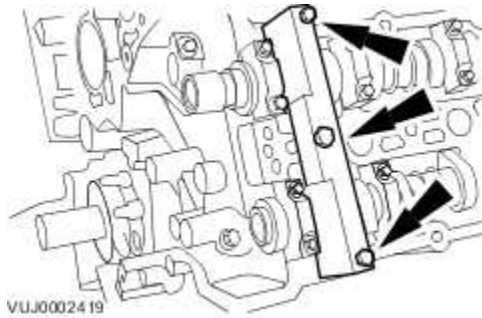


23 Remove the camshaft sprockets.

- ▶ Remove the secondary timing chain tensioner and secondary timing chain from the camshaft sprockets.

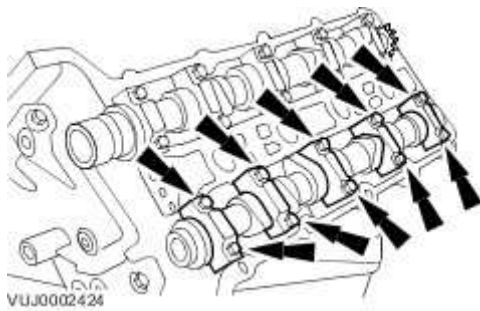


24 . Remove the camshaft setting tool.

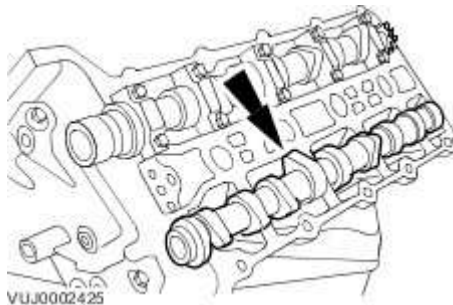


25 Remove the camshaft bearing caps.

- ▶ Remove the camshaft bearing cap retaining bolts evenly and in stages.
- ▶ Remove the camshaft bearing caps. Note their orientation and markings, each is marked with its position (a number) and orientation (an arrow).



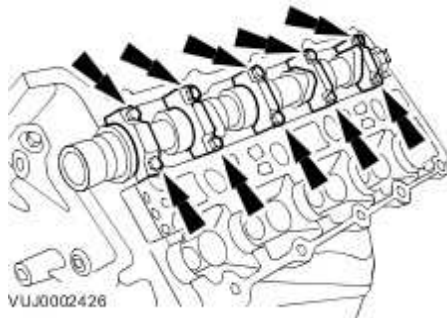
26 . Remove the left-hand exhaust camshaft.



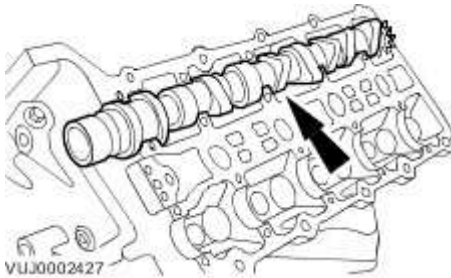
27 Remove the camshaft bearing caps.


- ▶ Remove the camshaft bearing cap retaining bolts evenly and in stages.


- ▶ Remove the camshaft bearing caps. Note their orientation and markings, each is marked with its position (a number) and orientation (an arrow).



- 28 . Remove the left-hand inlet camshaft.

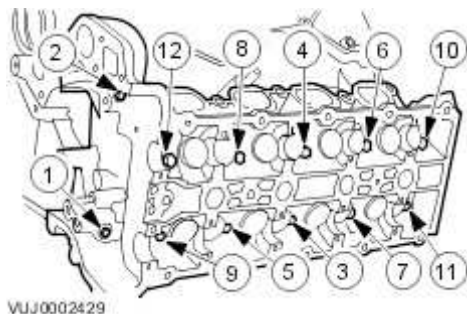


- 29  **CAUTION:** The bolts can only be used twice, mark the bolts with a center punch. If two punch marks are visible, discard the bolts.

 **CAUTION:** Vehicles fitted with Polydrive cylinder head bolts, the cylinder head bolts must be removed using a 10 mm Polydrive socket or a 10 mm Allen key. Failure to follow this instruction may result in damage to the component.

Remove the left-hand cylinder head.

- ▶ Remove the bolts in the indicated sequence.



30 .

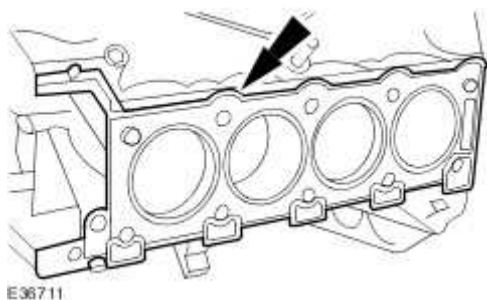


CAUTION: Only use a plastic scrapper to clean off old gasket.

Remove the cylinder head gasket.



Clean the gasket mating faces.

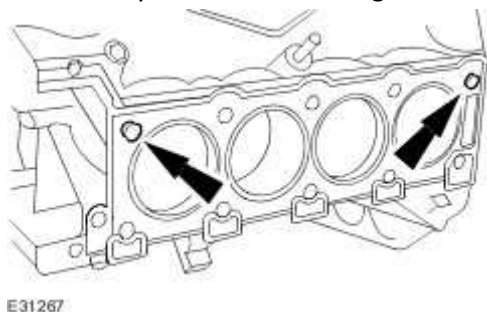


31 .



CAUTION: Only use a plastic scrapper to clean off old gasket.

Clean the cylinder head locating dowels.



32 . Clean and inspect the cylinder head and cylinder block.

Installation

All vehicles

1



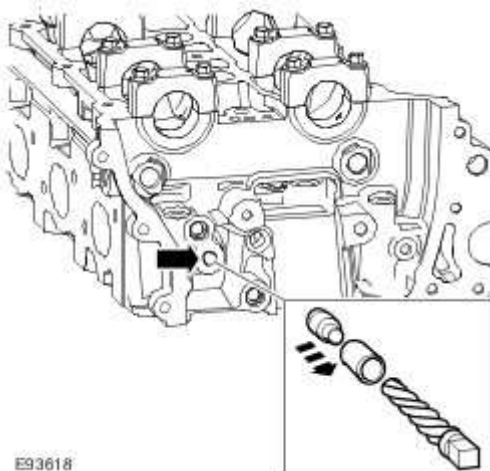
- CAUTION: If a replacement cylinder head is to be installed to a vehicle with VCT the cylinder head must have the oil gallery blind rivet removed before installation.



CAUTION: Make sure that all debris is removed from the cylinder head and cylinder head oil gallery.

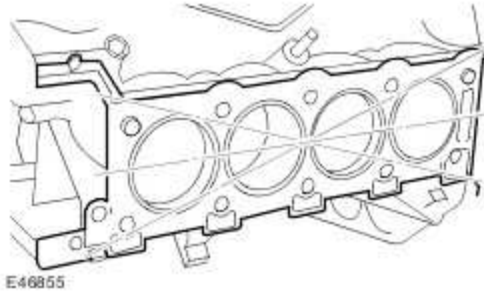
Vehicles fitted with VCT: Remove the blind rivet from the VCT oil gallery.

- Identify the VCT oil supply gallery and the 8 mm (0.31 inch) blind rivet.
- Using a suitable 3 mm (0.12 inch) punch release the centre of the blind rivet until it is released from the outer part of the blind rivet.
- Using a suitable extraction tool, remove the remaining part of the blind rivet.



2 . Clean the component mating faces.

3 . Check cylinder head face for distortion, across the center and from corner to corner.



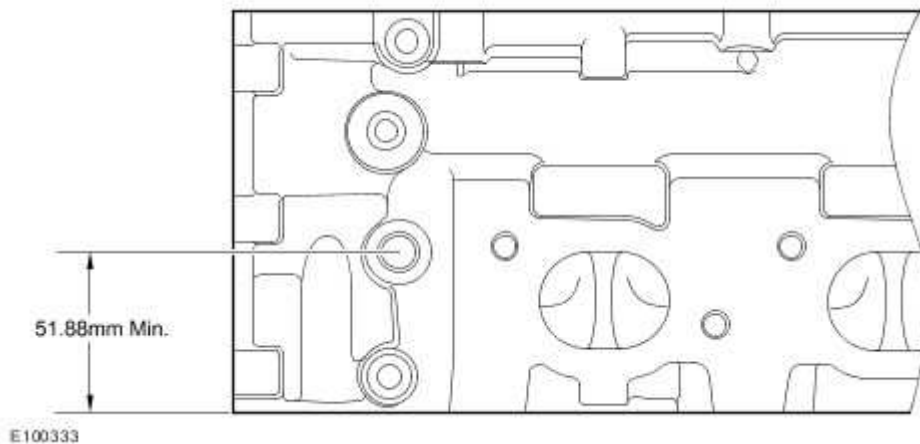
4 . For cylinder head face distortion data, refer to specifications.
For additional information, refer to Specifications

5 NOTE:

For cylinder head with distortion above the maximum allowance, the cylinder head material must be measured.

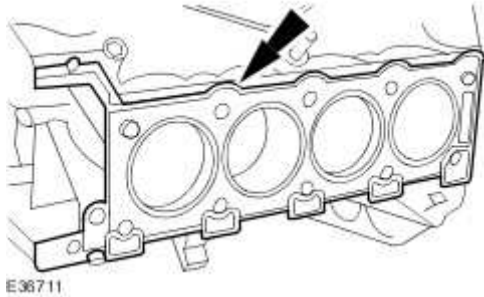
Measure the cylinder head material.


- ▶ Check measurement from the centre of the exhaust dowel to the cylinder head face as shown.
- ▶ If the measurement is less than 51.88 mm the cylinder head requires replacement.



6.  **CAUTION:** The head gasket must be installed over the cylinder block dowels.

Install a new cylinder head gasket



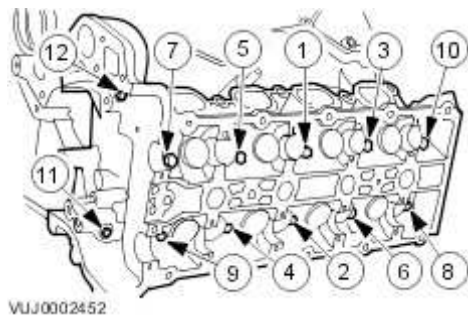
7.  **CAUTION:** Vehicles fitted with Polydrive cylinder head bolts, the cylinder head bolts must be installed using a 10 mm Polydrive socket or a 10 mm Allen key. Failure to follow this instruction may result in damage to the component.

NOTE:

Tighten the bolts 1 to 10 in the sequence shown.

Install the left-hand cylinder head.

- 1) Tighten bolts 1 to 10 to 20 Nm.
- 2) Tighten bolts 1 to 10 to 35 Nm.
- 3) Tighten bolts 1 to 10 to 90°.
- 4) Tighten bolts 1 to 10 to 90°.
- 5) Tighten bolts 11 to 12 to 25 Nm.

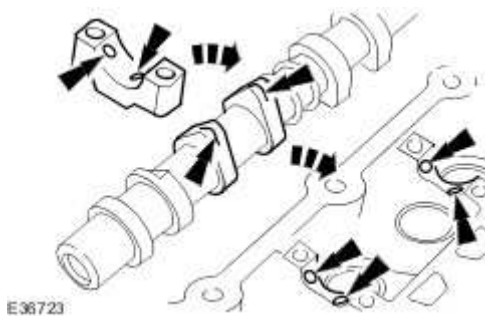


8 . NOTE:

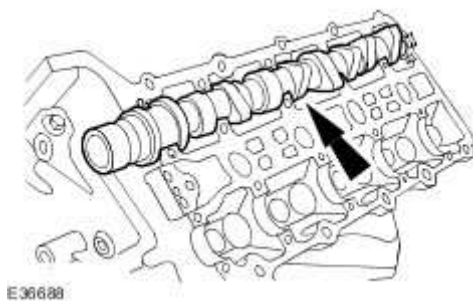
Make sure all components are clean.

Apply oil (EP-90) to the camshaft and bearing surfaces, as follows:

- ▶ To the upper face of each bearing surface in the cylinder head.
- ▶ To the upper face of each bearing surface in each bearing cap.
- ▶ On the cam lobes ONLY, not on the base circle area.



9 . Install the left-hand inlet camshaft.



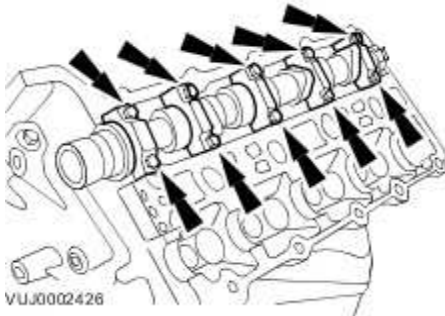
10 .



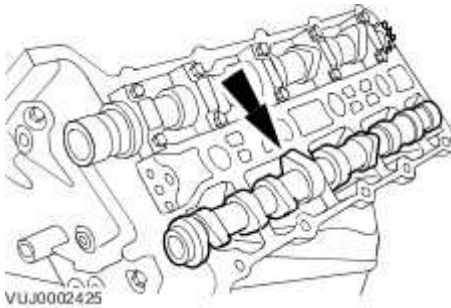
CAUTION: Alternate bolt tightening to correctly seat the camshaft bearing caps.

Install the camshaft bearing cap bolts evenly.

▶ Tighten to 10 Nm.



11 . Install the left-hand exhaust camshaft.



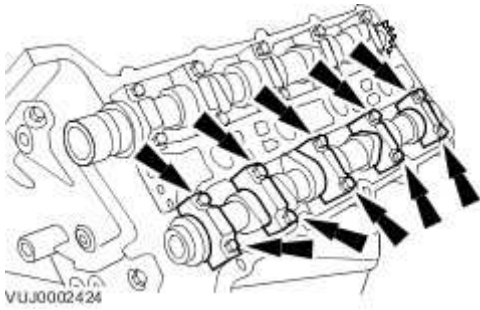
12 .



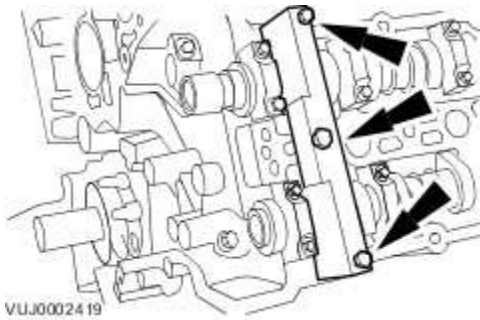
CAUTION: Alternate bolt tightening to correctly seat the camshaft bearing caps.

Install the camshaft bearing cap bolts evenly.

▶ Tighten to 10 Nm.



13 . Install the camshaft setting tool.



14



CAUTION: Do not tighten the camshaft sprocket retaining bolts.

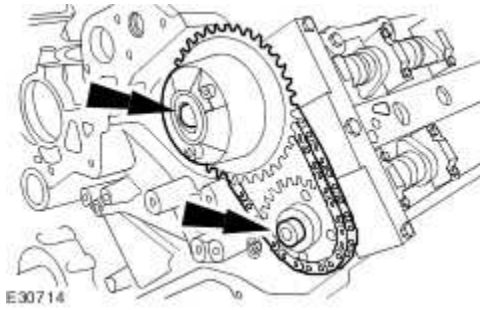


CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

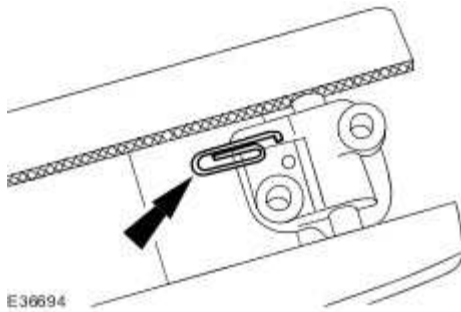
Install the camshaft sprockets.



Install the secondary timing chain tensioner and secondary timing chain to the camshaft sprockets.

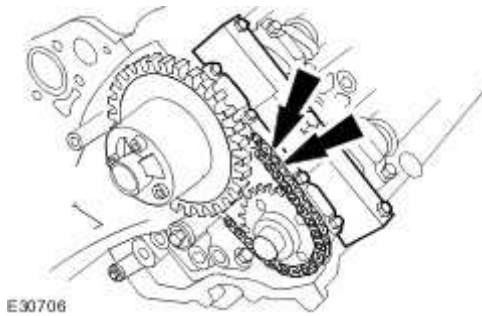


15 . Using a suitable tool, retain the left-hand timing chain tensioner piston.



16 . Install the secondary timing chain tensioner retaining bolts.

► Tighten to 12 Nm.

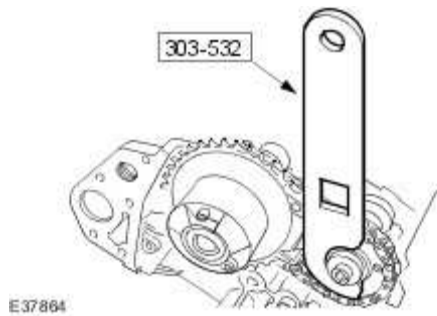


17 . Release the tension in the left-hand timing chain tensioner.

► Remove the retaining tool.

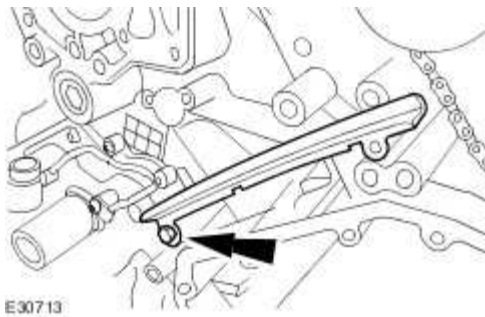
18 Install the timing chain tensioning tool 303-532 to the exhaust camshaft sprocket.

- ▶ Reposition the camshaft sprockets for the most advantageous position for use of the tool.



19 . Install the primary timing chain tensioner guide.

- ▶ Tighten to 12 Nm.



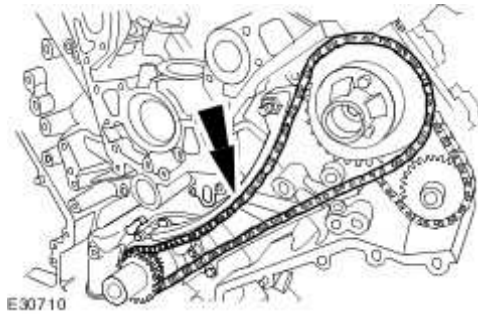
20



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

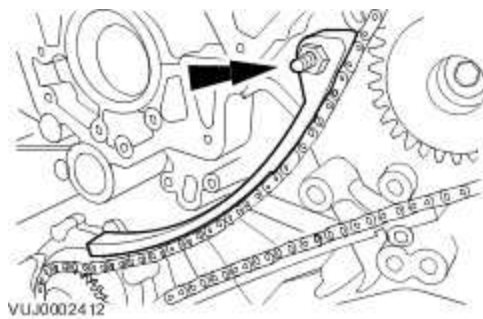
Install the primary timing chain.

- ▶ Install the primary chain over the crankshaft sprocket and the intake sprocket.



21 . Install the primary timing chain tensioner guide.

► Tighten to 12 Nm.

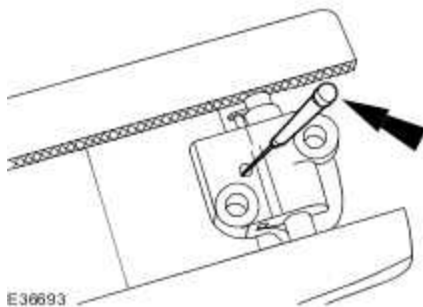


22



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the left-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



23 NOTE:

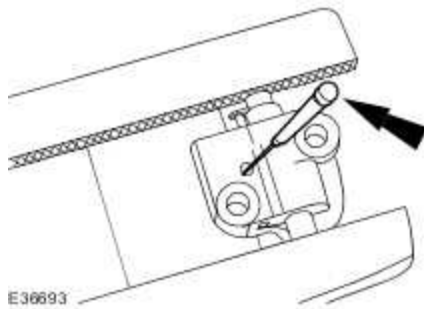
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the left-hand timing chain tensioner.

24 NOTE:

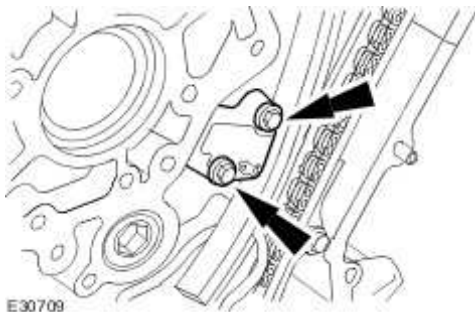
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the left-hand timing chain tensioner piston.



25 . Install the primary timing chain tensioner assembly.

► Tighten to 12 Nm.



26 . Release the tension in the left-hand timing chain tensioner.

► Remove the retaining tool.

27



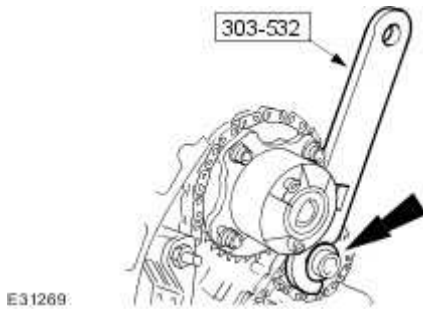
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

▶ Tighten to 20 Nm + 90 deg.



28



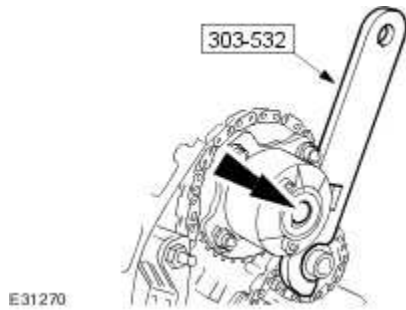
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



CAUTION: Make sure that a new bolt is installed.

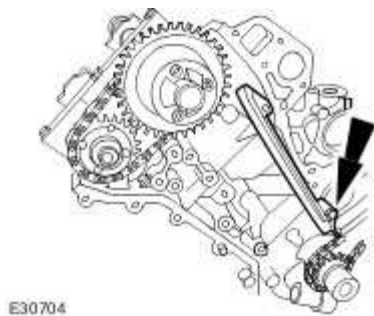
Using the special tool apply force to the tool in an anti-clockwise direction.

▶ Tighten to 20 Nm + 90 deg.



29 . Install the primary timing chain guide.

► Tighten to 12 Nm.



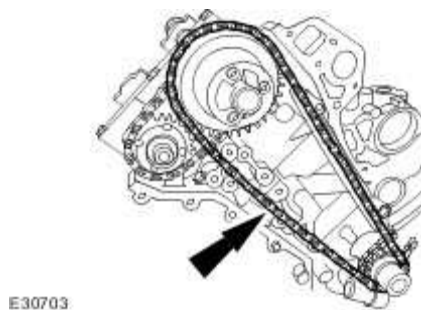
30



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

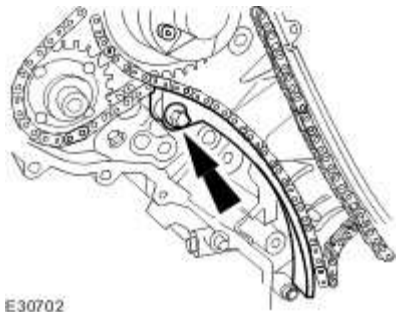
Install the primary timing chain.

► Install the primary chain over the crankshaft sprocket and the intake sprocket.



31 . Install the primary timing chain tensioner guide.

► Tighten to 12 Nm.

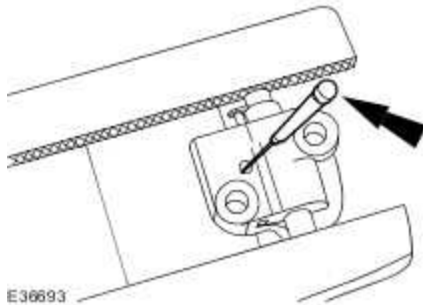


32



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the right-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



33 **NOTE:**

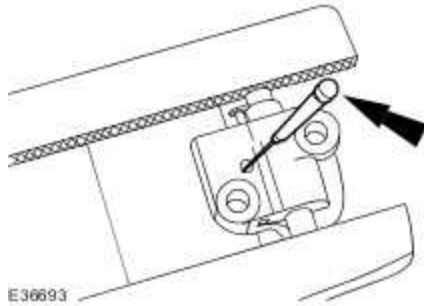
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the right-hand timing chain tensioner.

34 **NOTE:**

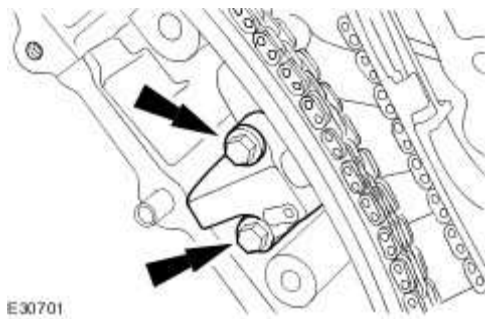
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the right-hand timing chain tensioner piston.



35 . Install the primary timing chain tensioner assembly.

► Tighten to 12 Nm.



36 . Release the tension in the right-hand timing chain tensioner.

► Remove the retaining tool.

37



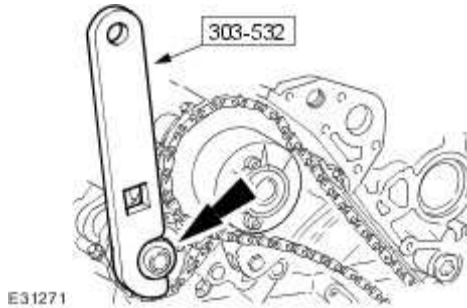
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.




CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

► Tighten to 20 Nm + 90 deg.

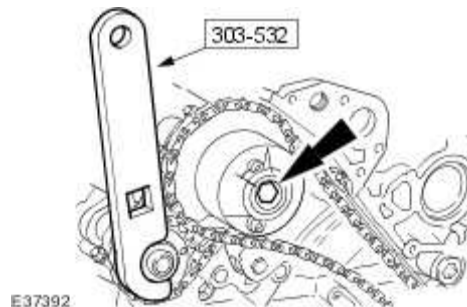


- 38  **CAUTION:** While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

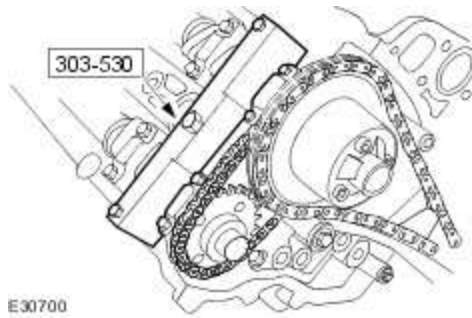
 **CAUTION:** Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction.

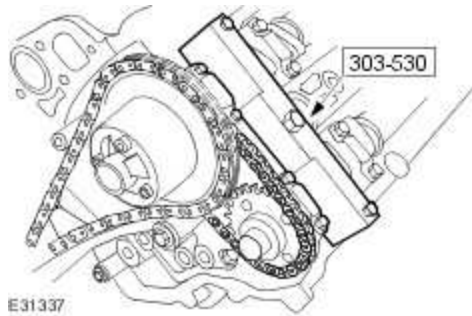
► Tighten to 20 Nm + 90 deg.



- 39 . Remove the special tool from the right-hand cylinder head.



40 . Remove the special tool from the left-hand cylinder head.

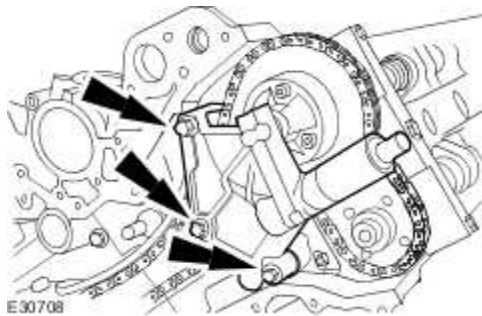


Vehicles without supercharger

41 . Install the left-hand variable camshaft timing oil control unit housing.

▶ Install new O-ring seals.

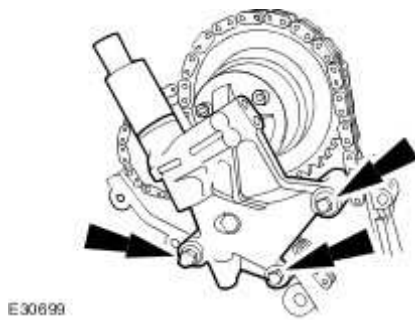
▶ Tighten to 22 Nm.



42 . Install the right-hand variable camshaft timing oil control unit housing.

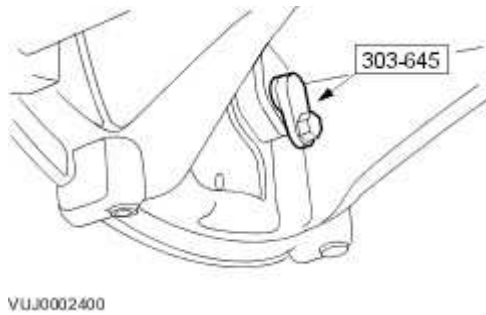
▶ Install new O-ring seals.

► Tighten to 22 Nm.



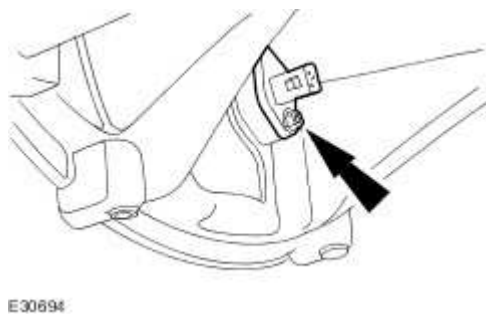
All vehicles

43 . Remove the special tool.

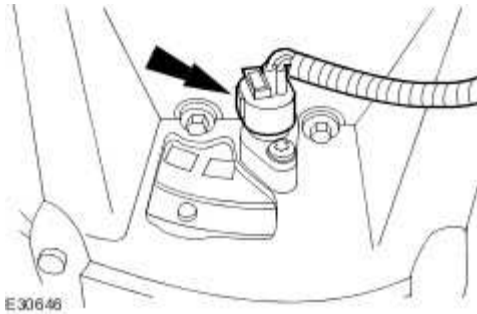


44 . Install the crankshaft position sensor.

► Tighten to 10 Nm.



45 . Connect the crankshaft position sensor electrical connector.



46 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)


Vehicles without supercharger

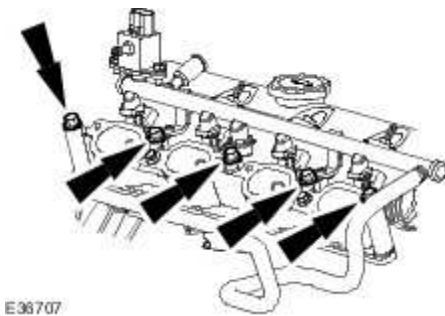
47 Install the intake manifold.

. For additional information, refer to Intake Manifold - VIN Range: G00442->G45703 (30.15.01)

Vehicles with supercharger

48 . Install the lower intake manifold.

 Tighten to 22 Nm.



49 . Install the charge air cooler.

For additional information, refer to Charge Air Cooler

All vehicles

50 Install the engine front cover.

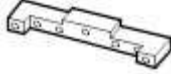
- . For additional information, refer to Engine Front Cover - VIN Range: G00442->G45703 (12.65.01)

51 . Carry out the valve clearance check.

For additional information, refer to Valve Clearance Check (12.29.47)

Cylinder Head LH - VIN Range: G45704- >G99999 (12.29.02)

Special Service Tools



303-530

Camshaft setting/locking Tool

303-530



303-532

Timing chain tensioning tool

303-532



303-645

Crankshaft setting, main tool

303-645

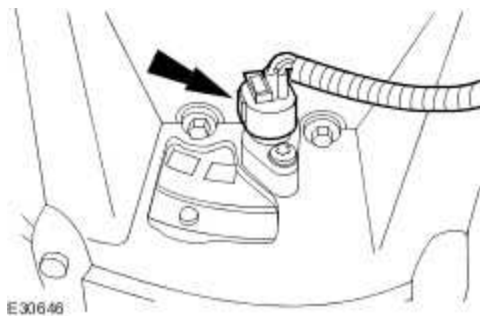
Removal

All vehicles

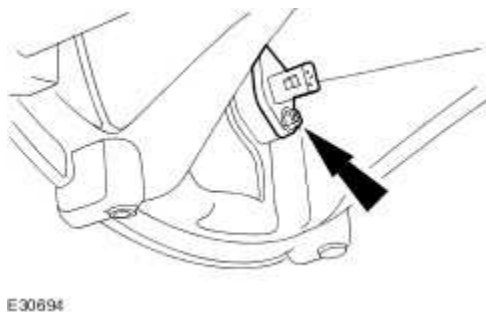


CAUTION: If a replacement cylinder head is to be installed to a vehicle with variable camshaft timing (VCT) the cylinder head must have the oil gallery blind rivet removed before installation.

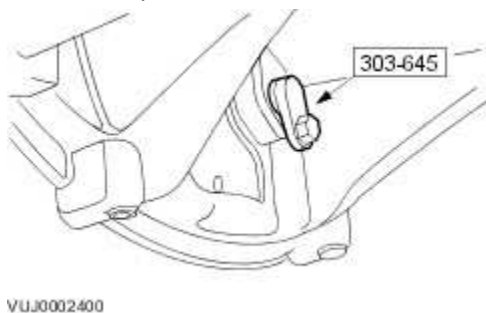
- 1 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)
- 2 . Disconnect the crankshaft position (CKP) sensor electrical connector.



3 . Remove the CKP sensor.



4 . Install the special tool.



Vehicles without supercharger

5 . Remove the intake manifold.

For additional information, refer to Intake Manifold - VIN Range: G45704->G99999 (30.15.01)

Vehicles with supercharger

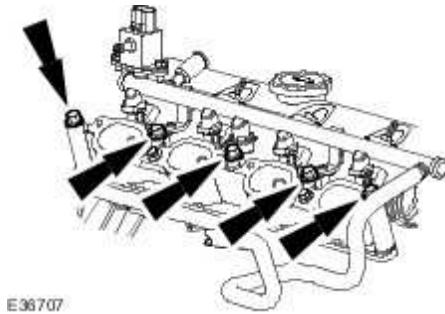
6 . Remove the charge air cooler.

For additional information, refer to Charge Air Cooler

7 . NOTE:

Left-hand shown, right-hand similar.

Remove the lower intake manifold.



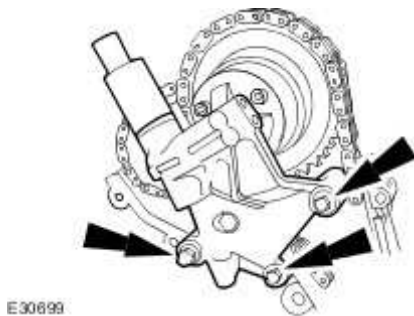
All vehicles

8 Remove the engine front cover.

- . For additional information, refer to Engine Front Cover - VIN Range: G45704->G99999 (12.65.01)

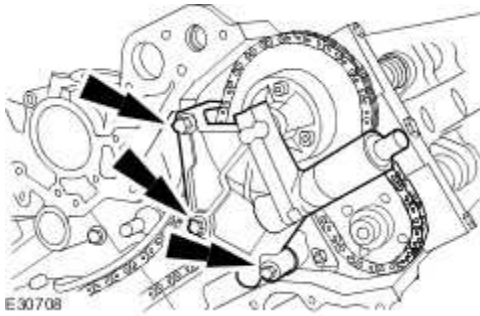
9 . Remove the right-hand variable camshaft timing oil control unit housing.

- ▶ Remove and discard the O-ring seals.

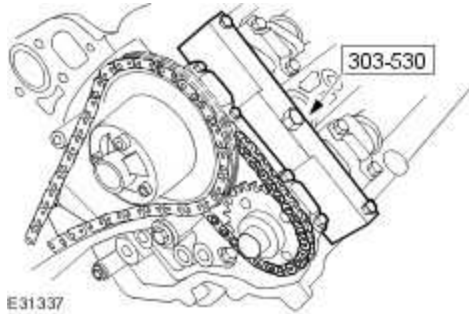


10 . Remove the left-hand variable camshaft timing oil control unit housing.

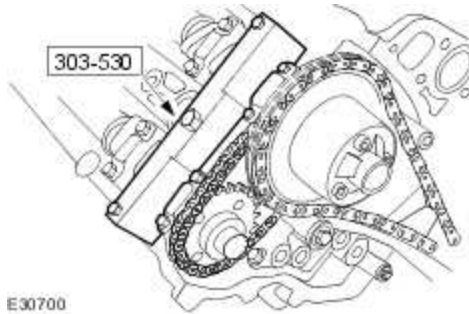
- ▶ Remove and discard the O-ring seals.



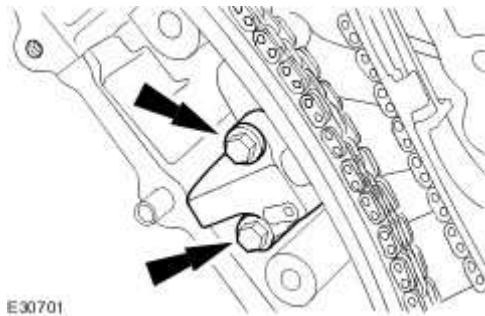
11 . Install the special tool to the left-hand cylinder head.



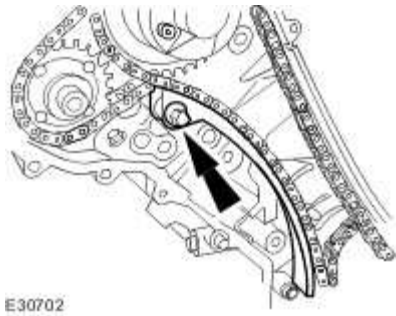
12 . Install the special tool to the right-hand cylinder head.



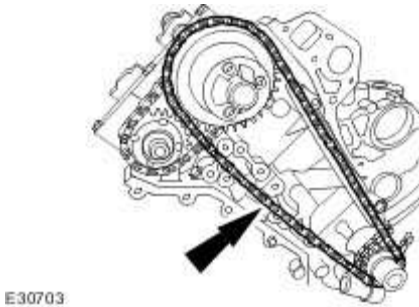
13 . Remove the primary timing chain tensioner assembly.



14 . Remove the primary timing chain tensioner guide.



15 . Remove the primary timing chain.

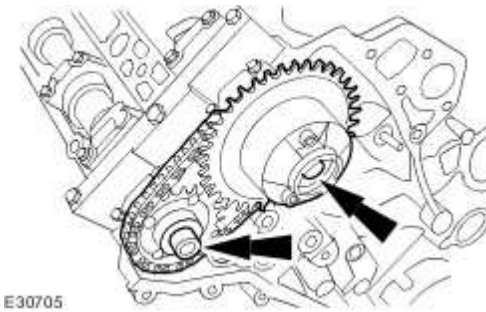


16

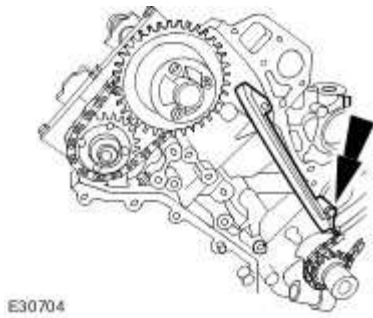


CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

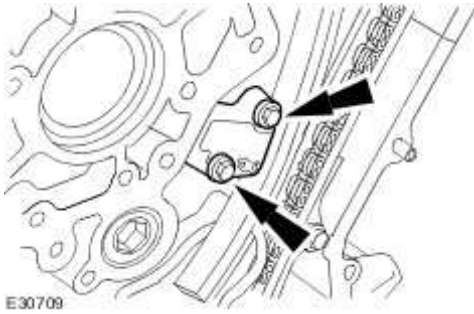
Loosen the camshaft sprockets.



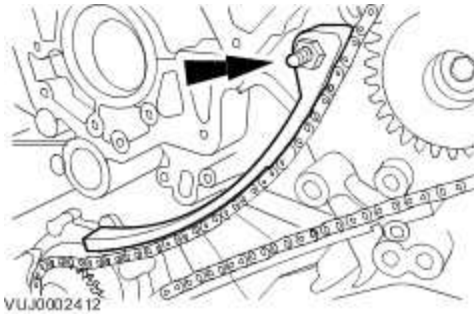
17 . Remove the primary timing chain guide.



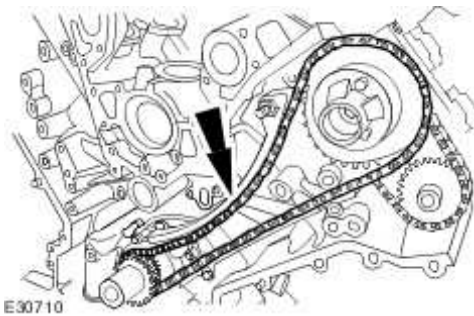
18 . Remove the primary timing chain tensioner assembly.



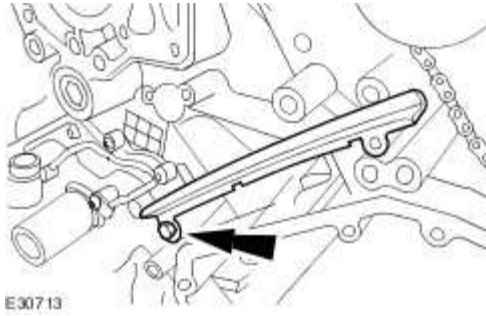
19 . Remove the primary timing chain tensioner guide.



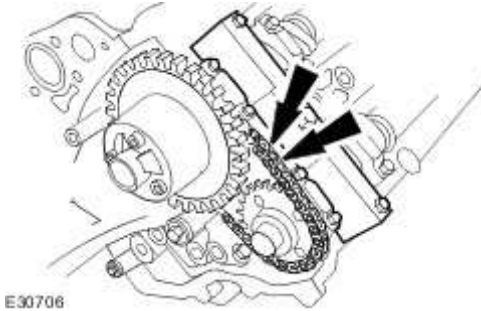
20 . Remove the primary timing chain.



21 . Remove the primary timing chain tensioner guide.

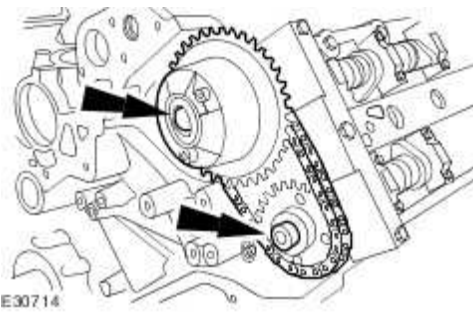


22 . Remove the secondary timing chain tensioner retaining bolts.

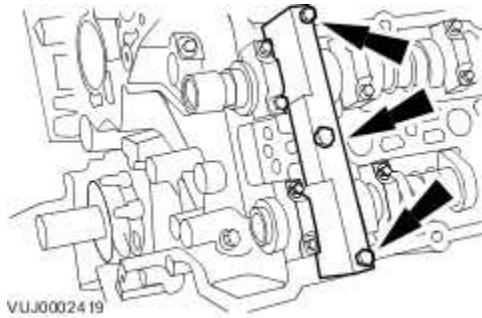


23 Remove the camshaft sprockets.

- ▶ Remove the secondary timing chain tensioner and secondary timing chain from the camshaft sprockets.

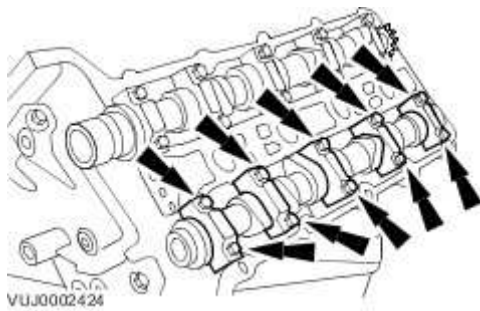


24 . Remove the camshaft setting tool.

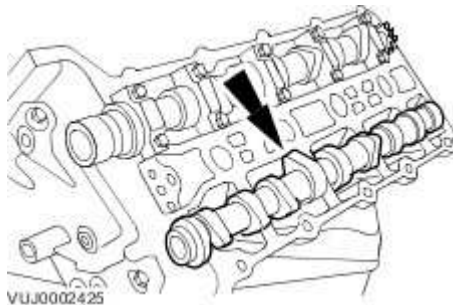


25 Remove the camshaft bearing caps.

- ▶ Remove the camshaft bearing cap retaining bolts evenly and in stages.
- ▶ Remove the camshaft bearing caps. Note their orientation and markings, each is marked with its position (a number) and orientation (an arrow).



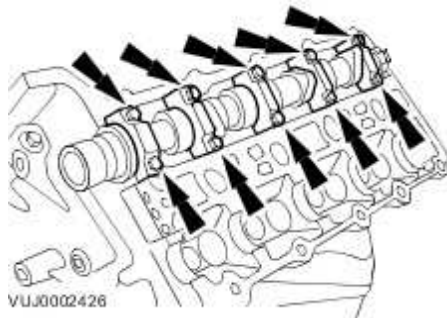
26 . Remove the left-hand exhaust camshaft.



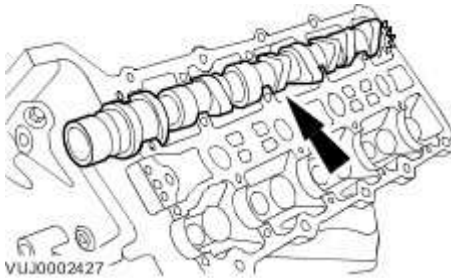
27 Remove the camshaft bearing caps.


- ▶ Remove the camshaft bearing cap retaining bolts evenly and in stages.


- ▶ Remove the camshaft bearing caps. Note their orientation and markings, each is marked with its position (a number) and orientation (an arrow).



- 28 . Remove the left-hand inlet camshaft.

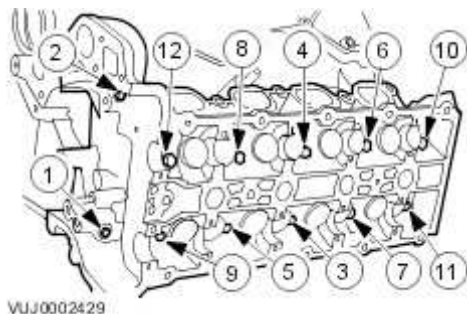


- 29  **CAUTION:** The bolts can only be used twice, mark the bolts with a center punch. If two punch marks are visible, discard the bolts.

 **CAUTION:** Vehicles fitted with Polydrive cylinder head bolts, the cylinder head bolts must be removed using a 10 mm Polydrive socket or a 10 mm Allen key. Failure to follow this instruction may result in damage to the component.


Remove the left-hand cylinder head.

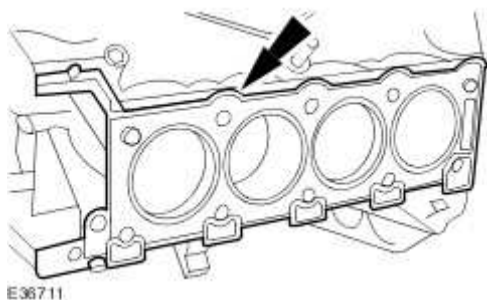
- ▶ Remove the bolts in the indicated sequence.



30.  **CAUTION: Only use a plastic scrapper to clean off old gasket.**

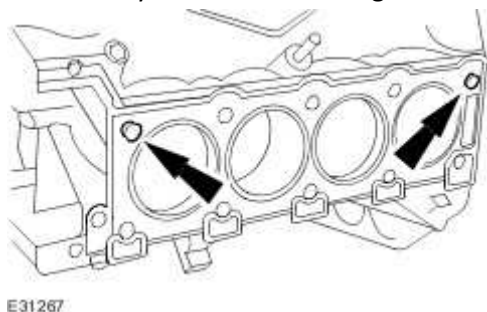
Remove the cylinder head gasket.

 Clean the gasket mating faces.



31.  **CAUTION: Only use a plastic scrapper to clean off old gasket.**

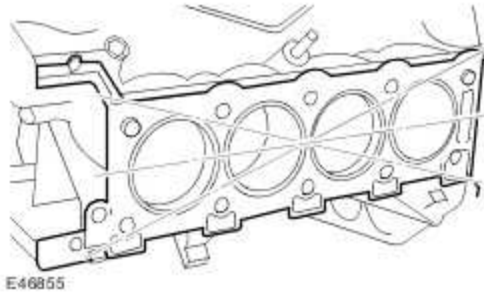
Clean the cylinder head locating dowels.



Installation

All vehicles

- 1 . Check cylinder head face for distortion, across the center and from corner to corner.



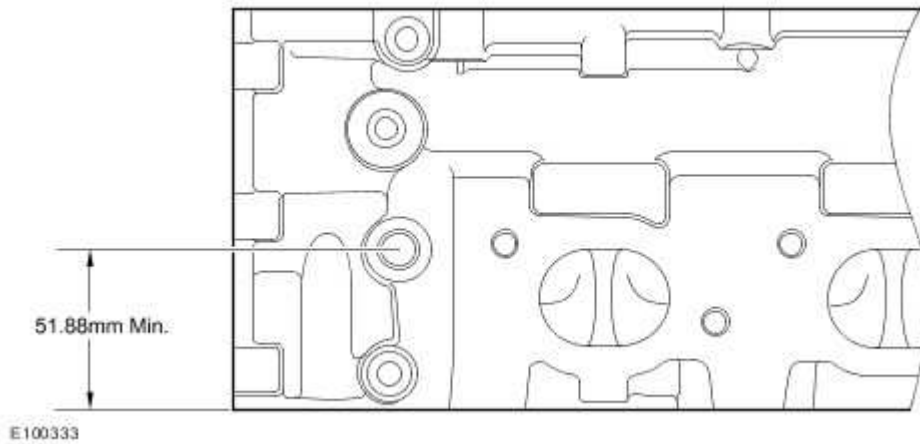
- 2 . For cylinder head face distortion data, refer to specifications.
For additional information, refer to Specifications

3 NOTE:

For cylinder head with distortion above the maximum allowance, the cylinder head material must be measured.

Measure the cylinder head material.

- ▶ Check measurement from the centre of the exhaust dowel to the cylinder head face as shown.
- ▶ If the measurement is less than 51.88 mm the cylinder head requires replacement.



4



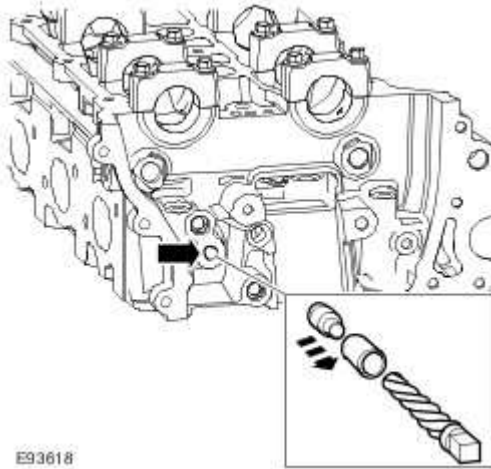
CAUTION: If a replacement cylinder head is to be installed to a vehicle with VCT the cylinder head must have the oil gallery blind rivet removed before installation.




CAUTION: Make sure that all debris is removed from the cylinder head and cylinder head oil gallery.

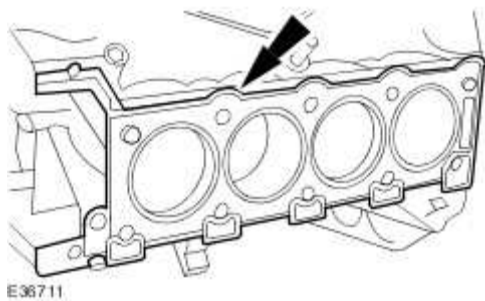
Vehicles fitted with VCT: Remove the blind rivet from the VCT oil gallery.

- Identify the VCT oil supply gallery and the 8 mm (0.31 inch) blind rivet.
- Using a suitable 3 mm (0.12 inch) punch release the centre of the blind rivet until it is released from the outer part of the blind rivet.
- Using a suitable extraction tool, remove the remaining part of the blind rivet.



5.  **CAUTION:** The head gasket must be installed over the cylinder block dowels.

Install a new cylinder head gasket



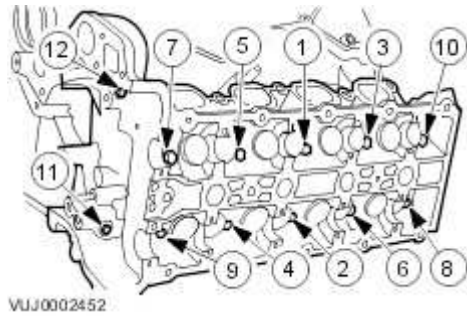
6. **NOTE:**

Tighten the bolts 1 to 10 in the sequence shown.

Install the left-hand cylinder head.

- 1) Tighten bolts 1 to 10 to 20 Nm.
- 2) Tighten bolts 1 to 10 to 35 Nm.
- 3) Tighten bolts 1 to 10 to 90°.
- 4) Tighten bolts 1 to 10 to 90°.

5) Tighten bolts 11 to 12 to 25 Nm.

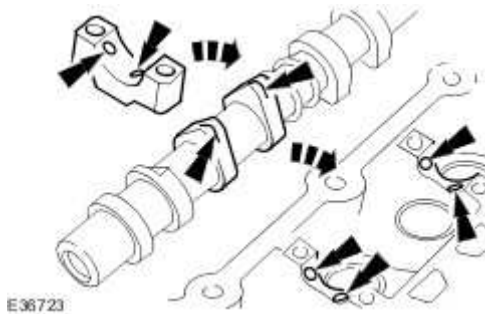


7 . NOTE:

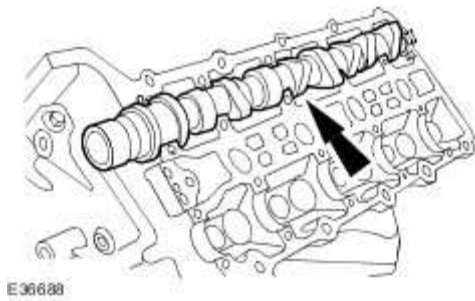
Make sure all components are clean.

Apply oil (EP-90) to the camshaft and bearing surfaces, as follows:

- ▶ To the upper face of each bearing surface in the cylinder head.
- ▶ To the upper face of each bearing surface in each bearing cap.
- ▶ On the cam lobes ONLY, not on the base circle area.



8 . Install the left-hand inlet camshaft.




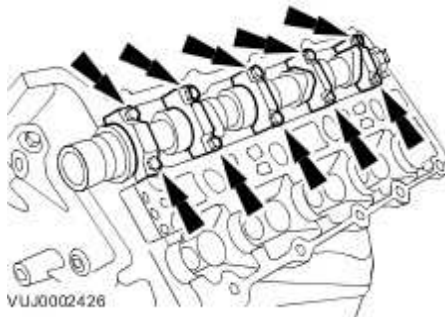
9 .



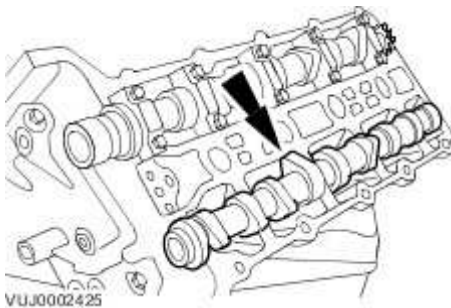
CAUTION: Alternate bolt tightening to correctly seat the camshaft bearing caps.

Install the camshaft bearing cap bolts evenly.

 Tighten to 10 Nm.



10 . Install the left-hand exhaust camshaft.



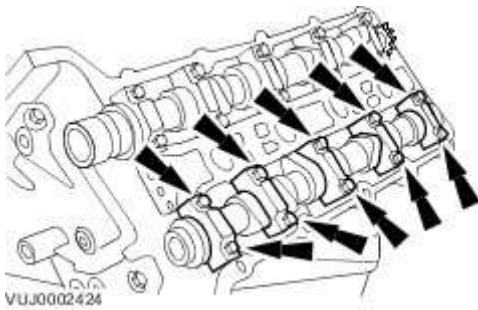
11 .



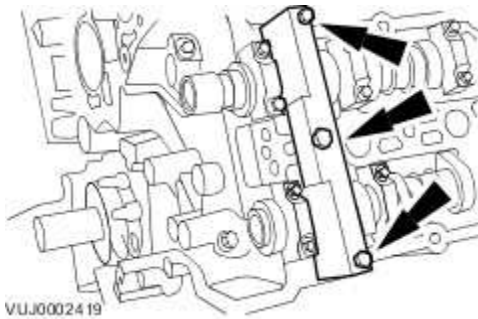
CAUTION: Alternate bolt tightening to correctly seat the camshaft bearing caps.

Install the camshaft bearing cap bolts evenly.

▶ Tighten to 10 Nm.



12 . Install the camshaft setting tool.



13



CAUTION: Do not tighten the camshaft sprocket retaining bolts.

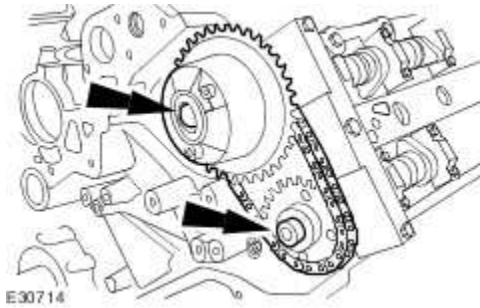


CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

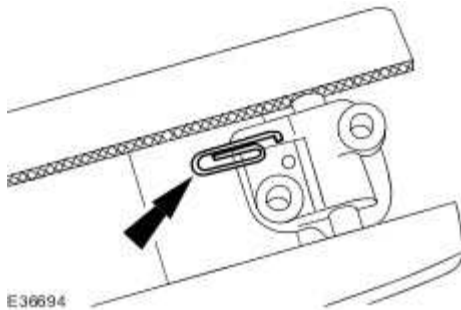
Install the camshaft sprockets.



Install the secondary timing chain tensioner and secondary timing chain to the camshaft sprockets.

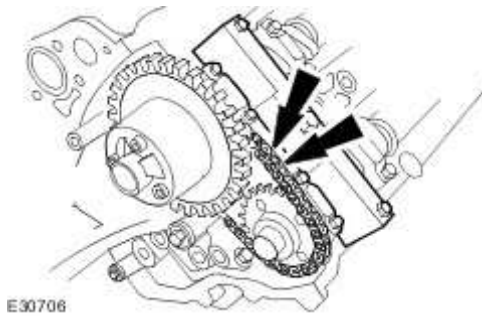


14 . Using a suitable tool, retain the left-hand timing chain tensioner piston.



15 . Install the secondary timing chain tensioner retaining bolts.

► Tighten to 12 Nm.

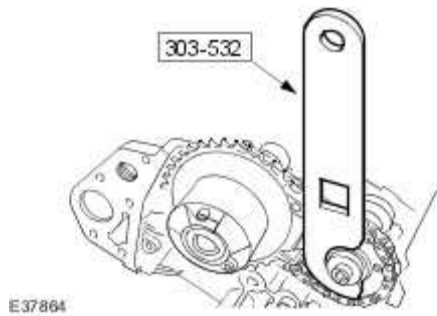


16 . Release the tension in the left-hand timing chain tensioner.

► Remove the retaining tool.

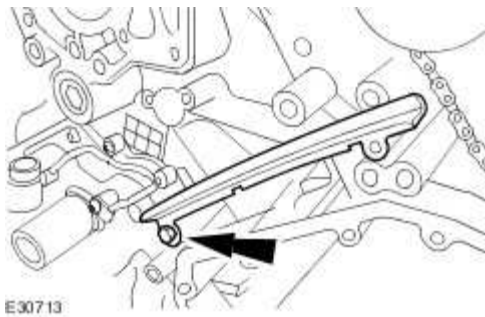
17 Install the timing chain tensioning tool 303-532 to the exhaust camshaft sprocket.

- ▶ Reposition the camshaft sprockets for the most advantageous position for use of the tool.



18 . Install the primary timing chain tensioner guide.

- ▶ Tighten to 12 Nm.



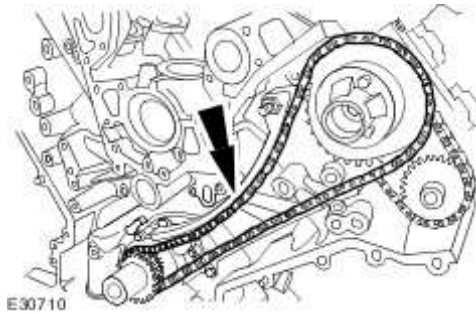
19



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

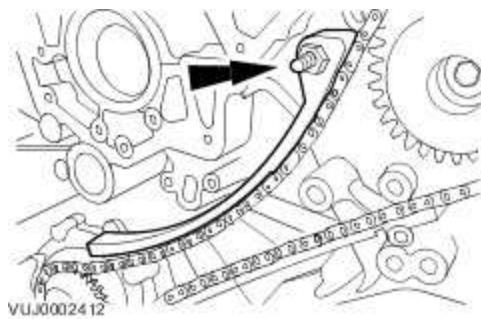
Install the primary timing chain.

- ▶ Install the primary chain over the crankshaft sprocket and the intake sprocket.



20 . Install the primary timing chain tensioner guide.

► Tighten to 12 Nm.

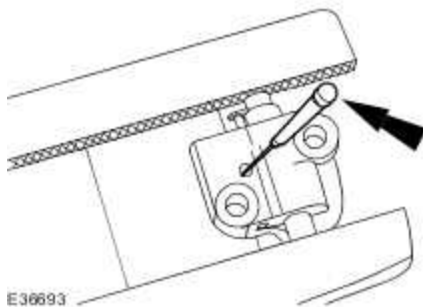


21



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the left-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



22 NOTE:

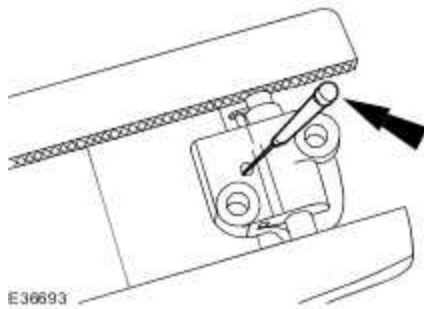
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the left-hand timing chain tensioner.

23 NOTE:

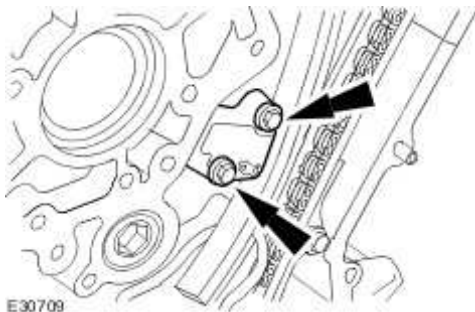
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the left-hand timing chain tensioner piston.



24 . Install the primary timing chain tensioner assembly.

► Tighten to 12 Nm.



25 . Release the tension in the left-hand timing chain tensioner.

► Remove the retaining tool.

26



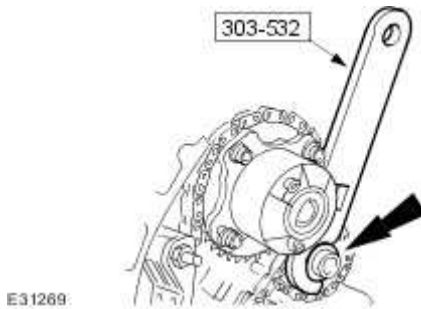
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



CAUTION: Make sure that a new bolt is installed.

Using the special tool, apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

▶ Tighten to 20 Nm + 90 deg.



27



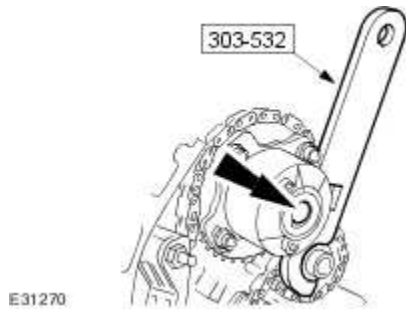
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



CAUTION: Make sure that a new bolt is installed.

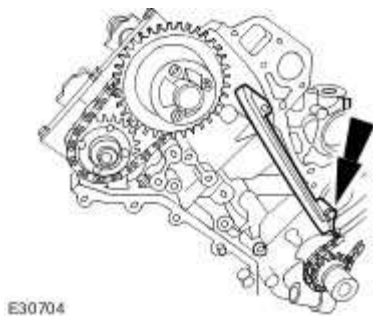
Using the special tool, apply force to the tool in an anti-clockwise direction.

▶ Tighten to 20 Nm + 90 deg.



28 . Install the primary timing chain guide.

► Tighten to 12 Nm.



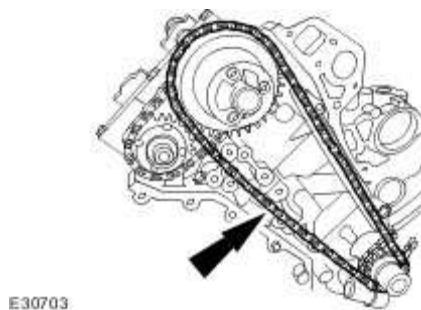
29



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

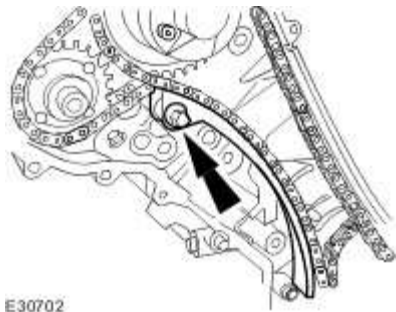
Install the primary timing chain.

► Install the primary chain over the crankshaft sprocket and the intake sprocket.



30 . Install the primary timing chain tensioner guide.

► Tighten to 12 Nm.

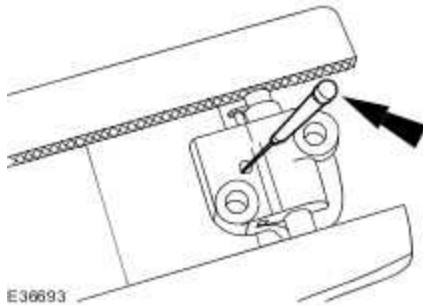


31



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the right-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



32 **NOTE:**

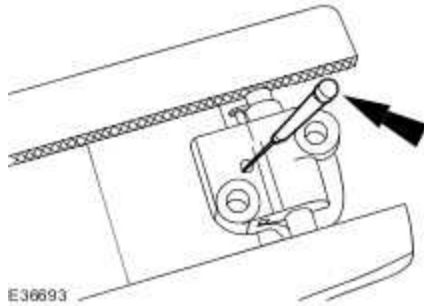
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the right-hand timing chain tensioner.

33 **NOTE:**

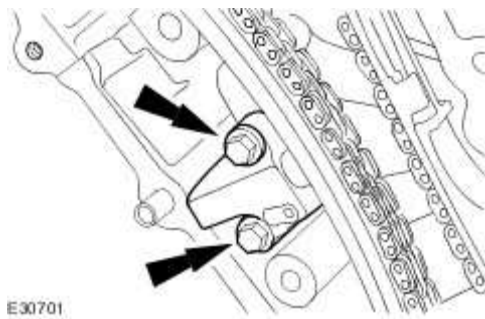
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the right-hand timing chain tensioner piston.



34 . Install the primary timing chain tensioner assembly.

► Tighten to 12 Nm.



35 . Release the tension in the right-hand timing chain tensioner.

► Remove the retaining tool.

36



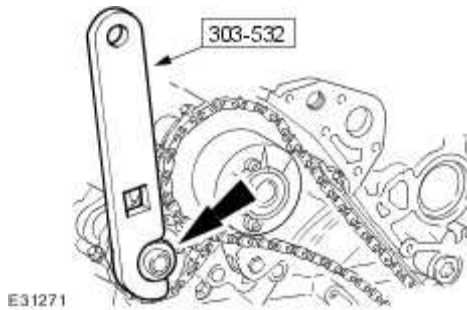
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

► Tighten to 20 Nm + 90 deg.



37



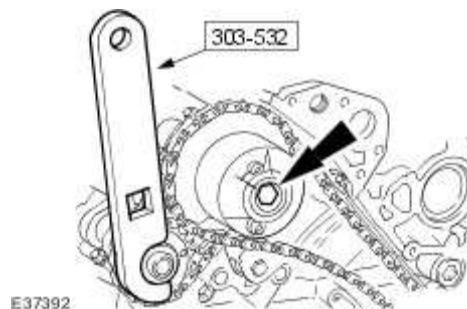
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



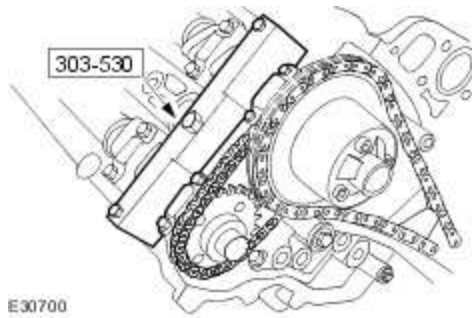
CAUTION: Make sure that a new bolt is installed.

Using the special tool, apply force to the tool in an anti-clockwise direction.

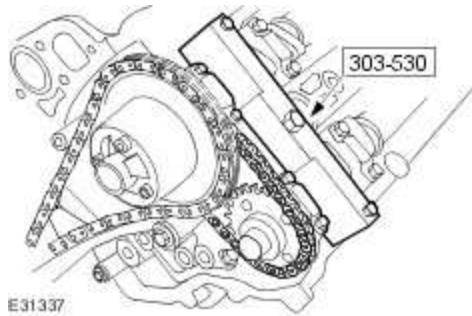
► Tighten to 20 Nm + 90 deg.



38 . Remove the special tool from the right-hand cylinder head.



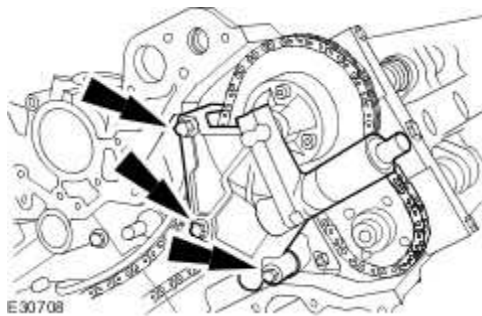
39 . Remove the special tool from the left-hand cylinder head.



40 . Install the left-hand variable camshaft timing oil control unit housing.

▶ Install new O-ring seals.

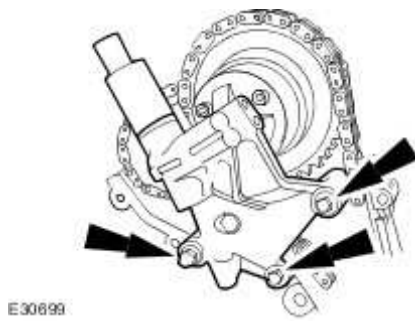
▶ Tighten to 22 Nm.



41 . Install the right-hand variable camshaft timing oil control unit housing.

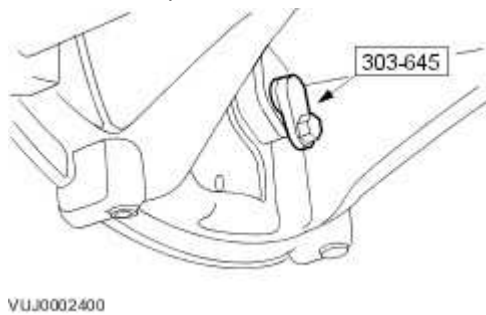
▶ Install new O-ring seals.

▶ Tighten to 22 Nm.



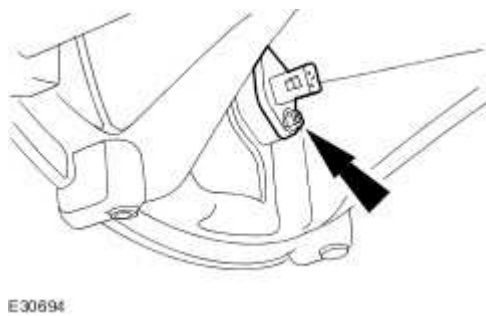
42 . Raise the vehicle.

43 . Remove the special tool.

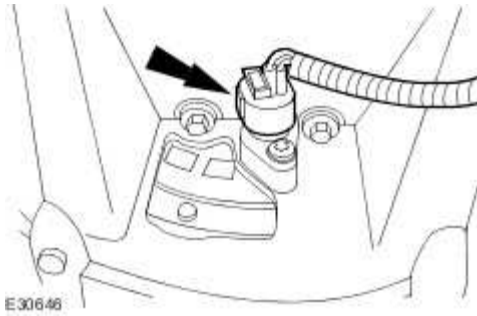


44 . Install the CKP sensor.

► Tighten to 10 Nm.



45 . Connect the CKP sensor electrical connector.



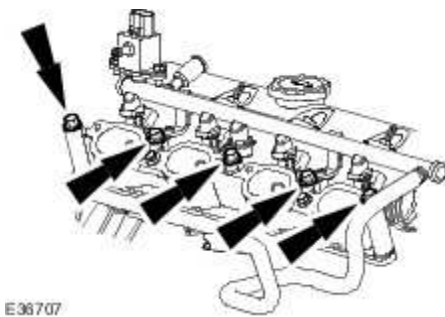
Vehicles without supercharger

- 46 Install the intake manifold.
- . For additional information, refer to Intake Manifold - VIN Range: G45704->G99999 (30.15.01)

Vehicles with supercharger

- 47 . Install the lower intake manifold.

► Tighten to 22 Nm.



- 48 . Install the charge air cooler.
- For additional information, refer to Charge Air Cooler

All vehicles

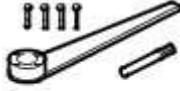
- 49 . Carry out the valve clearance check.
- For additional information, refer to Valve Clearance Check (12.29.47)

- 50 Install the engine front cover.

- . For additional information, refer to Engine Front Cover - VIN Range: G45704->G99999
(12.65.01)

Engine Front Cover - VIN Range: G00442- >G45703 (12.65.01)

Special Service Tools



303-191

Front Pulley Lock

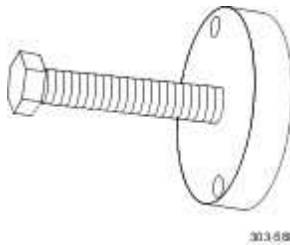
303-191



303-191-02

Front Pulley Lock Adaptor

303-191-02



303-588

Remover, Crankshaft Damper

303-588

Removal

All vehicles

- 1 . Remove the cooling fan motor and shroud. <<303-03A>>
- 2 . Remove the left-hand valve cover.
For additional information, refer to
- 3 . Remove the right-hand valve cover.
For additional information, refer to

Vehicles without supercharger

- 4 . Remove the oil cooler.

For additional information, refer to

Vehicles with supercharger

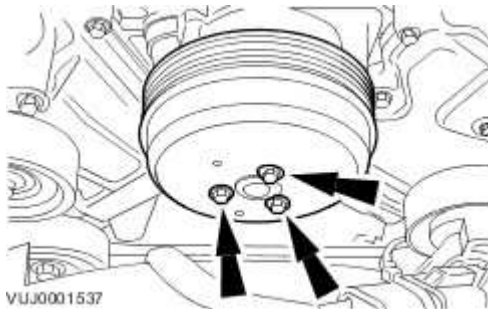
- 5 . Remove the supercharger drive belt. <<303-05>>

All vehicles

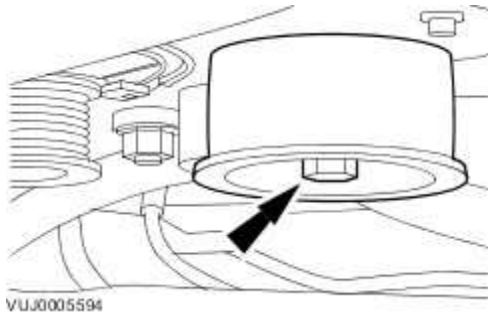
- 6 . Remove power steering pump. <<211-02>>

- 7 . Remove the air conditioning compressor. <<412-03>>

- 8 . Remove the water pump pulley.



- 9 . Remove the accessory drive belt idler pulley.

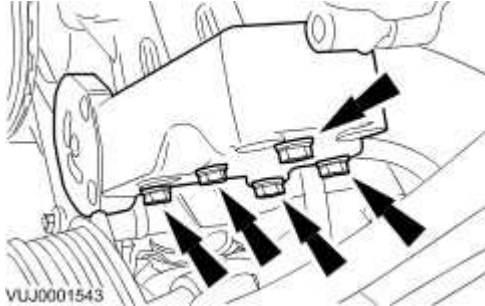


Vehicles with supercharger

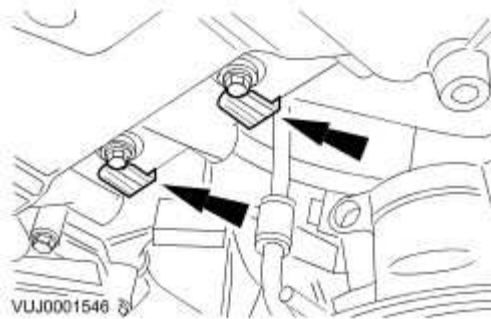
- 10 . Remove supercharger drive belt tensioner. <<303-05>>

All vehicles

- 11 . Remove the power steering pump mounting bracket.



- 12 . Detach the engine harness.



13

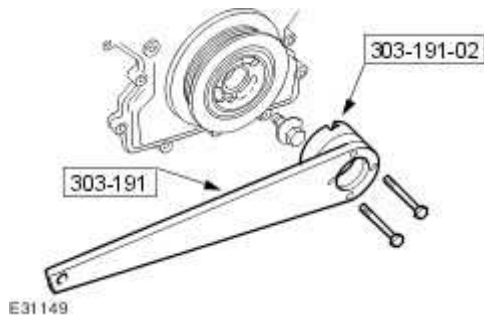


- **CAUTION:** Under no circumstances should the crankshaft setting peg 303-645 be used in the following operations to lock the crankshaft.

Using special tools, retain the crankshaft pulley.



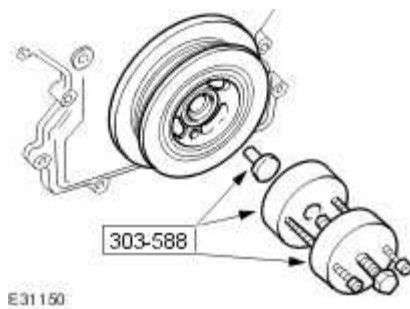
Remove and discard the crankshaft pulley bolt.



14 . Remove the special tools.

15 . Using special tools, remove the crankshaft pulley.

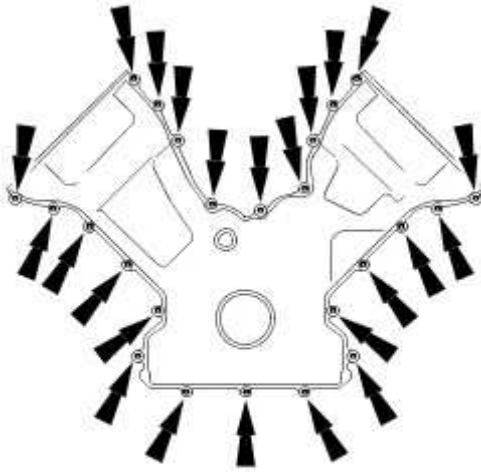
- ▶ Collect the locking ring.
- ▶ Remove and discard the O-ring seal.



16 . Remove the special tools.

17 . Remove the engine front cover.

- ▶ Remove and discard all the seals.



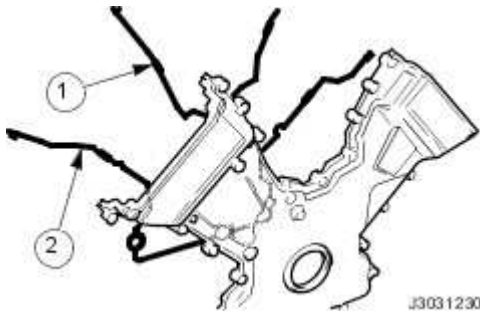
VUJ0002018

Installation

All vehicles

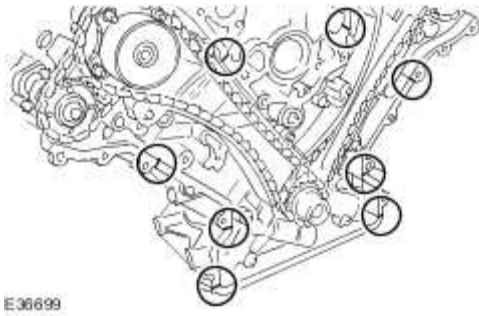
1 . Install new seals to the timing cover.

- 1) Install the new seal to the inner groove on the face of the timing cover.
- 2) Install the new seal to the outer groove on the face of the timing cover.



2 Apply sealant to the eight joints on the engine face.

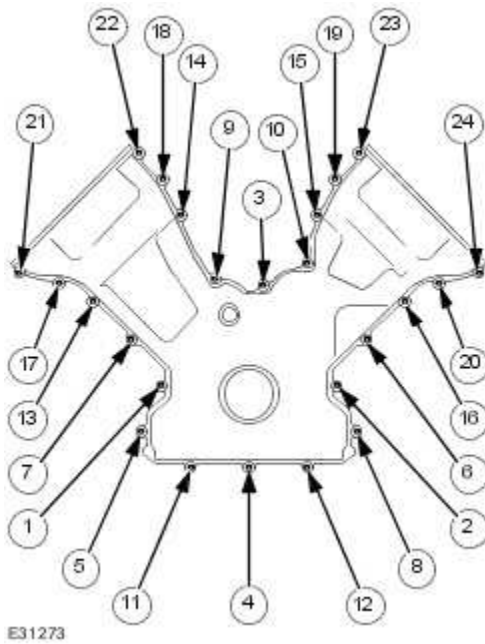
- ▶ Sealant beads to be 3mm diameter and 12mm long. Cut the nozzle of the sealant tube to produce a 3 mm (0.12 in) bead. (Install and tighten the securing bolts within twenty minutes of sealant application).



3 . Install the timing cover.

► Tighten in the sequence shown.

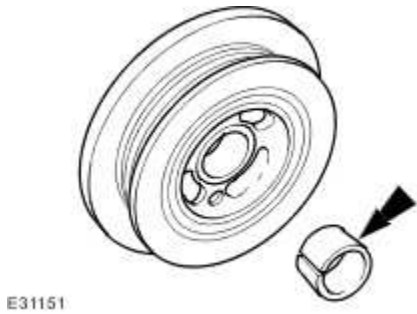
► Tighten to 13 Nm.




4 . **NOTE:**

Check crankshaft pulley and locking ring for damage.


Clean all crankshaft pulley mating faces.

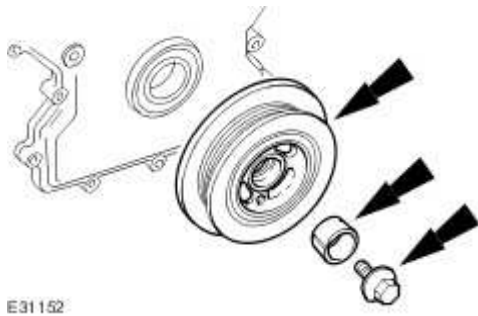



- 5  **CAUTION:** The screw thread in the crankshaft must be cleaned out before a new crankshaft pulley bolt is installed.

 **CAUTION:** A new crankshaft pulley bolt must be used.


Install, but do not tighten, a new crankshaft pulley retaining bolt.

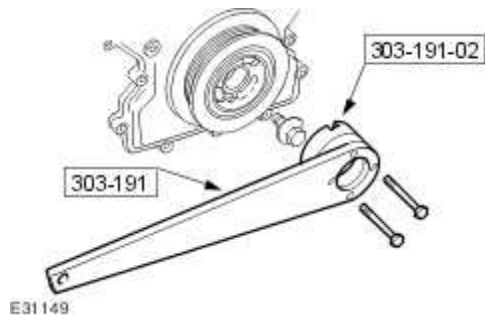
 Install the crankshaft pulley and locking ring to the crankshaft.



- 6  **CAUTION:** Under no circumstances should the crankshaft setting peg 303-645 be used in the following operations to lock the crankshaft.

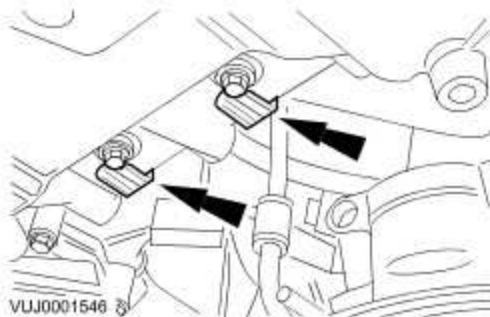
Using special tools, retain the crankshaft pulley.

 Tighten the crankshaft pulley retaining bolt to 375 Nm.



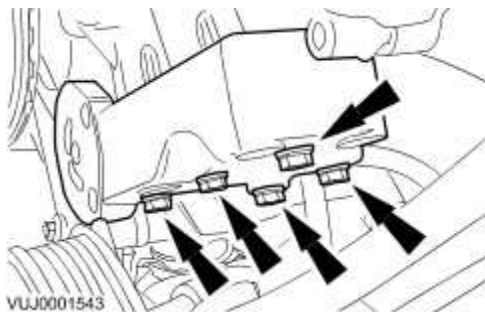
7 . Remove the special tools.

8 . Attach the engine harness.



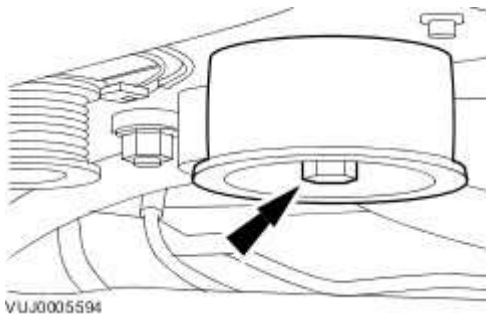
9 . Install the power steering pump mounting bracket.

► Tighten to 25 Nm.



10 . Install the accessory drive belt idler pulley.

► Tighten to 25 Nm.



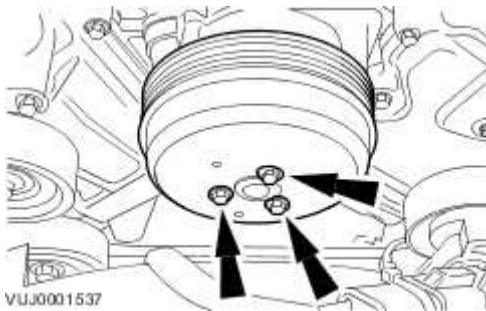
Vehicles with supercharger

11 . Install the supercharger drive belt tensioner. <<303-05>>

All vehicles

12 . Install the water pump pulley.

► Tighten to 10 Nm + 45°.



13 . Install the air conditioning compressor. <<412-03>>

14 . Install power steering pump. <<211-02>>

Vehicles with supercharger

15 . Install the supercharger drive belt. <<303-05>>

Vehicles without supercharger

16 . Install the oil cooler.

For additional information, refer to

All vehicles

17 . Install the left-hand valve cover.

For additional information, refer to

18 . Install the right-hand valve cover.

For additional information, refer to

19 . Install the cooling fan motor and shroud. <<303-03A>>

Engine Front Cover - VIN Range: G45704->G99999 (12.65.01)

Removal

All vehicles

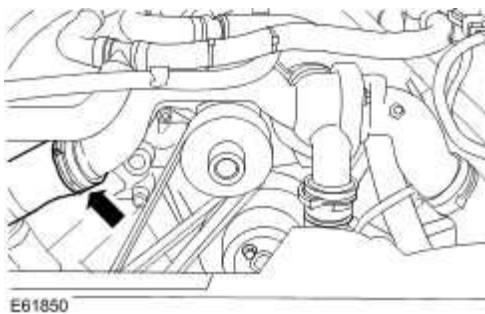
- 1 . Remove the left-hand valve cover.
For additional information, refer to Valve Cover LH - VIN Range: G45704->G99999 (12.29.43)
- 2 . Remove the right-hand valve cover.
For additional information, refer to Valve Cover RH - VIN Range: G45704->G99999 (12.29.44)
- 3 . Remove the crankshaft pulley.
For additional information, refer to Crankshaft Pulley (12.21.09)

Vehicles without supercharger

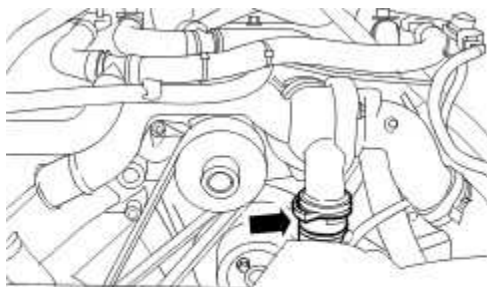
- 4 . Remove the oil cooler.
For additional information, refer to Oil Cooler - Vehicles Without: Supercharger (12.60.68)

Vehicles with supercharger

- 5 . Disconnect the coolant hose.

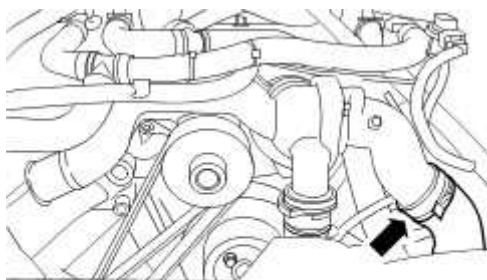


- 6 . Disconnect the coolant hose.



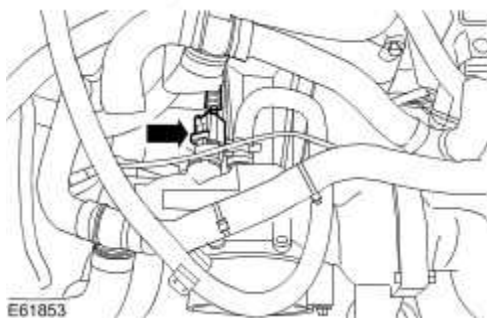
E61851

7 . Disconnect the coolant hose.



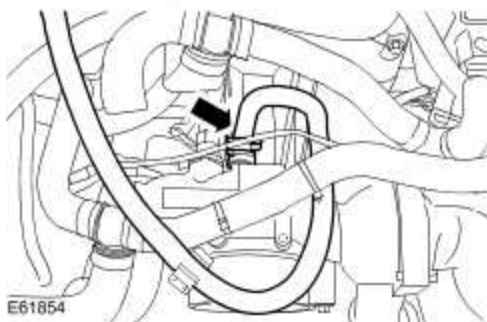
E61852

8 . Disconnect the engine coolant temperature (ECT) sensor electrical connector.

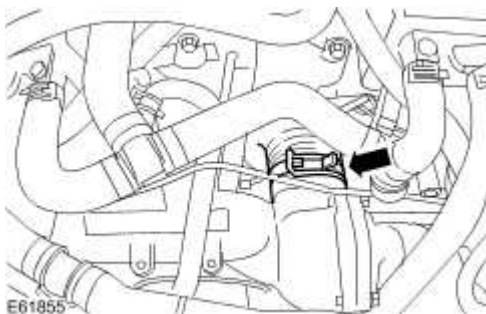


E61853

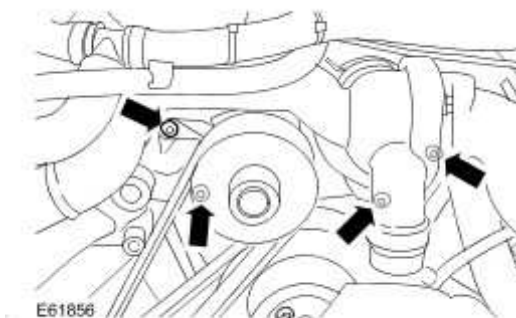
9 . Disconnect the coolant hose.



10 . Disconnect the coolant hose.

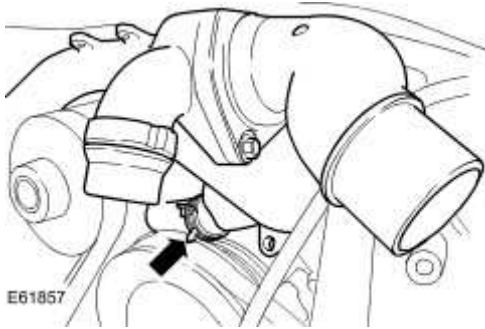


11 . Detach the coolant assembly.



12 . Remove the coolant assembly.

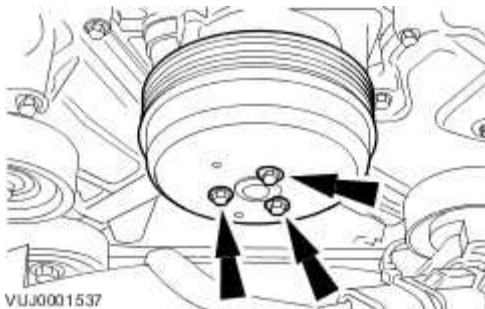
- ▶ Disconnect the coolant hose.
- ▶ Remove and discard the O-ring seals.



All vehicles

13 . Remove the water pump pulley.

▶ Using a suitable tool, retain the water pump pulley.



14 Remove the air conditioning (A/C) compressor.

- For additional information, refer to Air Conditioning (A/C) Compressor - 3.5L/4.2L, VIN Range: G45704->G99999 (82.10.20)

15



- CAUTION:** Cap the power steering line to prevent loss of fluid and prevent dirt ingress.

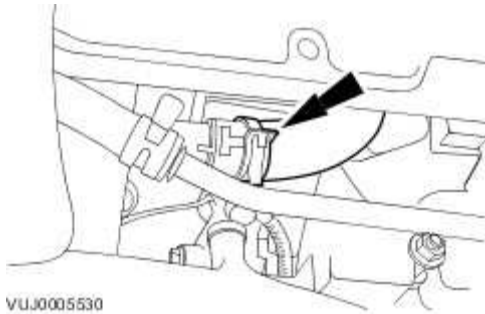


CAUTION: If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.

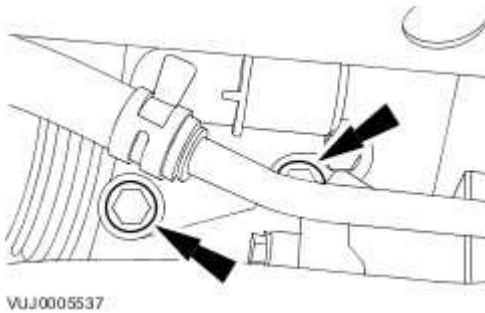
NOTE:

Drain the fluid into a suitable container.

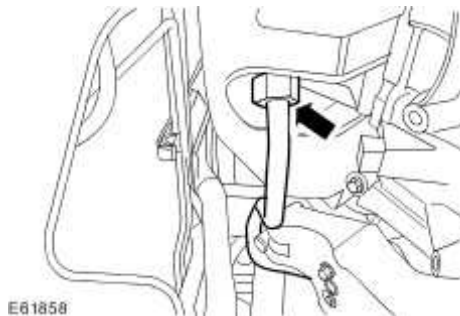
Disconnect the power steering reservoir to power steering pump supply line.



16 . Remove the power steering pump lower retaining bolts.



17 . Disconnect the secondary air injection (AIR) control valve to exhaust manifold tube.



18 . Lower the vehicle.

19



CAUTION: Cap the power steering lines to prevent loss of fluid and prevent dirt ingress.

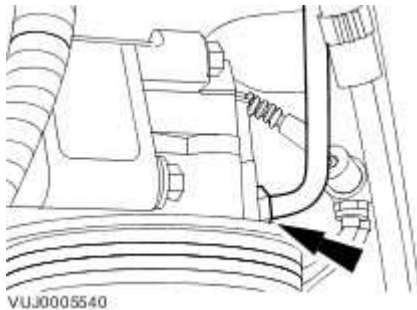


CAUTION: If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.

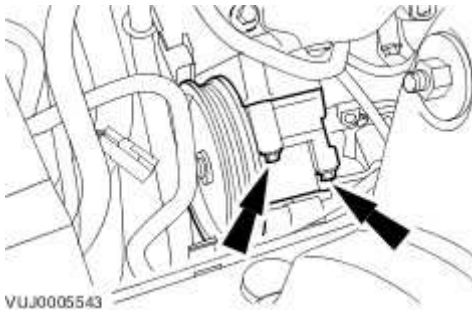
NOTE:

Drain the fluid into a suitable container.

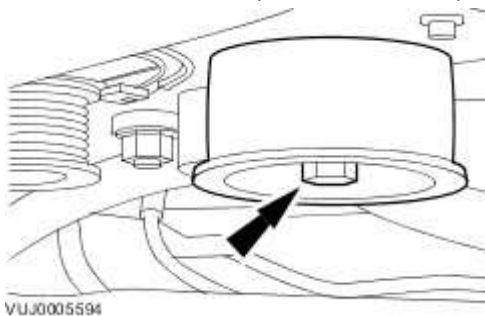
Disconnect the power steering pump to steering gear high-pressure line.



20 . Remove the power steering pump.

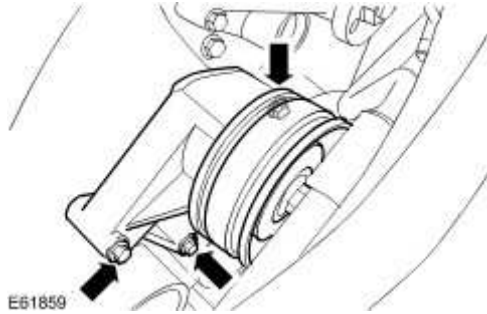


21 . Remove the accessory drive belt idler pulley.

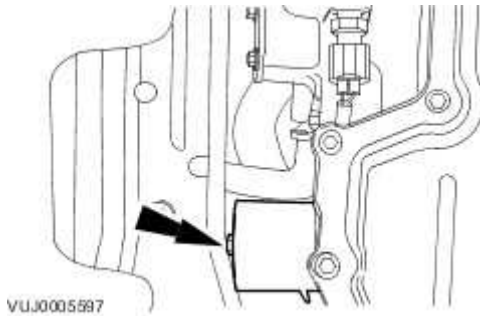


Vehicles with supercharger

22 . Remove the supercharger belt idler pulley and bracket assembly.



23 . Remove the supercharger belt tensioner.

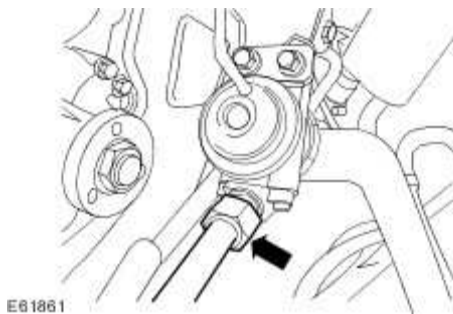


All vehicles

24 . **NOTE:**

Vehicles with supercharger shown, vehicles without supercharger similar.

Disconnect the AIR control valve to exhaust manifold tube.

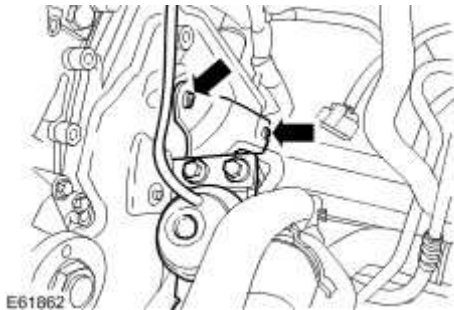


25 . **NOTE:**

Vehicles with supercharger shown, vehicles without supercharger similar.

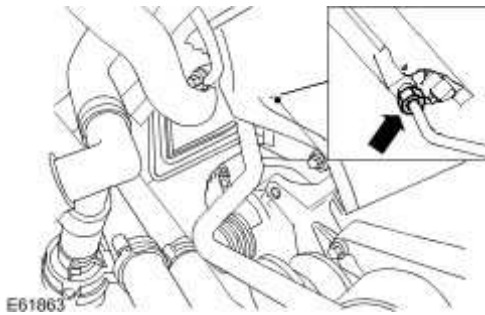
Reposition the AIR control valve and bracket assembly.

▶ Remove the retaining bolts.

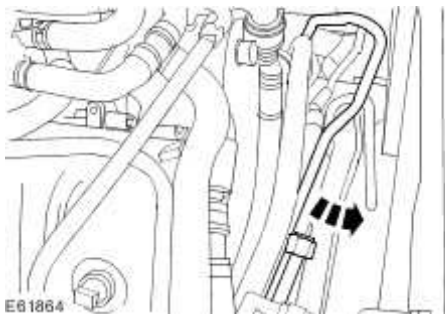


Vehicles with supercharger

26 . Disconnect the AIR control valve to exhaust manifold tube.

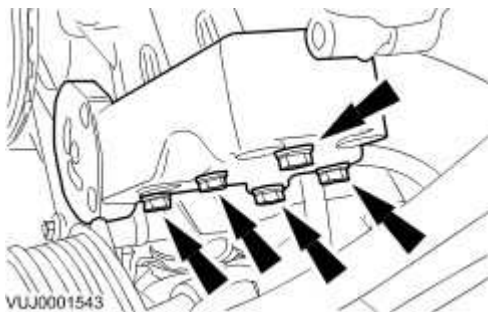


27 . Remove the AIR control valve to exhaust manifold tube.

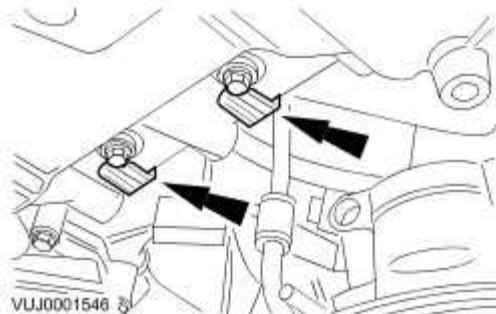


All vehicles

28 . Remove the power steering pump mounting bracket.

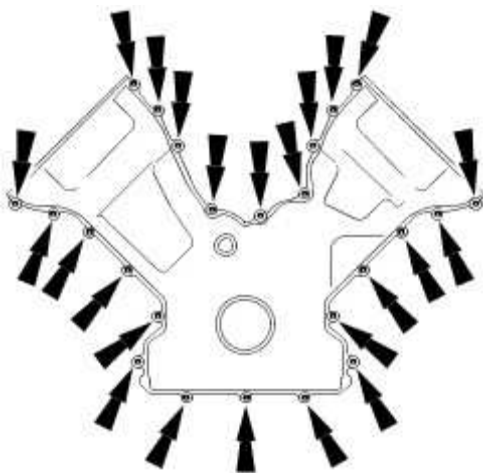


29 . Detach the engine harness.



30 . Remove the engine front cover.

▶ Remove and discard all the seals.



VUJ0002018

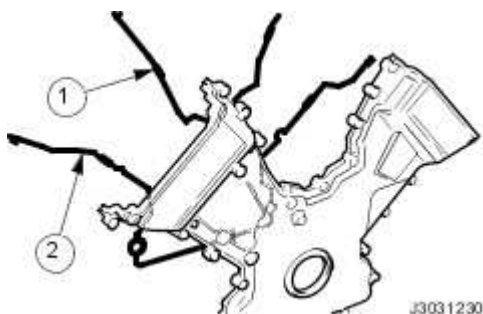
Installation

All vehicles

1 . Install new seals to the timing cover.

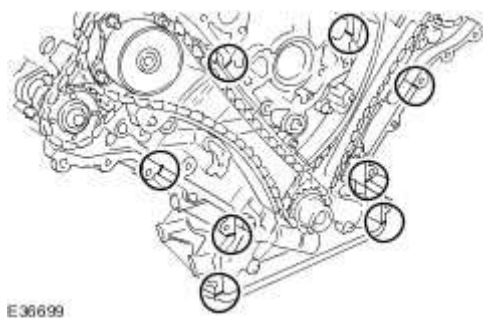
1) Install the new seal to the inner groove on the face of the timing cover.

2) Install the new seal to the outer groove on the face of the timing cover.



2 Apply sealant to the eight joints on the engine face.

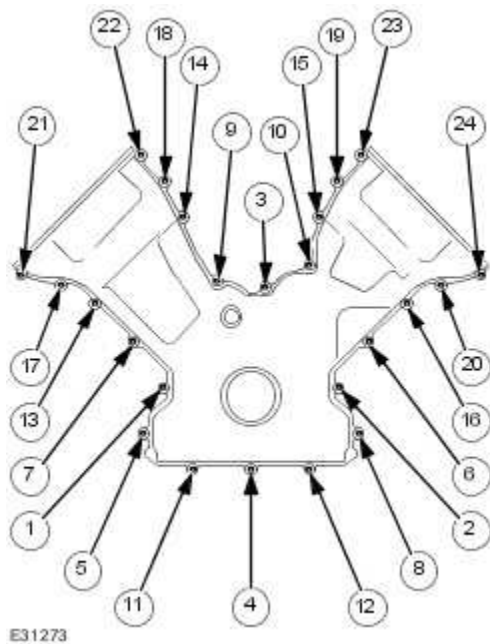
Sealant beads to be 3mm diameter and 12mm long. Cut the nozzle of the sealant tube to produce a 3 mm (0.12 in) bead. (Install and tighten the securing bolts within twenty minutes of sealant application).



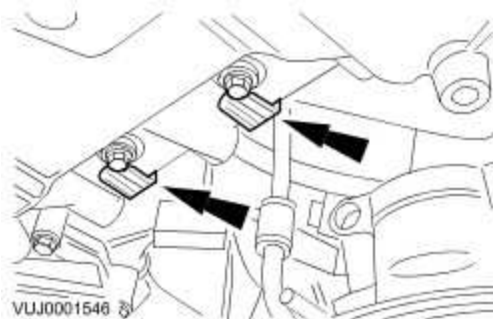
3 . Install the timing cover.

▶ Tighten in the sequence shown.

▶ Tighten to 12 Nm.

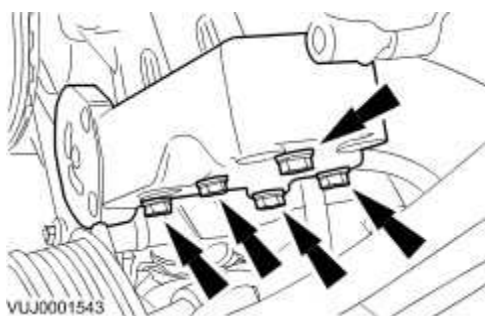


4 . Attach the engine harness.



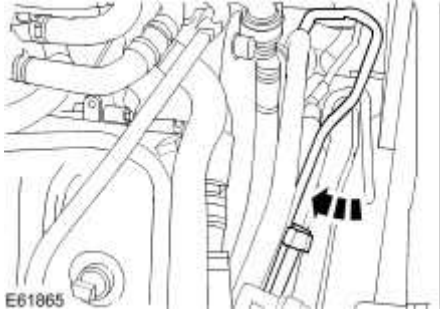
5 . Install the power steering pump mounting bracket.

► Tighten to 25 Nm.



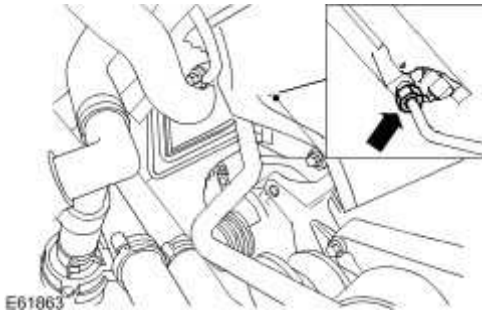
Vehicles with supercharger

6 . Install the AIR control valve to exhaust manifold tube.



7 . Connect the AIR control valve to exhaust manifold tube.

► Tighten to 35 Nm.



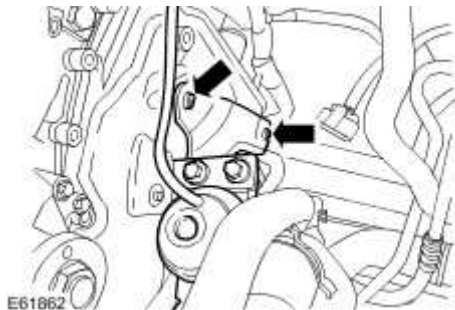
All vehicles

8 . **NOTE:**

Vehicles with supercharger shown, vehicles without supercharger similar.

Reposition the AIR control valve and bracket assembly.

► Tighten to 8 Nm.

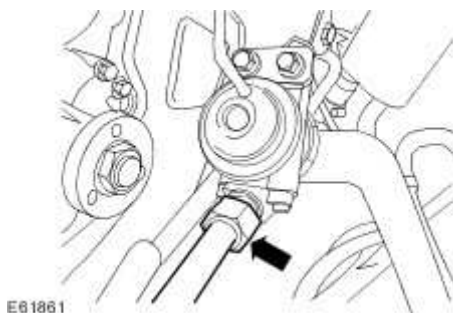


9 . NOTE:

Vehicles with supercharger shown, vehicles without supercharger similar.

Connect the AIR control valve to exhaust manifold tube.

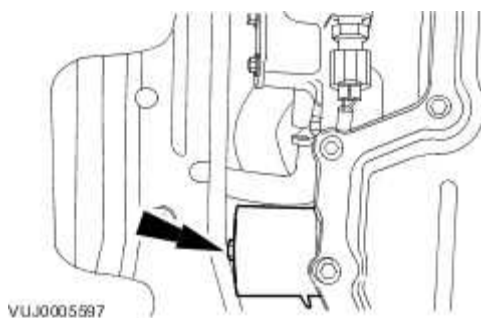
► Tighten to 35 Nm.



Vehicles with supercharger

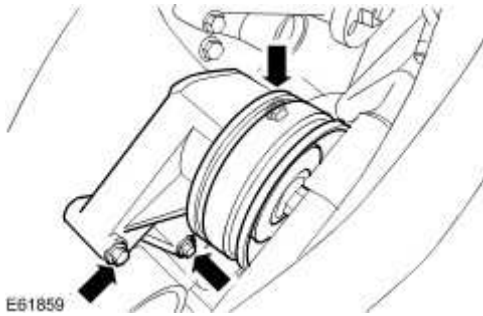
10 . Install the supercharger belt tensioner.

► Tighten to 40 Nm.



11 . Install the supercharger belt idler pulley and bracket assembly.

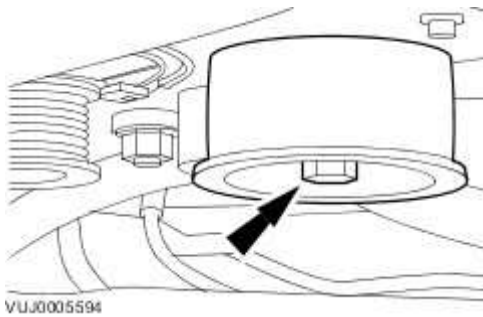
▶ Tighten to 9 Nm.



All vehicles

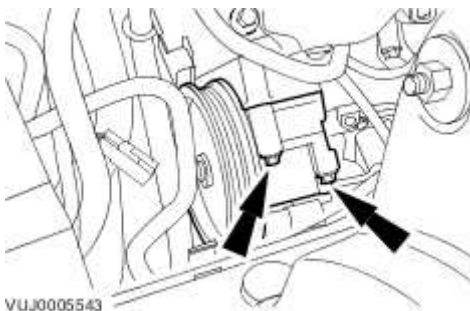
12 . Install the accessory drive belt idler pulley.

▶ Tighten to 61 Nm.



13 . Install the power steering pump.

▶ Tighten to 25 Nm.



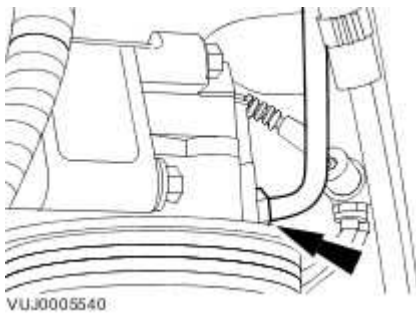
14 . **NOTE:**

Remove the blanking caps.

Connect the power steering pump to steering gear high-pressure line.

▶ Install a new O-ring seal.

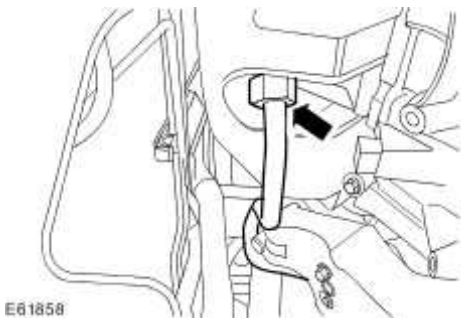
▶ Tighten to 25 Nm.



15 . Raise the vehicle.

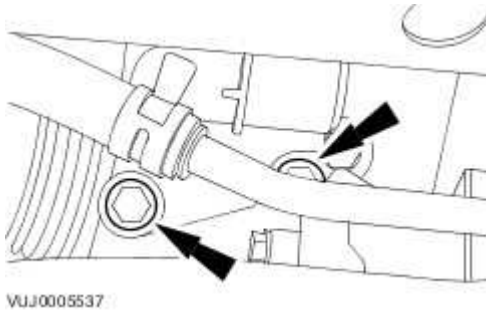
16 . Connect the AIR control valve to exhaust manifold tube.

▶ Tighten to 35 Nm.



17 . Install the power steering pump lower retaining bolts.

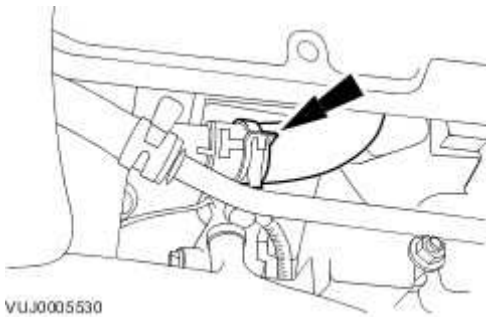
▶ Tighten to 25 Nm.



18 . NOTE:

Remove the blanking caps.

Connect the power steering reservoir to power steering pump supply line.

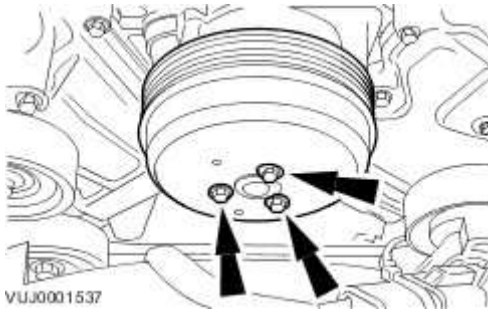


19 Install the A/C compressor.

- . For additional information, refer to Air Conditioning (A/C) Compressor - 3.5L/4.2L, VIN Range: G45704->G99999 (82.10.20)

20 . Install the water pump pulley.

- Using a suitable tool, retain the water pump pulley.
- Tighten to 10 Nm + 45°.

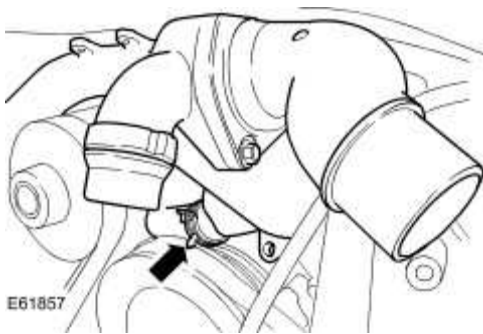


Vehicles with supercharger

21 . Install the coolant assembly.

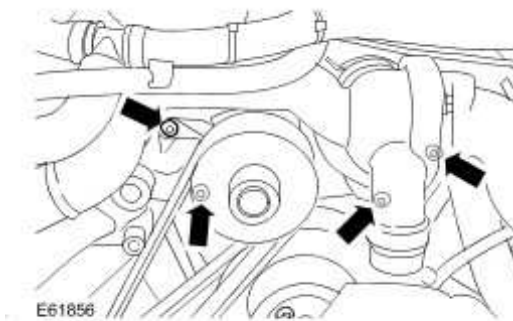
▶ Install new O-ring seals.

▶ Connect the coolant hose.

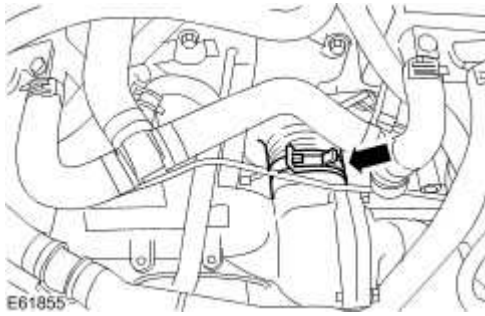


22 . Attach the coolant assembly.

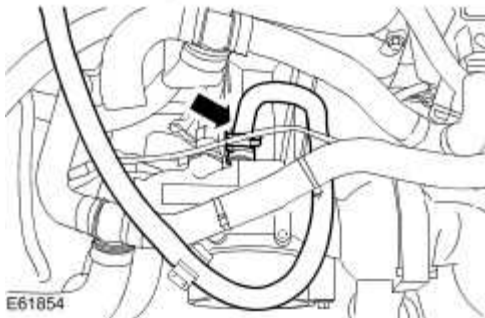
▶ Tighten to 9 Nm.



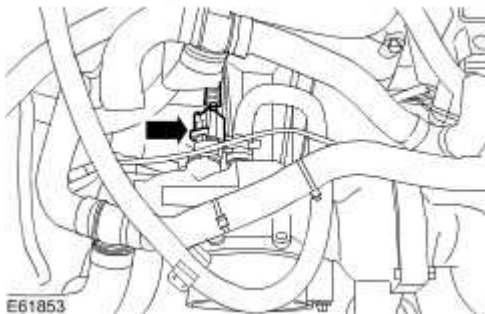
23 . Connect the coolant hose.



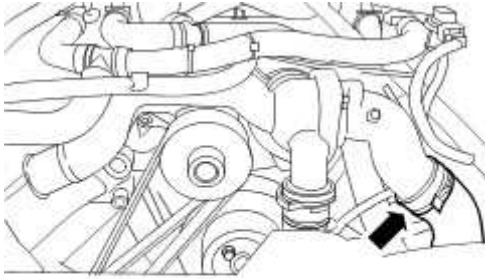
24 . Connect the coolant hose.



25 . Connect the ECT sensor electrical connector.

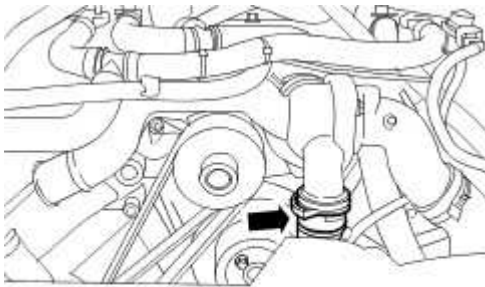


26 . Connect the coolant hose.



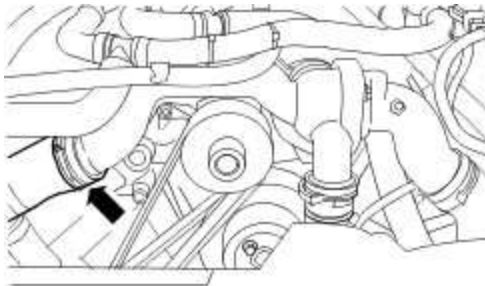
E61852

27 . Connect the coolant hose.



E61851

28 . Connect the coolant hose.



E61850

Vehicles without supercharger

29 . Install the oil cooler.

For additional information, refer to Oil Cooler - Vehicles Without: Supercharger (12.60.68)

All vehicles

30 . Install the crankshaft pulley.

For additional information, refer to Crankshaft Pulley (12.21.09)

31 Install the right-hand valve cover.

. For additional information, refer to Valve Cover RH - VIN Range: G45704->G99999
(12.29.44)

32 . Install the left-hand valve cover.

For additional information, refer to Valve Cover LH - VIN Range: G45704->G99999
(12.29.43)

Engine Mount LH (12.45.01)

Special Service Tools



303-021

Engine Support Beam

303-021



303-749

Engine Lifting Brackets

303-749

Removal

Vehicles without supercharger

- 1 . Remove the throttle body.

For additional information, refer to Throttle Body - VIN Range: G00442->G45703 (19.70.04)

For additional information, refer to Throttle Body - VIN Range: G45704->G99999 (19.70.04)

Vehicles with supercharger

- 2 . Remove the air cleaner outlet pipe.

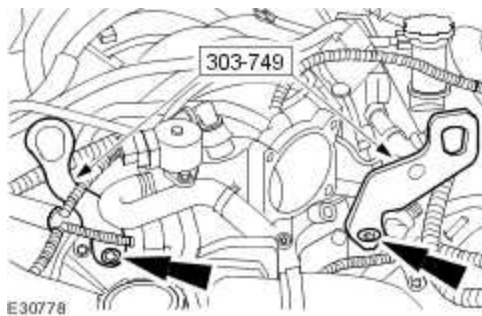
For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

All vehicles

- 3 **NOTE:**

Vehicles with 3.5L or 4.2L engine without supercharger shown, vehicles with 4.2L engine with supercharger similar.

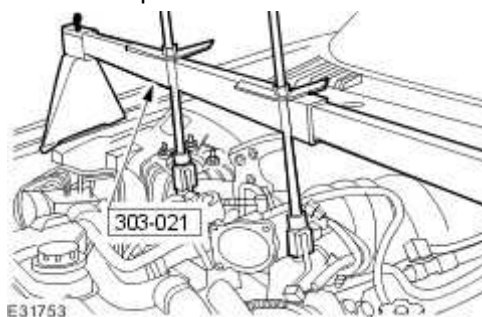
Install the special tools.



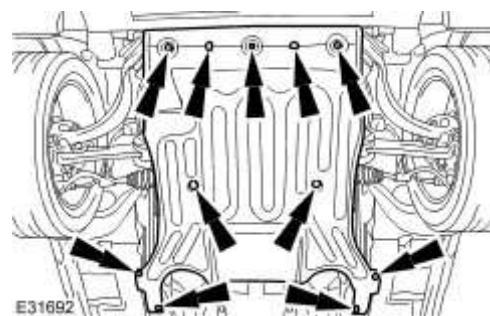
4 NOTE:

Vehicles with 3.5L or 4.2L engine without supercharger shown, vehicles with 4.2L engine with supercharger similar.

Install the special tool.



5 . Remove the air deflector.



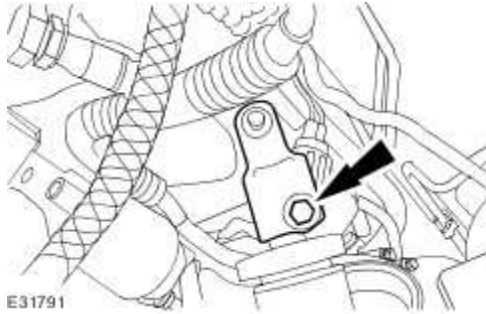
6 . Remove the left-hand front wheel and tire assembly.

For additional information, refer to Wheel and Tire (74.20.05)

7 . NOTE:

Left-hand drive vehicle shown, right-hand drive vehicle similar.

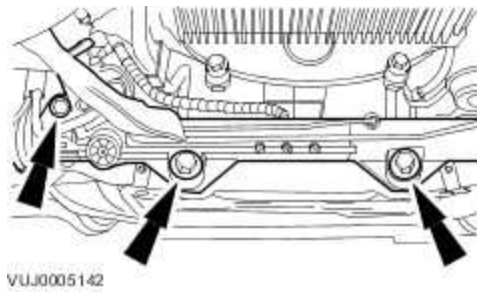
Remove the steering gear shaft pinch bolt.



8 . NOTE:

Left-hand drive vehicle shown, right-hand drive vehicle similar.

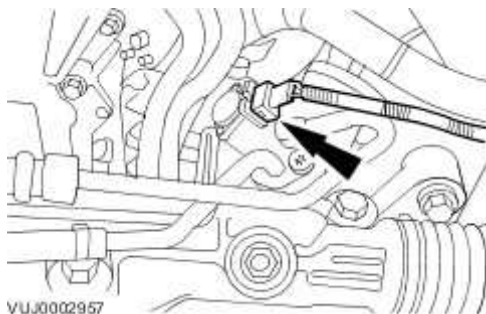
Detach the steering gear.



9 . NOTE:

Right-hand drive vehicle shown, left-hand drive vehicle similar.

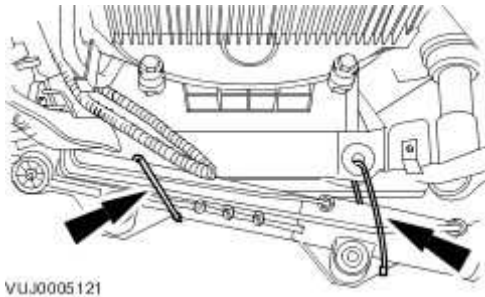
Disconnect the power steering control valve actuator electrical connector.



10 . **NOTE:**

Left-hand drive vehicle shown, right-hand drive vehicle similar.

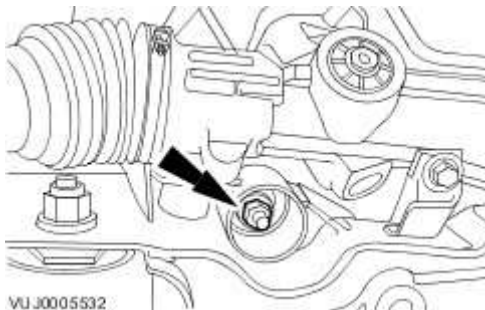
Secure the steering gear.



11 . **NOTE:**

Remove and discard the engine mounting securing nut.

Remove the engine mounting retaining nut.



12 . Lower the vehicle.

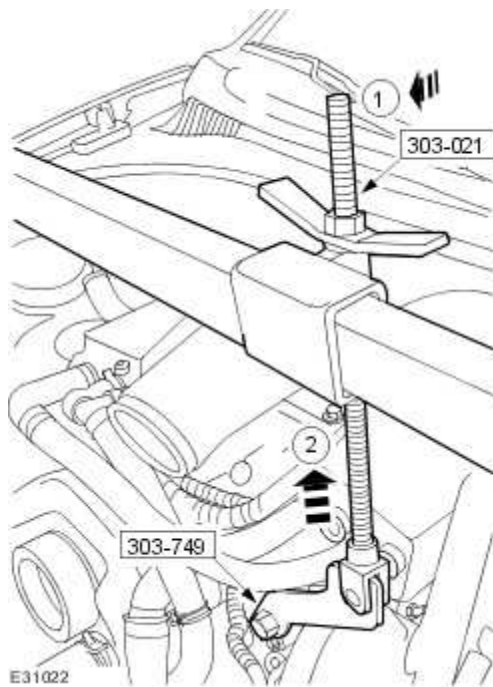
13 **NOTE:**

Vehicles with 4.2L engine with supercharger shown, vehicles with 3.5L or 4.2L engine without supercharger similar.

Using the special tools, raise the engine to a suitable height.

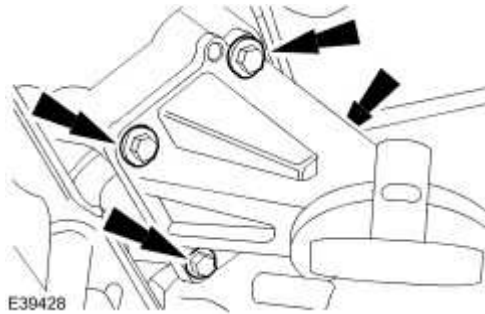
1) Adjust the engine support beam (clockwise).

2) Raise the engine to a suitable height.



14 . Raise the vehicle.

15 . Remove the engine mount and bracket assembly.



16 . **NOTE:**


Remove and discard the engine mounting securing nut.

Remove the engine mount.

E31200




Installation

- 1  **CAUTION:** Make sure the engine mount location peg is correctly located into the engine bracket. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

Install a new engine mounting securing nut.

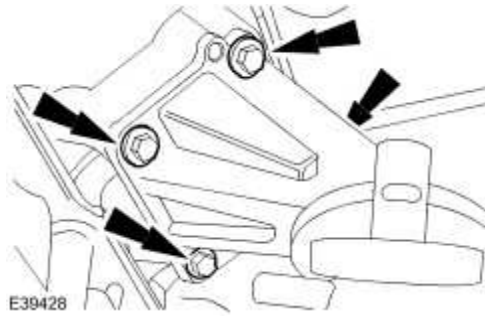
To install, reverse the removal procedure.

 Tighten to 55 Nm (+/- 15%).

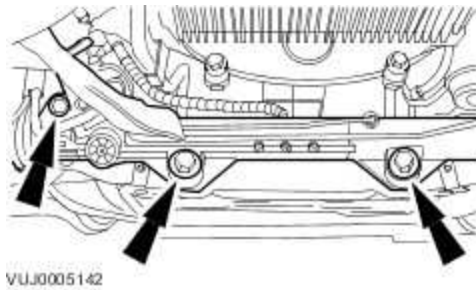
E31200



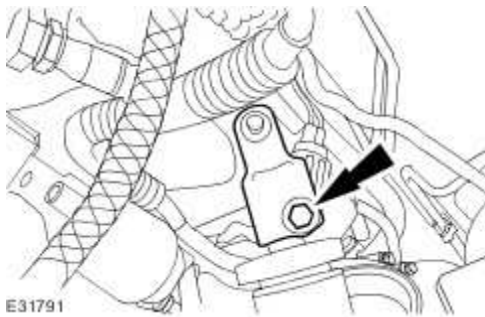
- 2 . Tighten to 40 Nm (+/- 15%).



3 . Tighten to 100 Nm.



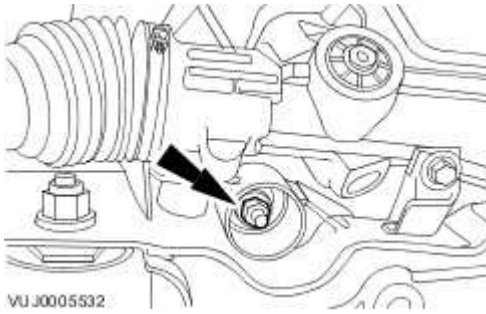
4 . Tighten to 35 Nm.



5 . **NOTE:**

Install a new engine mounting securing nut.

Tighten to 63 Nm (+/- 15%).



Engine Mount RH (12.45.03)

Special Service Tools



303-021

Engine Support Beam

303-021



303-749

Engine Lifting Brackets

303-749

Removal

Vehicles without supercharger

- 1 . Remove the throttle body.

For additional information, refer to Throttle Body - VIN Range: G00442->G45703 (19.70.04)

For additional information, refer to Throttle Body - VIN Range: G45704->G99999 (19.70.04)

Vehicles with supercharger

- 2 . Remove the air cleaner outlet pipe.

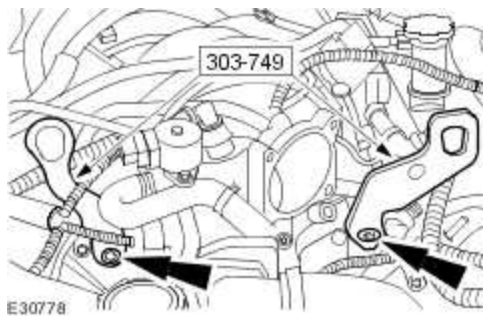
For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

All vehicles

- 3 **NOTE:**

Vehicles with 3.5L or 4.2L engine without supercharger shown, vehicles with 4.2L engine with supercharger similar.

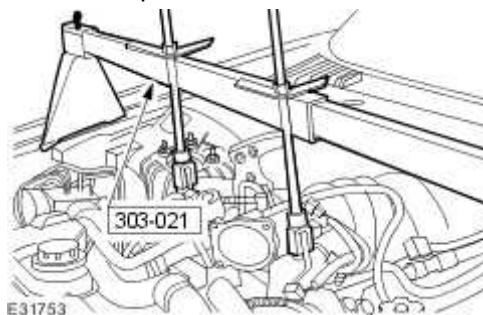
Install the special tools.



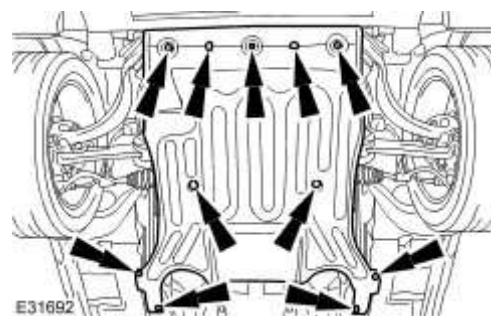
4 NOTE:

Vehicles with 3.5L or 4.2L engine without supercharger shown, vehicles with 4.2L engine with supercharger similar.

Install the special tool.



5 . Remove the air deflector.



6 . Remove the right-hand front wheel and tire assembly.
For additional information, refer to Wheel and Tire (74.20.05)

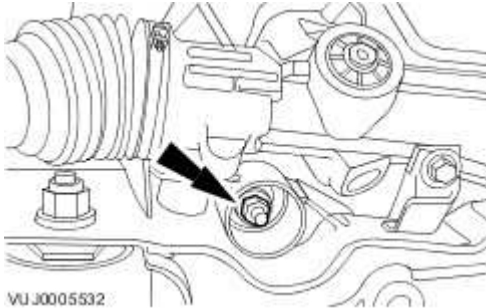
7 . NOTE:

Remove and discard the engine mounting securing nut.

NOTE:

Left-hand shown, right-hand similar.

Remove the engine mounting retaining nut.



8 . Lower the vehicle.

9 NOTE:

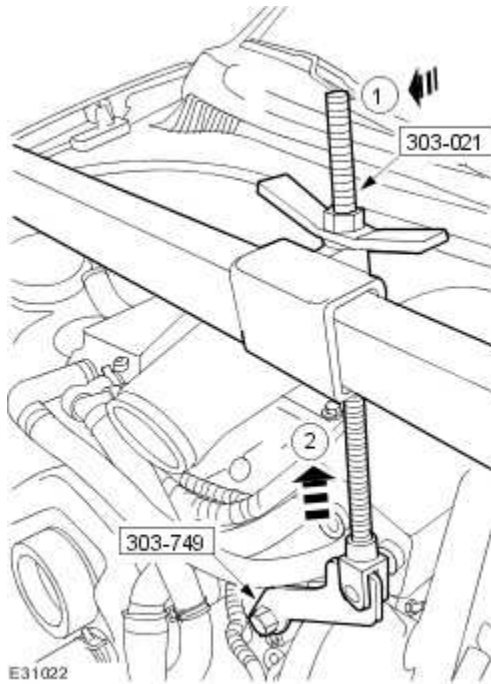
Left-hand shown, right-hand similar.

NOTE:

Vehicles with 4.2L engine with supercharger shown, vehicles with 3.5L or 4.2L engine without supercharger similar.

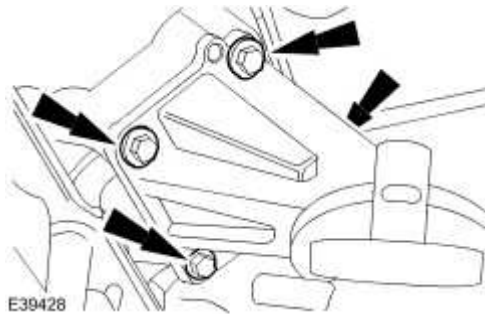
Using the special tools, raise the engine to a suitable height.

- 1) Adjust the engine support beam (clockwise).
- 2) Raise the engine to a suitable height.



10 . Raise the vehicle.

11 . Remove the engine mount and bracket assembly.



12 . **NOTE:**


Remove and discard the engine mounting securing nut.

Remove the engine mount.

E31200




Installation

- 1  **CAUTION:** Make sure the engine mount location peg is correctly located into the engine bracket. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

Install a new engine mounting securing nut.

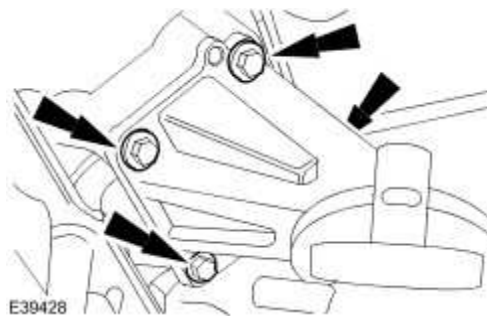
To install, reverse the removal procedure.

 Tighten to 55 Nm (+/- 15%).

E31200



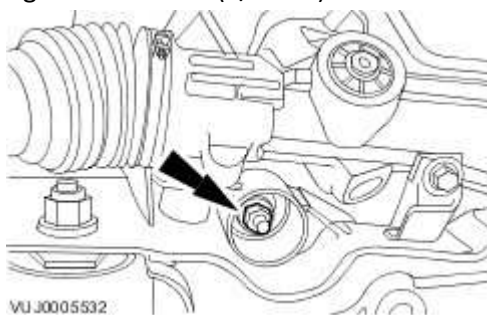
- 2 . Tighten to 40 Nm (+/- 15%).



3 . NOTE:

Install a new engine mounting securing nut.

Tighten to 63 Nm (+/- 15%).

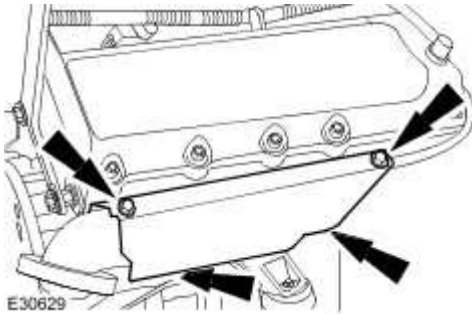


Exhaust Manifold RH - VIN Range: G00442->G45703 (30.15.56)

Removal

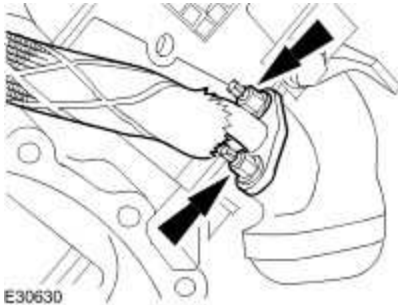
1 . Remove the exhaust system. <<309-00>>

2 . Remove the right-hand exhaust manifold heat shield

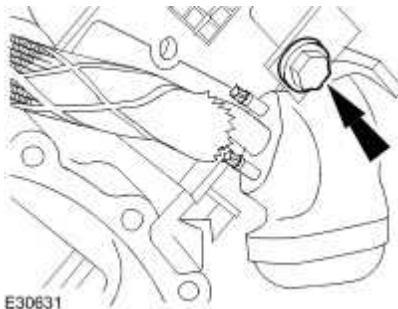


3 . Detach the exhaust gas recirculation (EGR) valve.

▶ Remove and discard the retaining nuts and gasket.



4 . Remove the right-hand exhaust manifold heat shield/gasket retaining bolt.

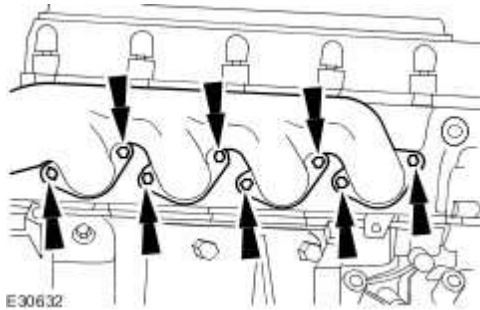


5 . NOTE:

New exhaust manifold retaining studs must be fitted if the old studs are removed.

Remove the exhaust manifold.

▶ Remove and discard the retaining nuts and heat shield/gasket.



Installation

1



CAUTION: When all retaining nuts have been torqued, re-torque all retaining nuts to 25 Nm.

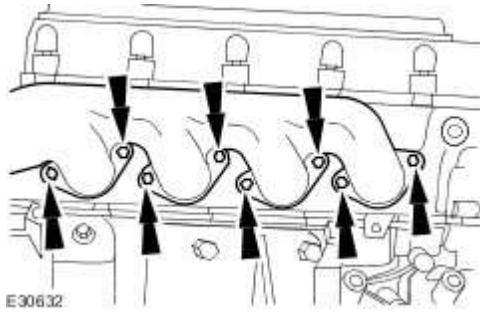


CAUTION: Ensure exhaust manifold and heat shield/gasket is correctly aligned to cylinder head and studs.

Install the exhaust manifold.

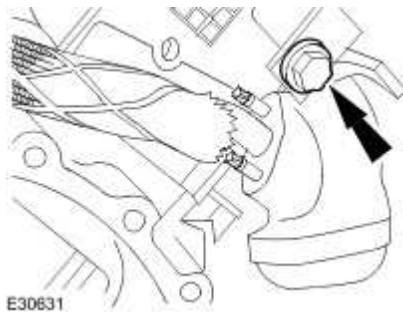
▶ Install new retaining nuts and a new heat shield/gasket.

▶ Tighten to 25 Nm.



2 . Install the right-hand exhaust manifold heat shield/gasket retaining bolt.

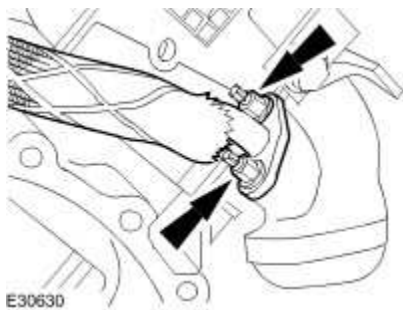
▶ Tighten to 50 Nm.



3 . Attach the exhaust gas recirculation (EGR) valve.

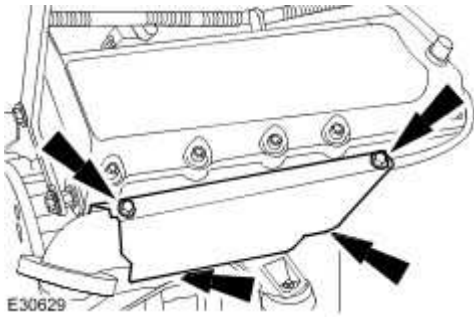
▶ Install new retaining nuts and a new gasket.

▶ Tighten to 22 Nm.



4 . Install the right-hand exhaust manifold heat shield

▶ Tighten to 3 Nm.



5 . Install the exhaust system. <<309-00>>

Exhaust Manifold RH - VIN Range: G45704->G99999 (30.15.56)

Removal

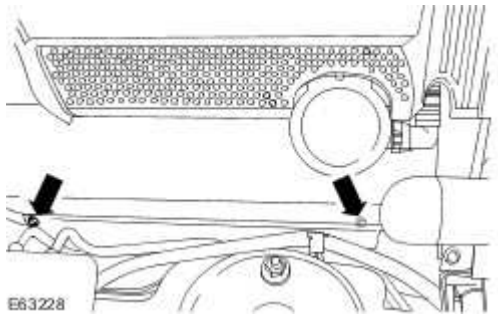
Right-hand drive vehicles

- 1 . Center the steering wheel.

▶ Lock in position, remove the ignition key.

All vehicles

- 2 . Remove the right-hand exhaust manifold heat shield upper retaining bolts.

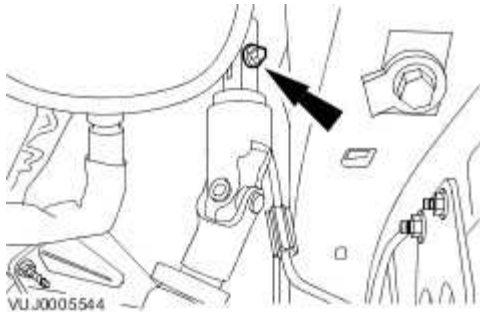


- 3 . Remove the right-hand catalytic converter.

For additional information, refer to Catalytic Converter - 3.0L/3.5L/4.2L (17.50.05)

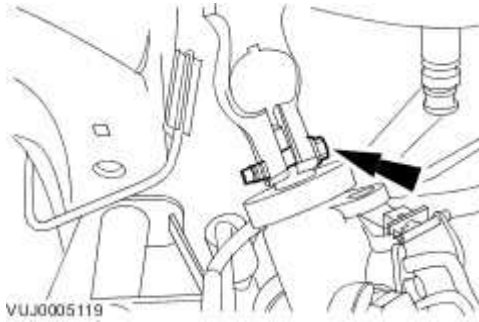
Right-hand drive vehicles

- 4 . Remove the steering gear coupling upper pinch bolt



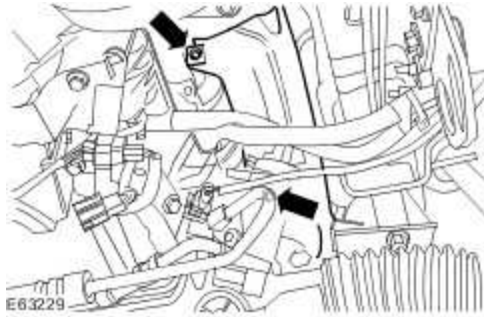
- 5 . Remove the steering gear coupling.

- ▶ Remove the steering gear coupling lower pinch bolt.

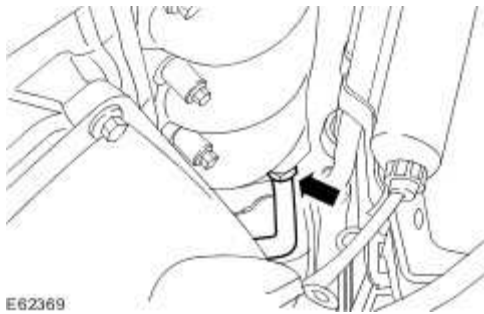


All vehicles

- 6 . Remove the right-hand exhaust manifold heat shield.



- 7 . Disconnect the secondary air injection (AIR) control valve to exhaust manifold tube.

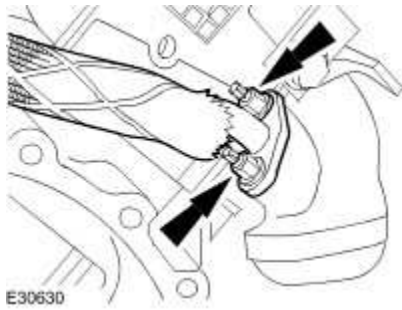


8 . NOTE:

Engine shown removed for clarity.

Detach the exhaust gas recirculation (EGR) valve.

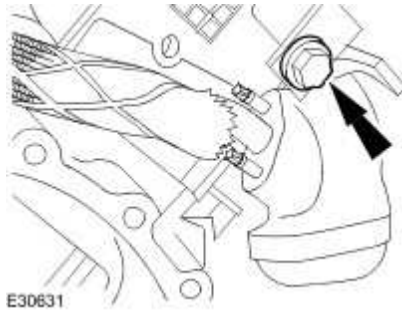
- ▶ Remove and discard the retaining nuts and gasket.



9 . **NOTE:**

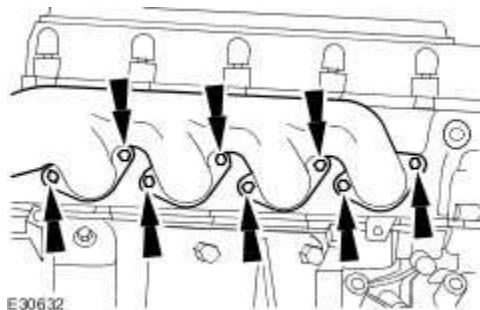
Engine shown removed for clarity.

Remove the right-hand exhaust manifold heat shield/gasket retaining bolt.



10 . Remove the exhaust manifold.

- ▶ Remove and discard the retaining bolts and heat shield/gasket.



Installation

All vehicles

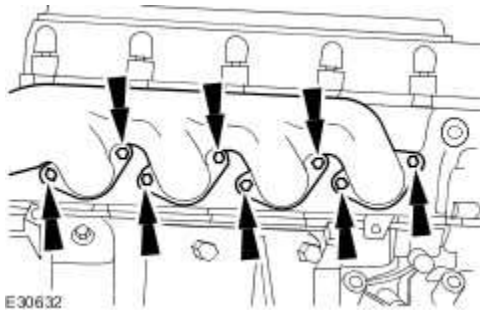
1



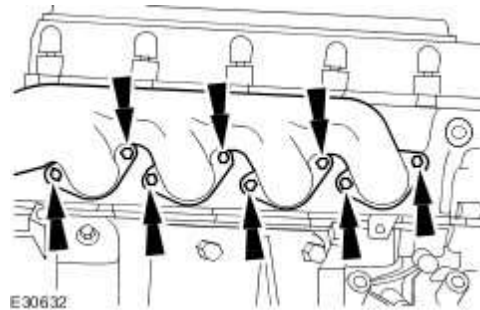
- CAUTION: Make sure that the exhaust manifold and heat shield/gasket is correctly aligned to cylinder head.

Install the exhaust manifold.

- Loosely install new retaining bolts and a new heat shield/gasket.



- 2 . Tighten the exhaust manifold retaining bolts to 25 Nm.

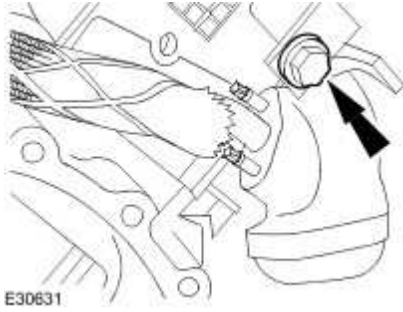


- 3 . NOTE:

Engine shown removed for clarity.

Install the right-hand exhaust manifold heat shield/gasket retaining bolt.

- Tighten to 50 Nm.



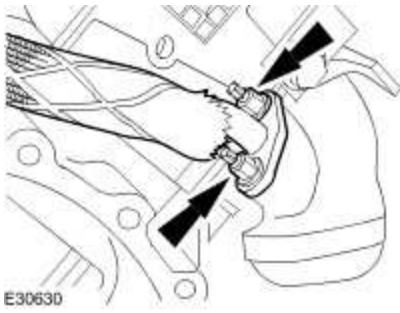
4 . NOTE:

Engine shown removed for clarity.

Attach the EGR valve.

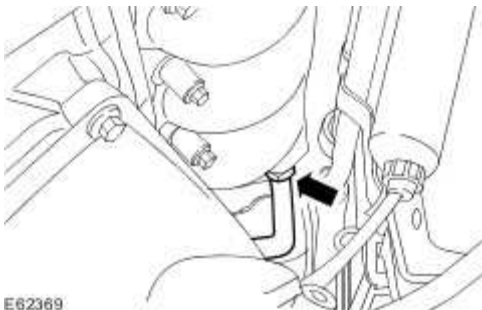
▶ Install new retaining nuts and a new gasket.

▶ Tighten to 22 Nm.



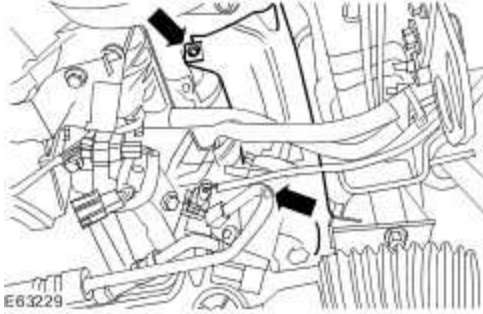
5 . Connect the AIR control valve to exhaust manifold tube.

▶ Tighten to 35 Nm.



6 . Install the right-hand exhaust manifold heat shield

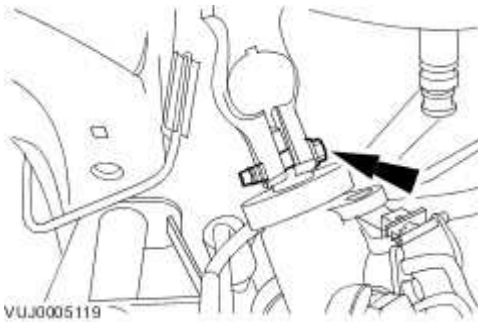
▶ Tighten to 3 Nm.



Right-hand drive vehicles

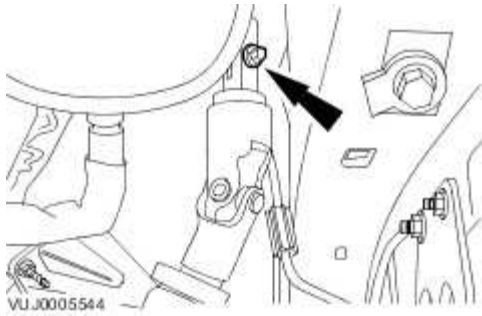
7 . Install the steering gear coupling.

▶ Tighten the steering gear coupling lower pinch bolt to 35 Nm.



8 . Install the steering gear coupling upper pinch bolt

▶ Tighten to 35 Nm.



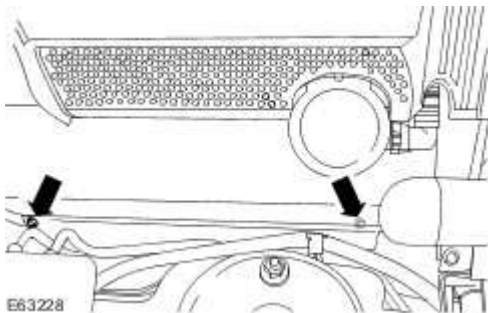
All vehicles

9 . Install the right-hand catalytic converter.

For additional information, refer to Catalytic Converter - 3.0L/3.5L/4.2L (17.50.05)

10 . Install the right-hand exhaust manifold heat shield upper retaining bolts.

► Tighten to 3 Nm.



Flexplate (12.53.13)

Removal

- 1 . Remove the automatic transmission. For additional information, refer to
For additional information, refer to Transmission - 3.5L/4.2L (44.20.01)

2



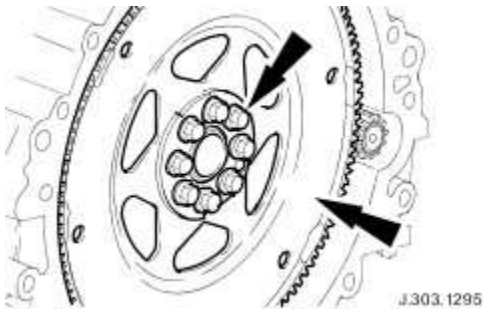
- **CAUTION:** The bolts can only be used 3 times, mark the bolts with a center punch. If 2 punch marks are visible, discard the bolts.

NOTE:

Prevent the flexplate from rotating.

Remove the flexplate.

➤ Remove the 8 bolts.



Installation

- 1 . **NOTE:**

Make sure the crankshaft and flexplate mating faces are clean before installation.

NOTE:

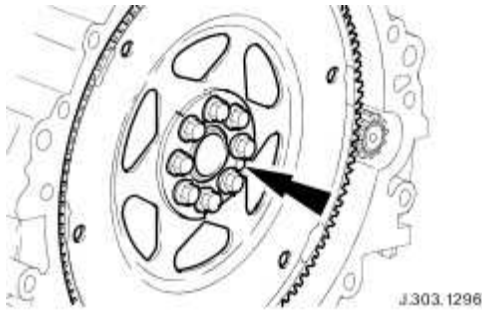
The flexplate will only locate in one position.

NOTE:

Install, but do not tighten, the flexplate retaining bolts.

Install the flexplate.

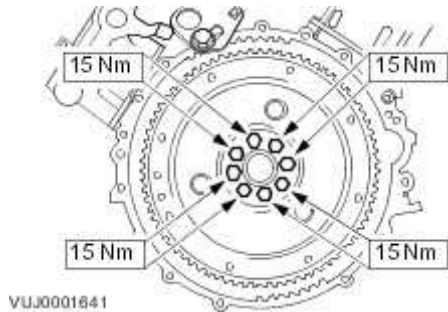
▶ Prevent the flexplate from rotating.



2 . NOTE:

Tighten the retaining bolts working diagonally.

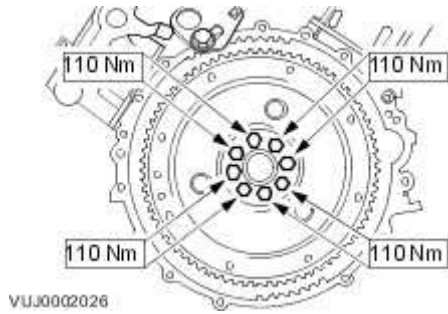
Tighten to 15 Nm.



3 . NOTE:

Tighten the retaining bolts working diagonally.

Tighten to 110 Nm.



- 4 . Install the automatic transmission. For additional information, refer to
For additional information, refer to Transmission - 3.5L/4.2L (44.20.01)

Intake Manifold - VIN Range: G00442- >G45703 (30.15.01)

Removal

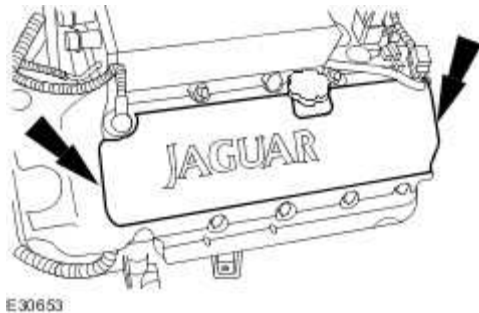
- 1 . Remove the cowl vent screen. <<501-02>>
- 2 . Remove the air cleaner outlet pipe. <<303-12B>>
- 3 . Remove the engine compartment support.



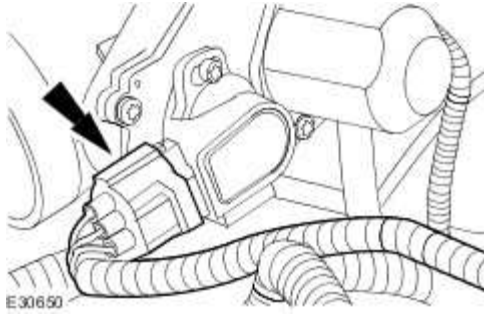
4 . NOTE:

Left-hand shown, right-hand similar.

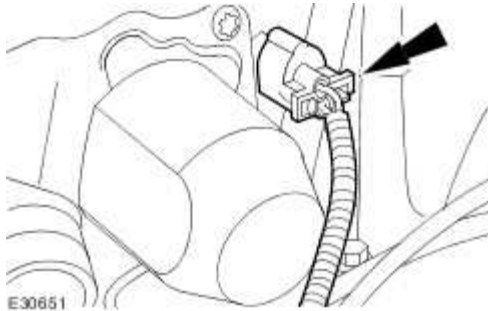
Remove the on-plug coil covers.



- 5 . Disconnect the throttle potentiometer (TP) electrical connector.



6 . Disconnect the throttle motor electrical connector.



7



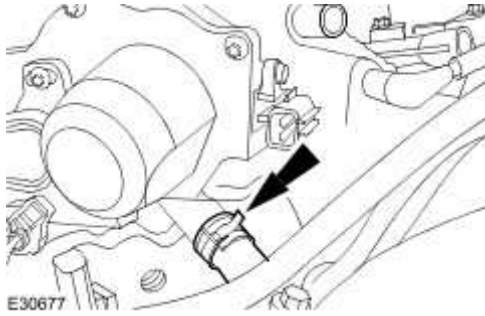
WARNING: TO AVOID HAVING SCALDING HOT COOLANT OR STEAM BLOW OUT OF THE COOLING SYSTEM, USE EXTREME CARE WHEN REMOVING THE COOLANT PRESSURE CAP FROM A HOT COOLING SYSTEM. WAIT UNTIL THE ENGINE HAS COOLED, THEN WRAP A THICK CLOTH AROUND THE COOLANT PRESSURE CAP AND TURN IT SLOWLY UNTIL THE PRESSURE BEGINS TO RELEASE. STEP BACK WHILE THE PRESSURE IS RELEASED FROM THE SYSTEM. WHEN CERTAIN ALL THE PRESSURE HAS BEEN RELEASED (STILL WITH A CLOTH) TURN AND REMOVE THE COOLANT PRESSURE CAP FROM THE COOLANT EXPANSION TANK. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

Remove the coolant expansion tank cap.

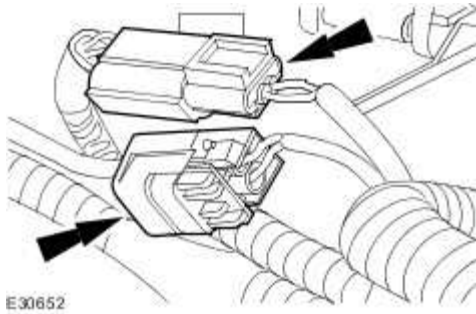
8 . **NOTE:**

Cap the coolant hose.

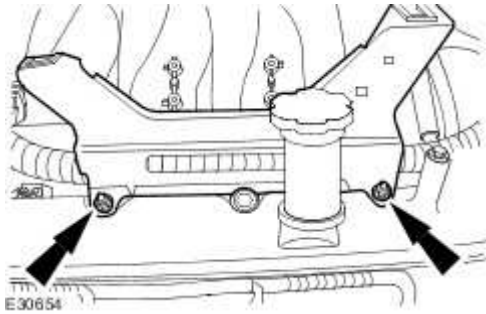
Disconnect the throttle body coolant hose.



9 . Disconnect the knock sensors (KS) electrical connectors.



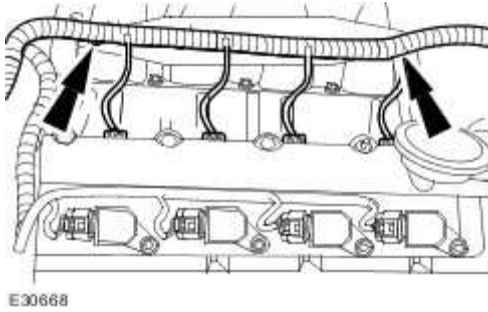
10 . Remove the left-hand engine cover bracket.



11 . **NOTE:**

Right-hand shown left-hand similar.

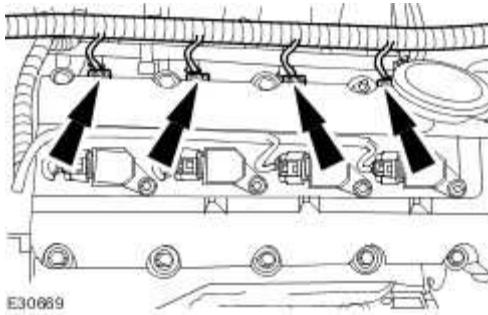
Detach the engine wiring harness.



12 . **NOTE:**

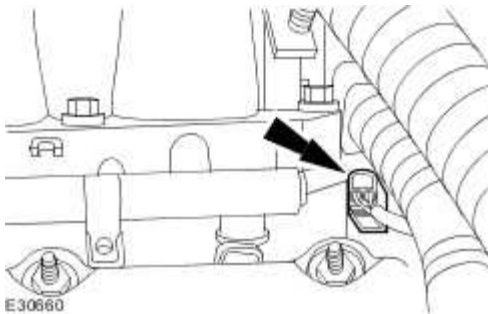
Right-hand shown left-hand similar.

Disconnect the fuel injector electrical connectors.

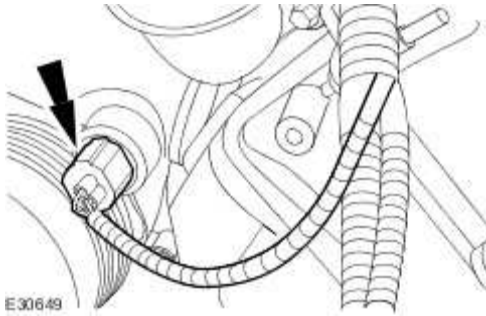


13 . Detach the fuel line. <<310-00>>

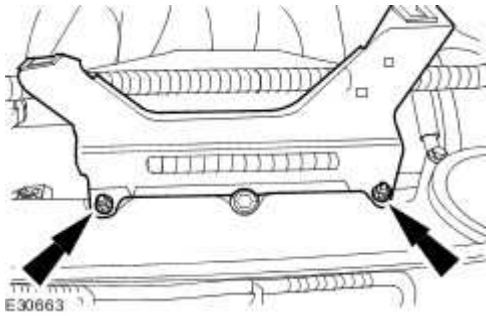
14 . Detach the left-hand camshaft position sensor electrical connector.



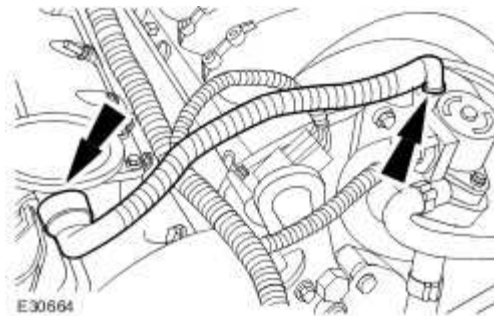
15 . Disconnect the coolant temperature sensor electrical connector.



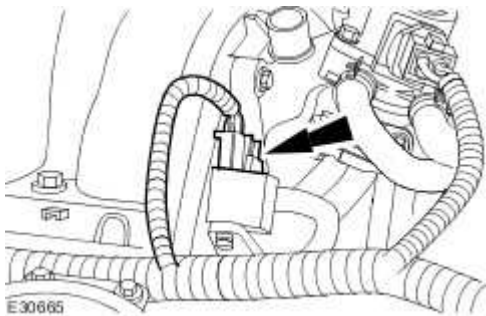
16 . Remove the right-hand engine cover bracket.



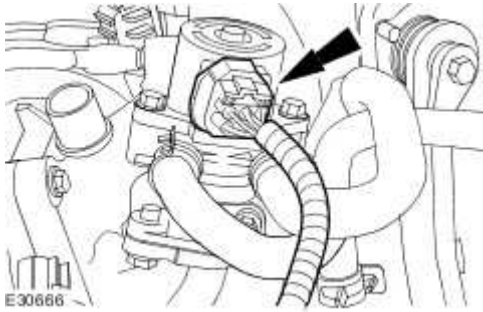
17 . Remove the positive crankcase ventilation (PCV) valve.



18 . Disconnect the fuel pressure regulator electrical connector.



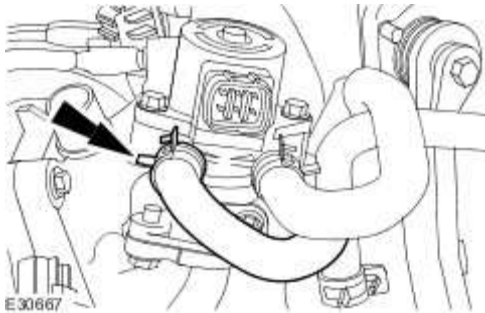
19 . Disconnect the exhaust gas recirculation (EGR) valve electrical connector.



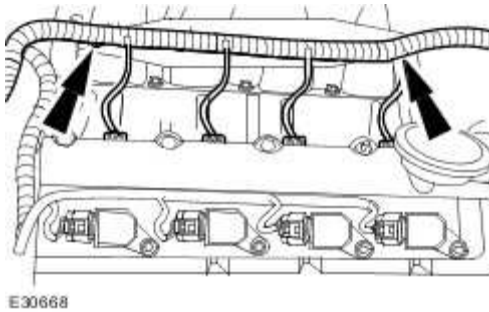
20 . **NOTE:**

Cap the coolant hose.

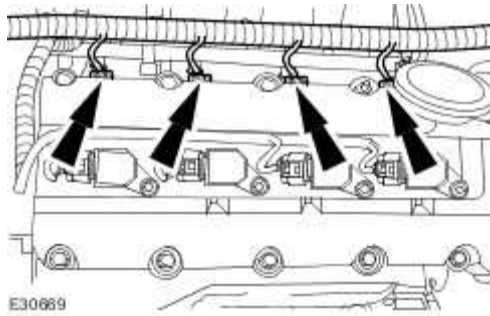
Disconnect the exhaust gas recirculation (EGR) valve coolant hose.



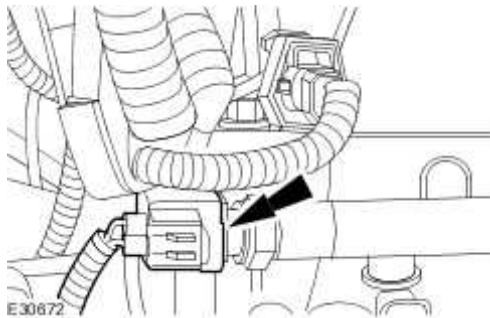
21 . Detach the right-hand engine wiring harness.



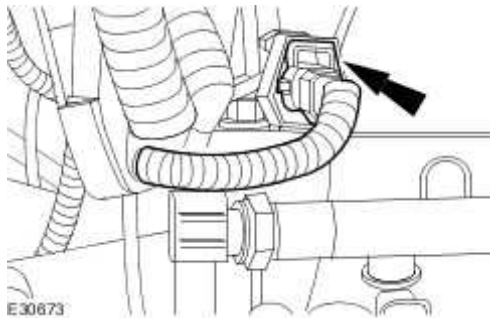
22 . Disconnect the right-hand fuel injector electrical connectors.



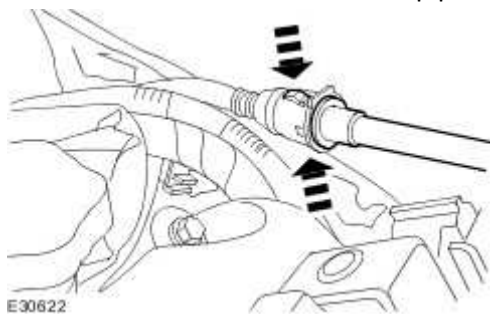
23 . Disconnect the fuel temperature sensor electrical connector.



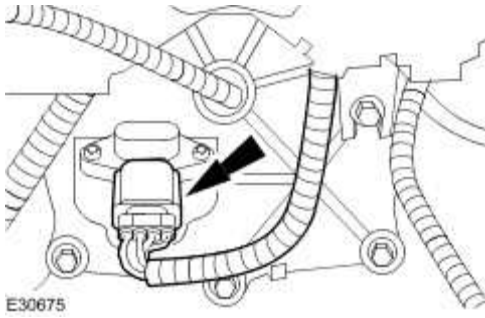
24 . Disconnect the right-hand camshaft position (CMP) sensor.



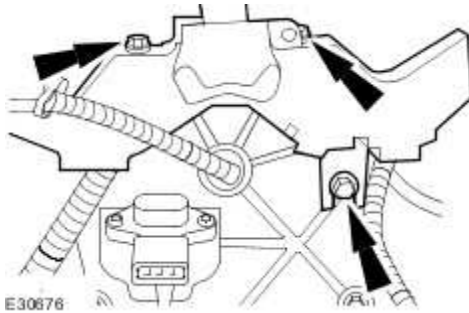
25 . Detach the brake booster vacuum pipe.



26 . Disconnect the manifold absolute pressure (MAP) sensor electrical connector.

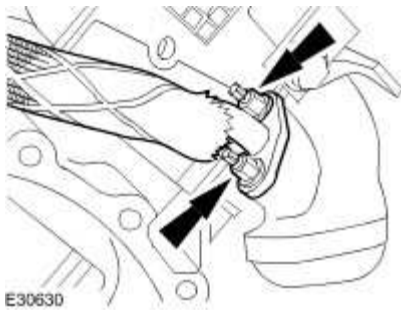


27 . Detach the engine wiring harness.



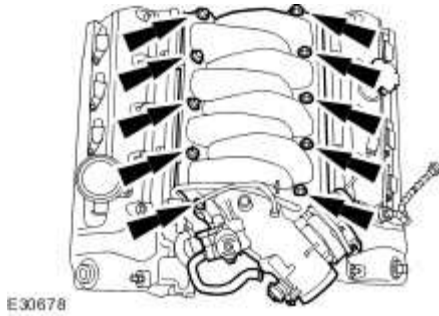
28 . Detach the exhaust gas recirculation (EGR) valve tube.

▶ Remove and discard the gasket.



29 . Remove the intake manifold.

▶ Remove and discard the gaskets.



Installation

1 .

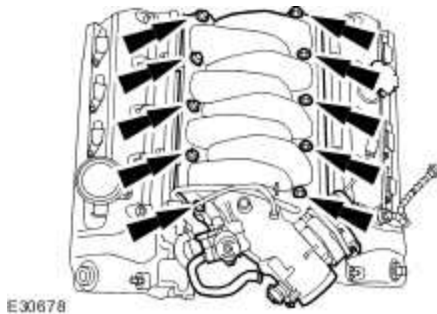


CAUTION: Make sure that all gasket mating faces are clean and dry.

Install the intake manifold.

▶ Install new gaskets.

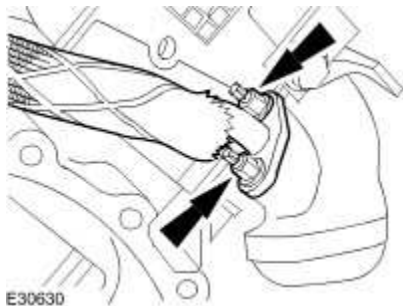
▶ Tighten to 22 Nm.



2 . Attach the exhaust gas recirculation (EGR) valve tube.

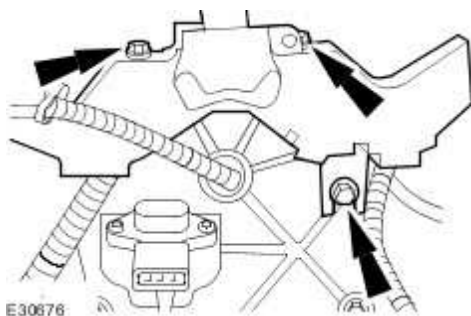
▶ Install a new gasket.

▶ Tighten to 22 Nm.

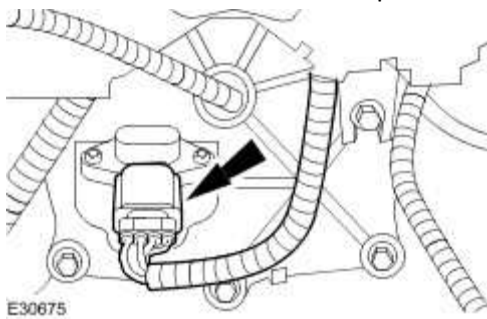


3 . Attach the engine wiring harness.

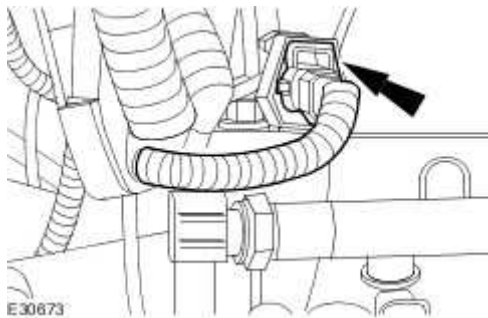
▶ Tighten to 10 Nm.



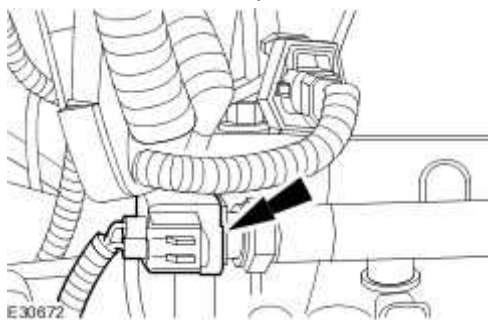
4 . Connect the manifold absolute pressure (MAP) sensor electrical connector.



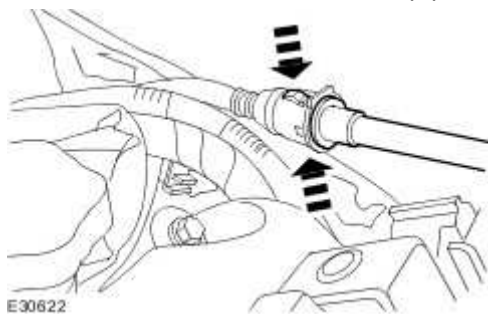
5 . Connect the right-hand camshaft position (CMP) sensor.



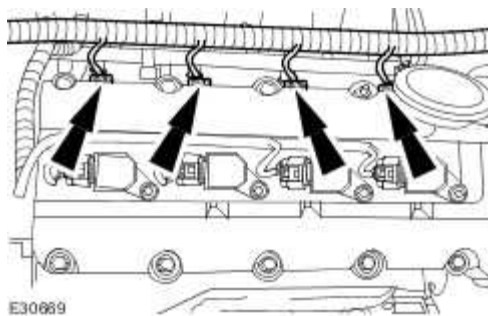
6 . Connect the fuel temperature sensor electrical connector.



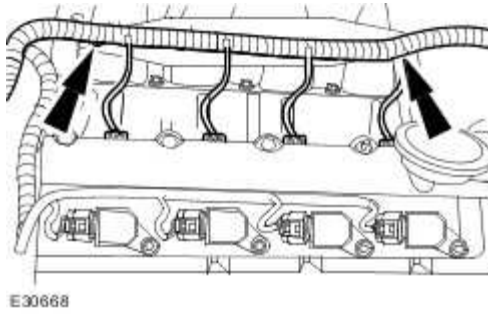
7 . Attach the brake booster vacuum pipe.



8 . Connect the right-hand fuel injector electrical connectors.



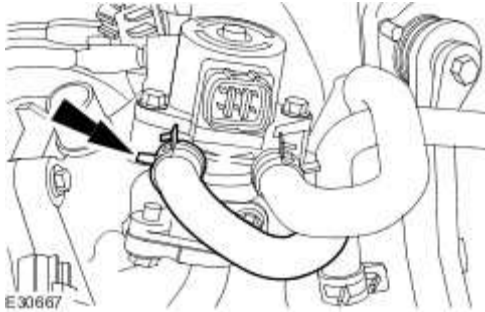
9 . Attach the engine wiring harness.



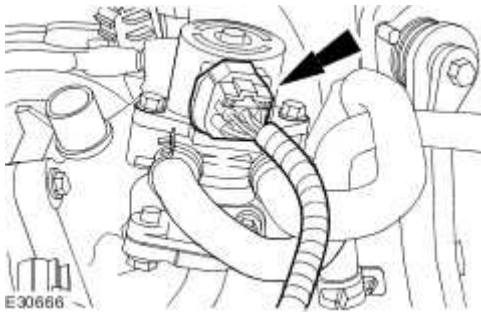
10 . **NOTE:**

Remove the cap from the coolant hose.

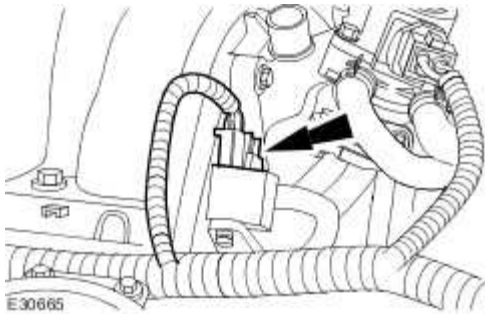
Connect the exhaust gas recirculation (EGR) valve coolant hose.



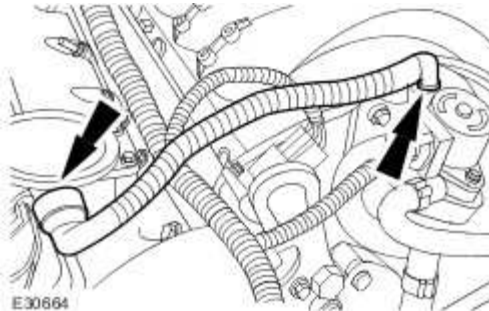
11 . Connect the exhaust gas recirculation (EGR) valve electrical connector.



12 . Connect the fuel pressure regulator electrical connector.

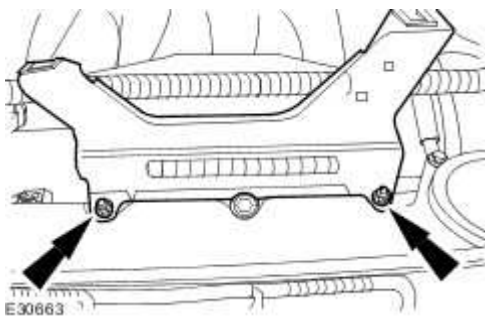


13 . Install the positive crankcase ventilation (PCV) pipe.

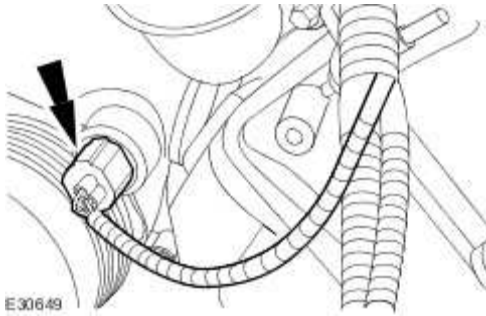


14 . Install the right-hand engine cover bracket.

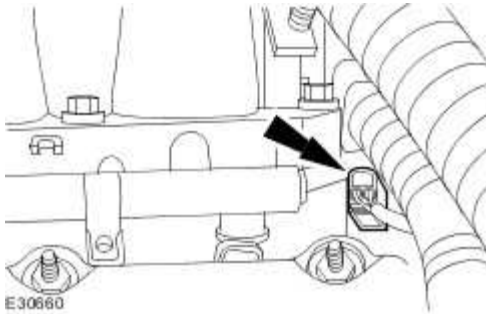
► Tighten to 6 Nm.



15 . Connect the coolant temperature sensor electrical connector.



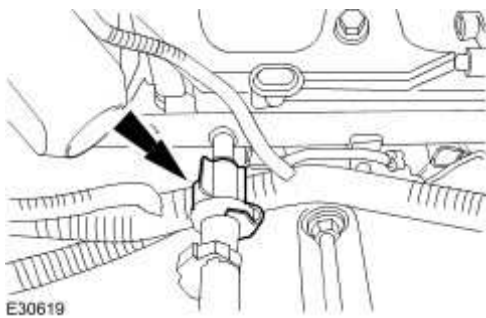
16 . Attach the left-hand camshaft position sensor electrical connector.



17 . Connect the fuel line.

▶ Install new O-ring seals.

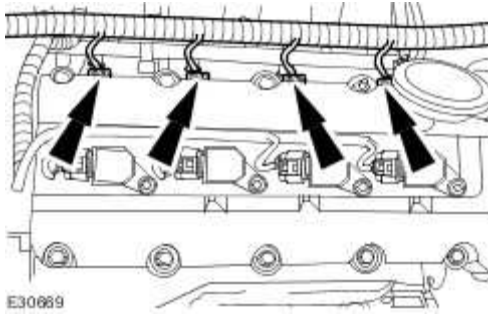
▶ Attach the fuel line retaining clip.



18 . **NOTE:**

Right-hand shown left-hand similar.

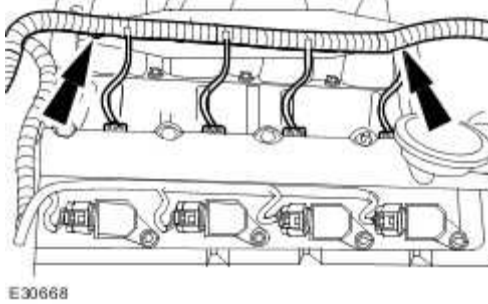
Connect the fuel injector electrical connectors.



19 . **NOTE:**

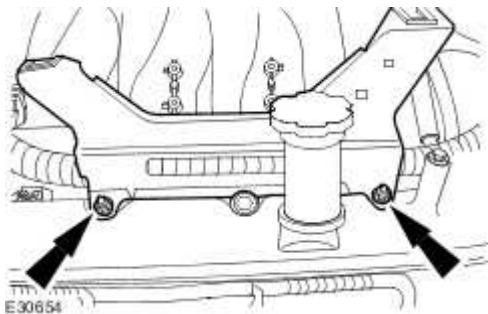
Left-hand shown right-hand similar.

Attach the engine wiring harness.

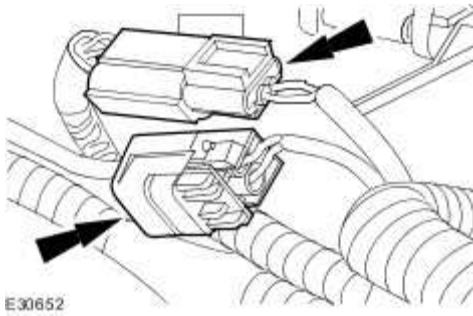


20 . Install the left-hand engine cover bracket.

▶ Tighten to 6 Nm.



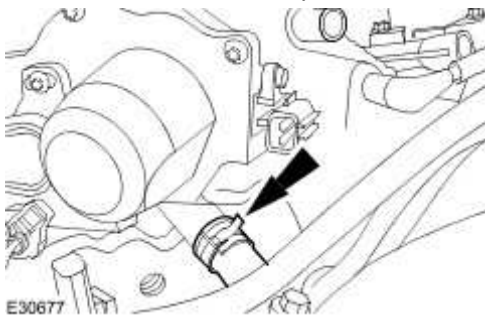
21 . Connect the knock sensor (KS) electrical connectors.



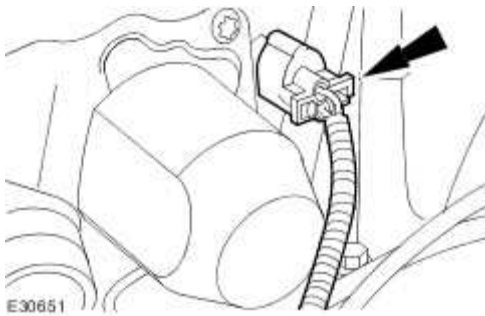
22 . **NOTE:**

Remove the cap from the coolant hose.

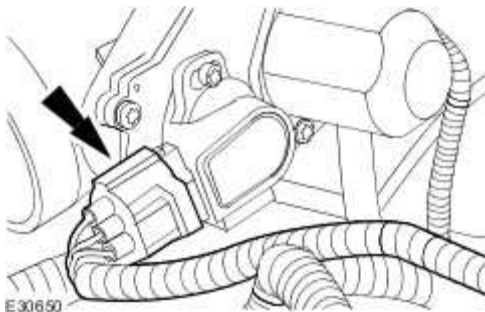
Connect the throttle body coolant hose.



23 . Connect the throttle motor electrical connector.



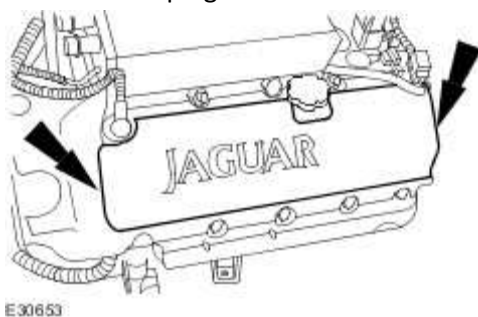
24 . Connect the throttle potentiometer (TP) electrical connector.



25 . **NOTE:**

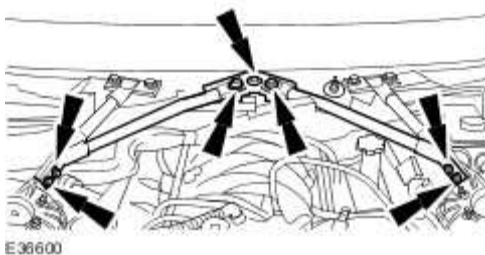
Left-hand shown, right-hand similar.

Install the on-plug coil covers.



26 . Install the engine compartment support.

► Tighten to 18 Nm.



27 . Install the air cleaner outlet pipe. <<303-12B>>

28 . Install the cowl vent screen. <<501-02>>

29 . Check and top up the cooling system.

Intake Manifold - VIN Range: G45704- >G99999 (30.15.01)

Removal

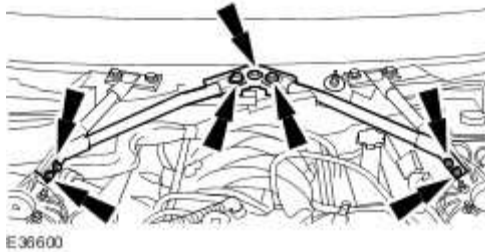
- 1 . Remove the cowl vent screen.

For additional information, refer to Cowl Vent Screen (76.10.01)

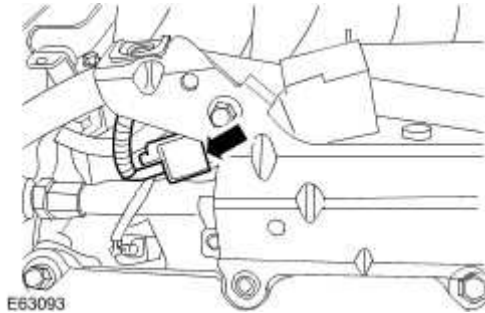
- 2 . Remove the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

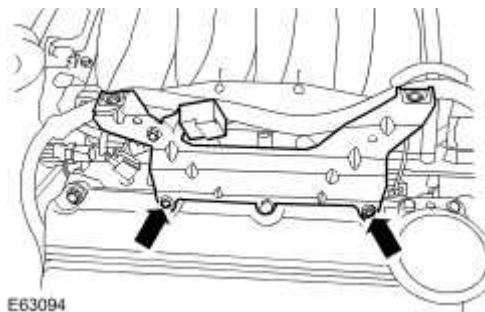
- 3 . Remove the engine compartment support.



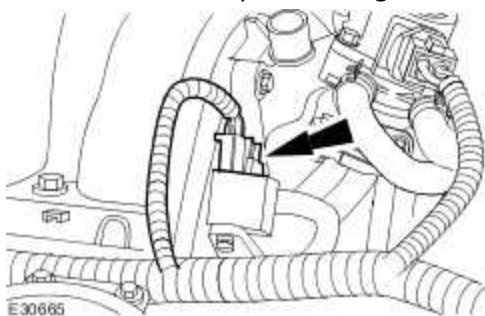
- 4 . Disconnect the supressor electrical connector.



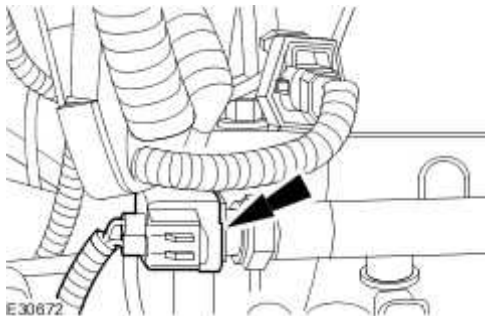
- 5 . Remove the engine cover right-hand bracket.



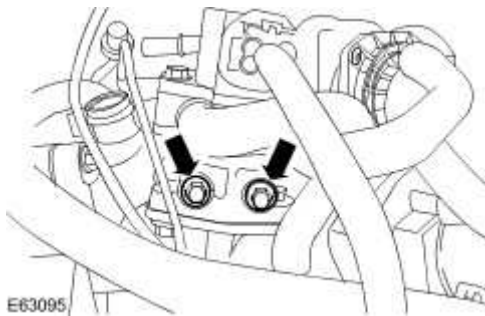
6 . Disconnect the fuel pressure regulator electrical connector.



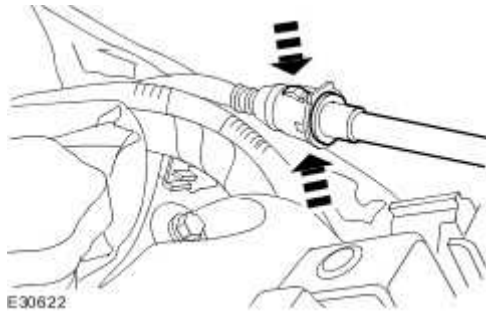
7 . Disconnect the fuel temperature sensor electrical connector.



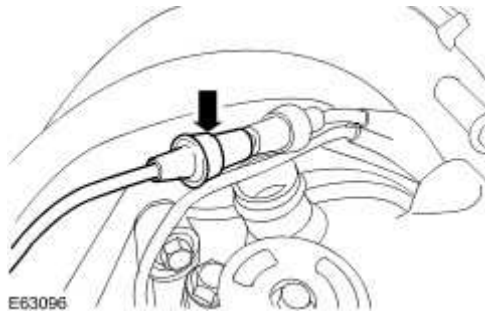
8 . Remove the exhaust gas recirculation (EGR) valve retaining bolts.



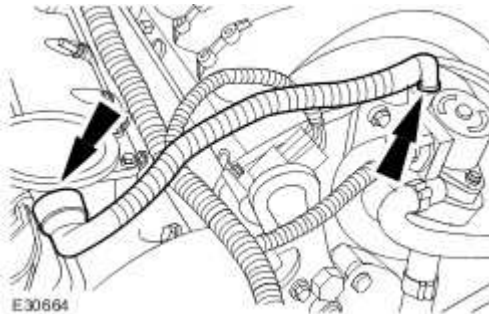
9 . Disconnect the brake booster vacuum pipe.



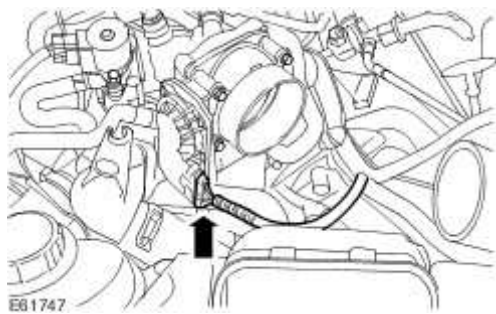
10 . Disconnect the secondary air injection (AIR) vacuum line.



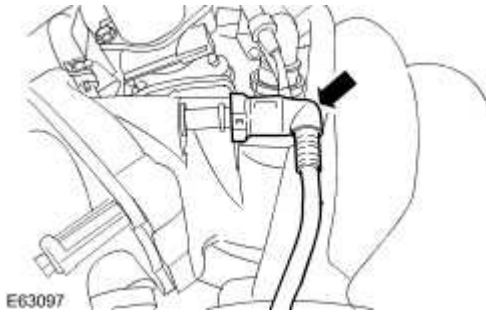
11 . Remove the positive crankcase ventilation (PCV) valve.



12 . Disconnect the throttle body electrical connector.



13 . Disconnect the evaporative emission vent hose.



14



WARNING: When relieving cooling system pressure, cover the expansion tank cap with a thick cloth to prevent the possibility of scalding. Failure to follow these instructions may result in personal injury.

Remove the coolant expansion tank cap.

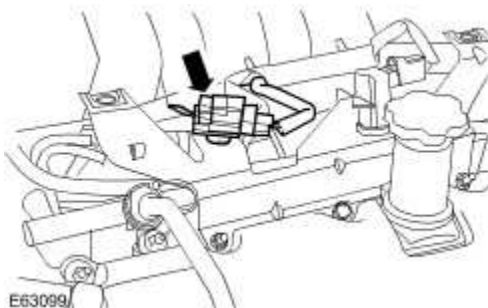
15 . **NOTE:**

Cap the coolant hose to minimize coolant loss.

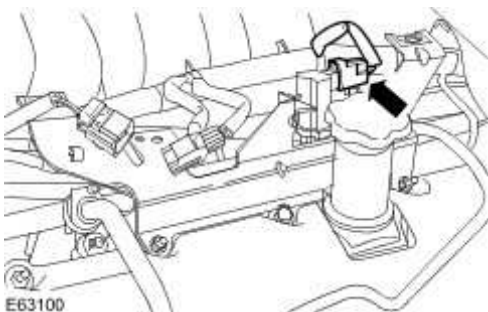
Disconnect the throttle body coolant hose.



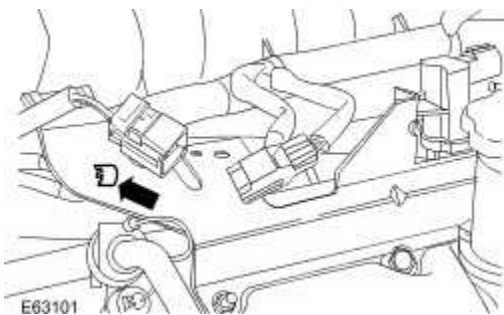
16 . Disconnect the engine coolant temperature (ECT) sensor electrical connector.



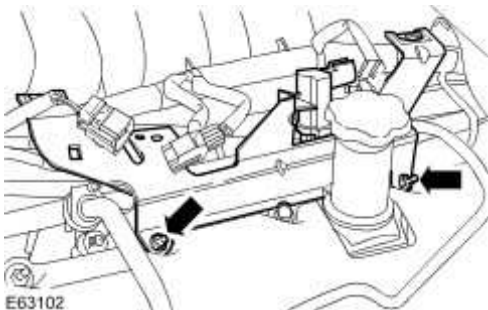
17 . Disconnect the evaporative emission canister purge valve electrical connector.



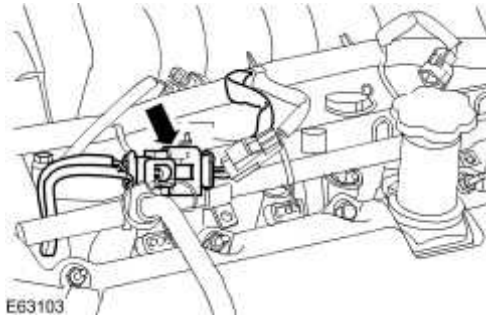
18 . Detach the knock sensor (KS) electrical connector.



19 . Reposition the engine cover left-hand bracket.



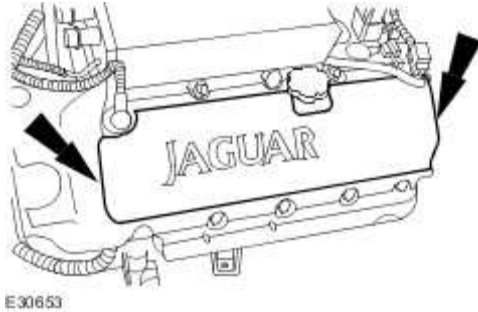
20 . Disconnect the KS electrical connector.



21 . **NOTE:**

Left-hand shown, right-hand similar.

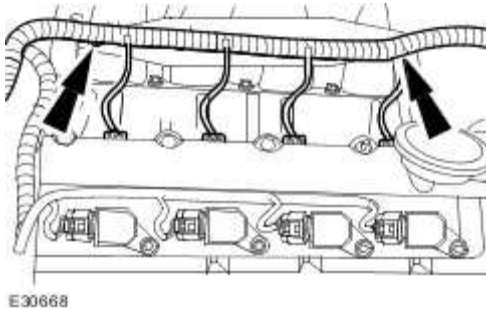
Remove the on-plug coil covers.



22 . **NOTE:**

Right-hand shown, left-hand similar.

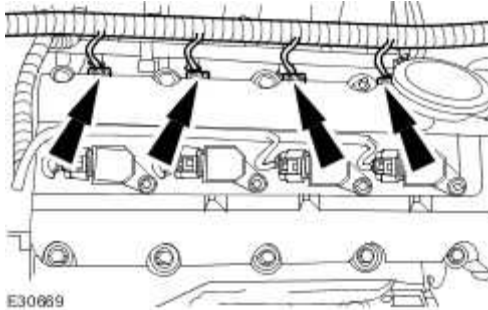
Detach the engine wiring harness.



23 . **NOTE:**

Right-hand shown, left-hand similar.

Disconnect the fuel injector electrical connectors.

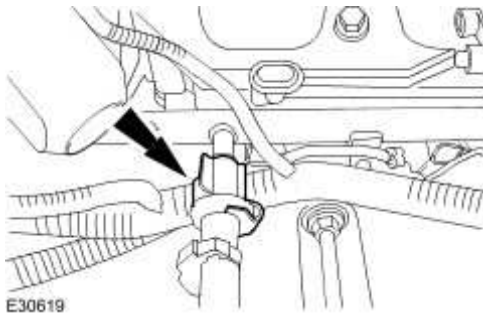


24 . Disconnect the fuel line.

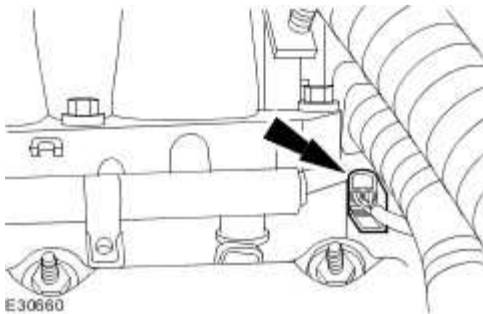
For additional information, refer to Spring Lock Couplings

► Release the retaining clip.

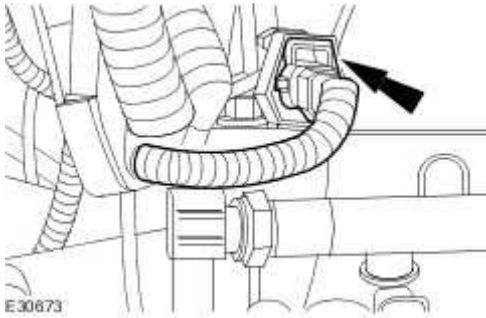
► Remove and discard the O-ring seals.



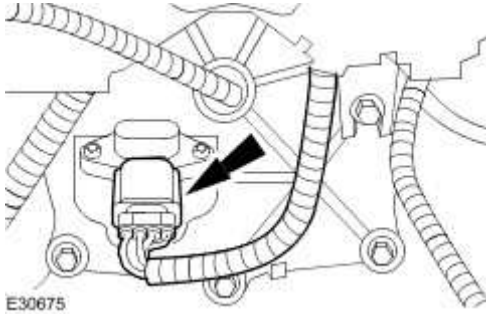
25 . Detach the left-hand camshaft position sensor electrical connector.



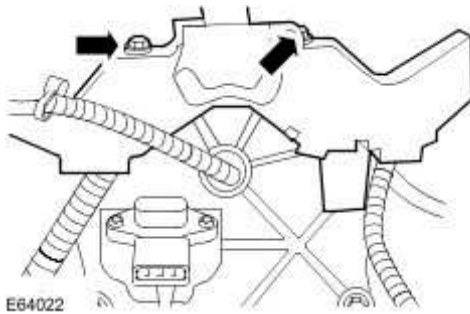
26 . Disconnect the right-hand camshaft position (CMP) sensor.



27 . Disconnect the manifold absolute pressure (MAP) sensor electrical connector.

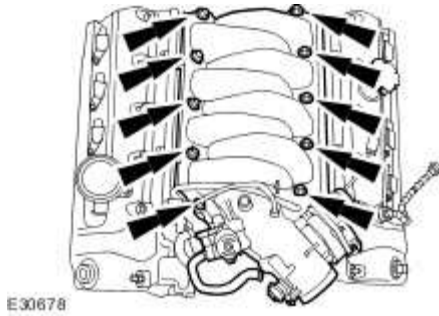


28 . Detach the engine wiring harness.



29 . Remove the intake manifold.

▶ Remove and discard the gaskets.



Installation

1 .

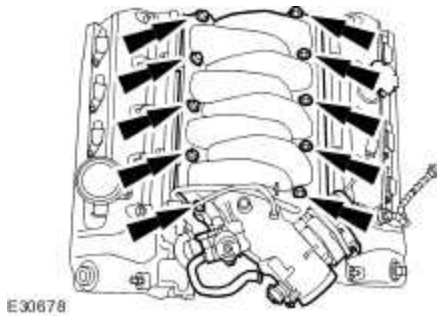


CAUTION: Make sure that all gasket mating faces are clean and dry.

Install the intake manifold.

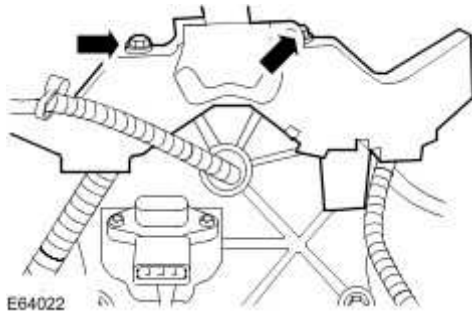
▶ Install new gaskets.

▶ Tighten to 22 Nm.

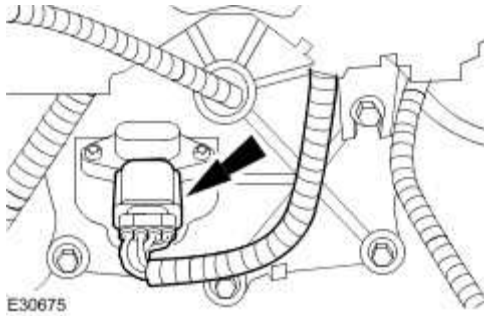


2 . Attach the engine wiring harness.

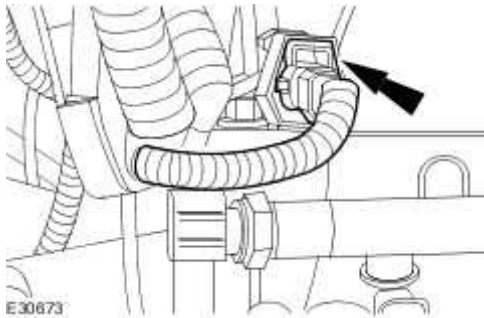
▶ Tighten to 10 Nm.



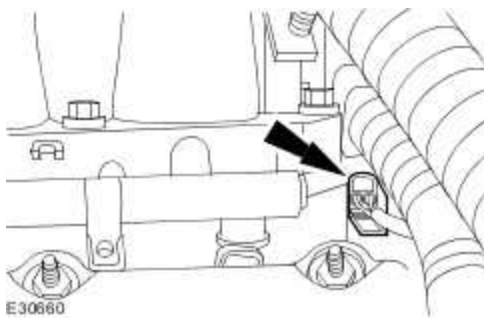
3 . Connect the MAP sensor electrical connector.



4 . Connect the right-hand CMP sensor.



5 . Attach the left-hand CMP sensor electrical connector.

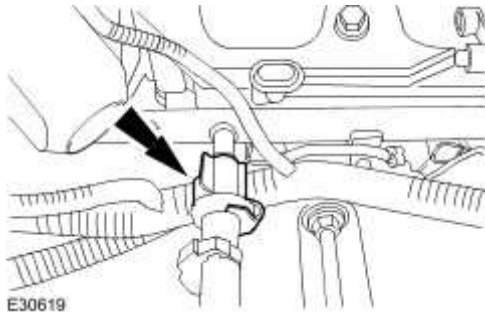


6 . Connect the fuel line.

For additional information, refer to Spring Lock Couplings

▶ Install new O-ring seals.

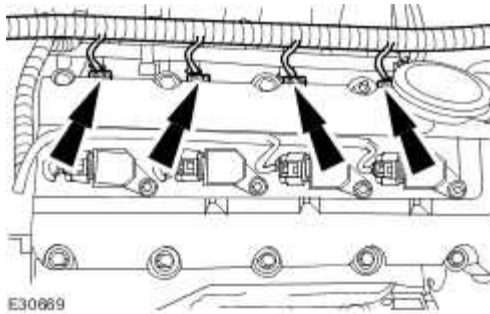
▶ Secure the retaining clip.



7 . **NOTE:**

Right-hand shown, left-hand similar.

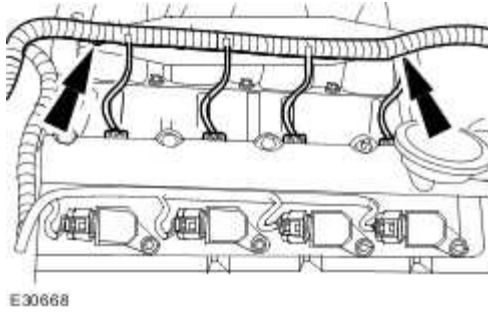
Connect the fuel injector electrical connectors.



8 . **NOTE:**

Right-hand shown, left-hand similar.

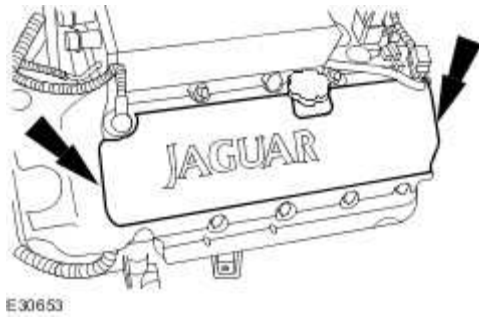
Attach the engine wiring harness.



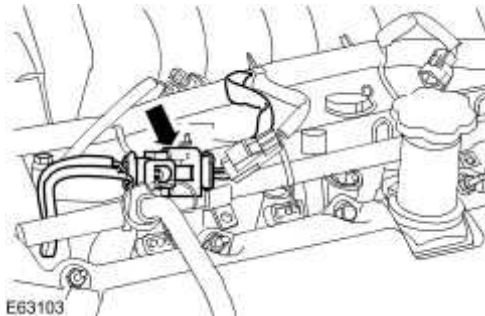
9 . **NOTE:**

Left-hand shown, right-hand similar.

Install the on-plug coil covers.

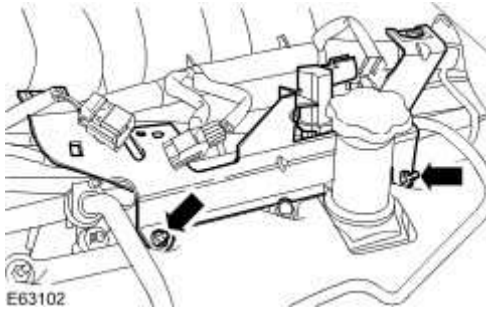


10 . Connect the KS electrical connector.

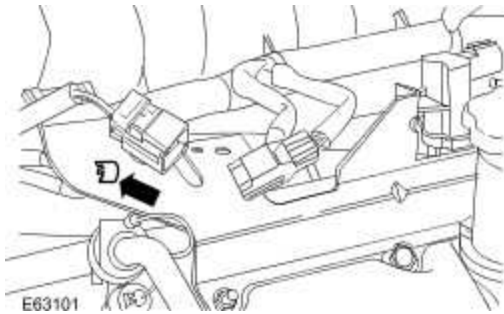


11 . Reposition the engine cover left-hand bracket.

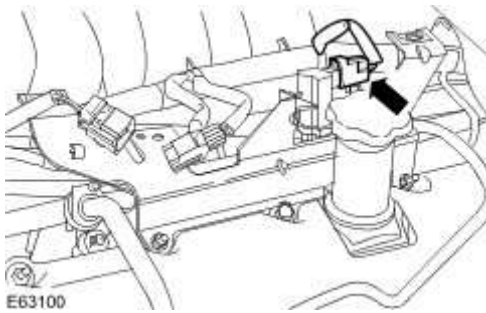
► Tighten to 6 Nm.



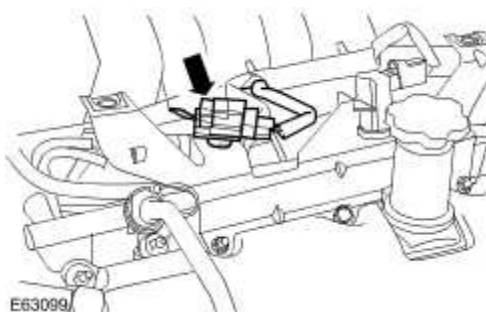
12 . Attach the KS electrical connector.



13 . Connect the evaporative emission cannister purge valve electrical connector.



14 . Connect the ECT sensor electrical connector.



15 . **NOTE:**

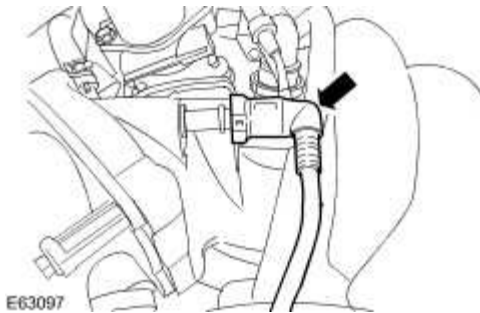
Remove the blanking caps.

Connect the throttle body coolant hose.

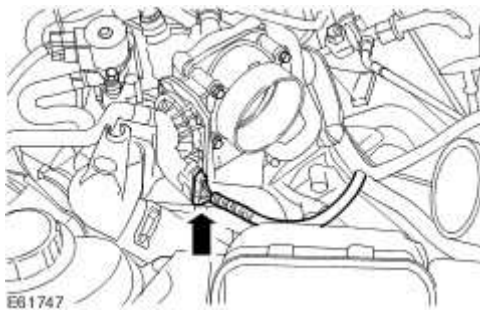


16 . Install the coolant expansion tank cap.

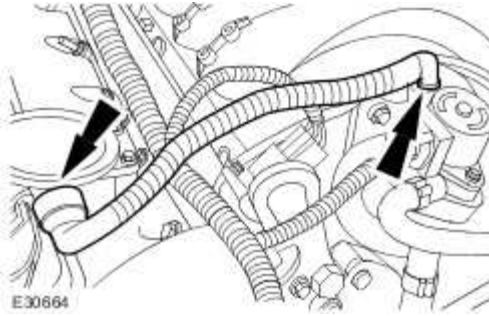
17 . Connect the evaporative emission vent hose.



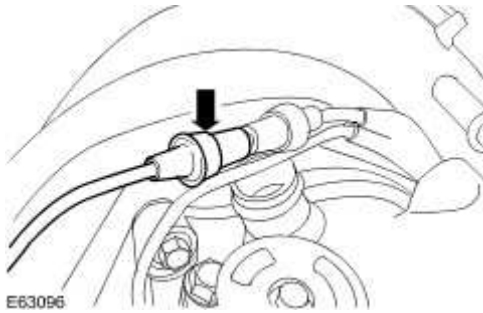
18 . Connect the throttle body electrical connector.



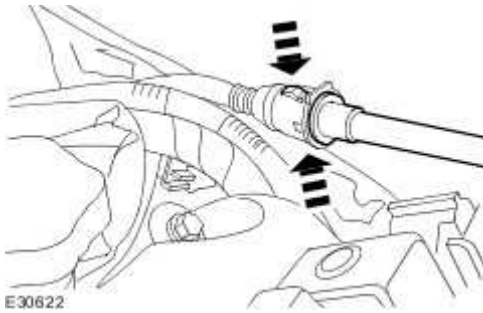
19 . Install the PCV valve.



20 . Connect the AIR vacuum line.

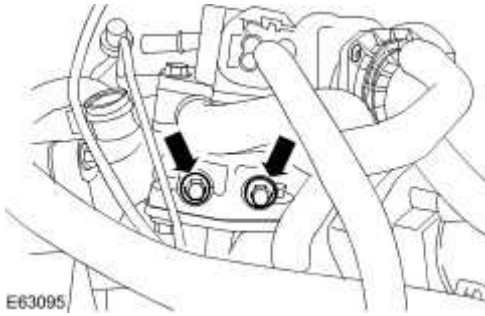


21 . Connect the brake booster vacuum pipe.

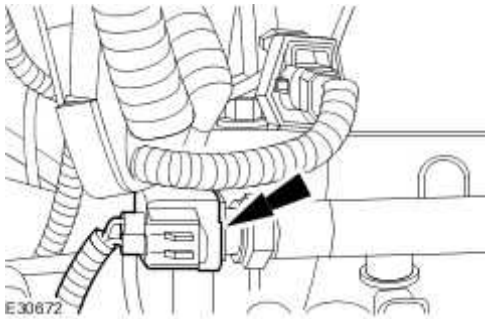


22 . Install the EGR valve retaining bolts.

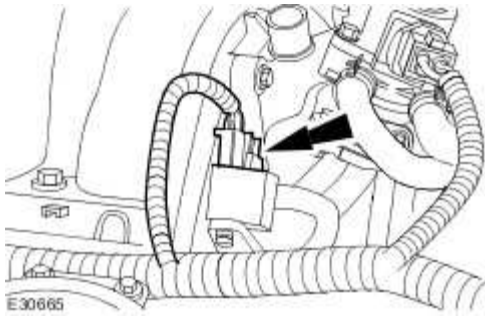
► Tighten to 10 Nm.



23 . Connect the fuel temperature sensor electrical connector.

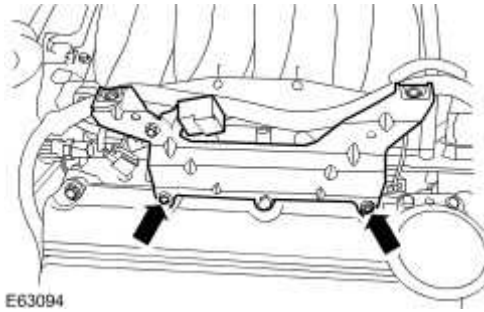


24 . Connect the fuel pressure regulator electrical connector.

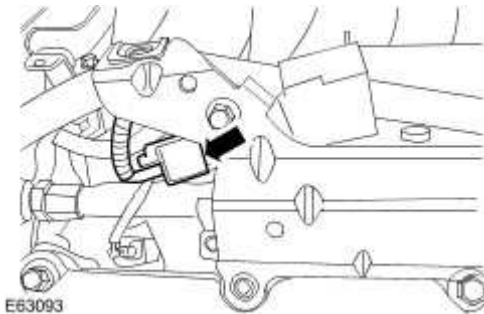


25 . Install the engine cover right-hand bracket.

▶ Tighten to 6 Nm.

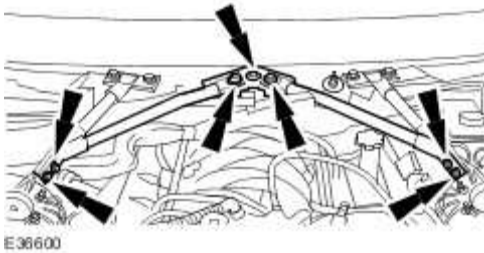


26 . Connect the supressor electrical connector.



27 . Install the engine compartment support.

► Tighten to 18 Nm.



28 . Install the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

29 . Install the cowl vent screen.

For additional information, refer to Cowl Vent Screen (76.10.01)

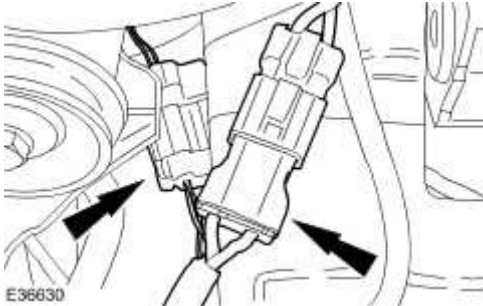
30 . Check and top up the cooling system.

Oil Cooler - Vehicles With: Supercharger (12.60.68)

Removal

1 . Remove the radiator splash shield. <<501-02>>

2 . Detach the electrical connectors.



3 . Remove the radiator lower cowl.

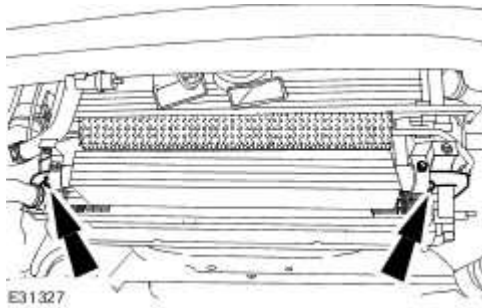


4 . **NOTE:**

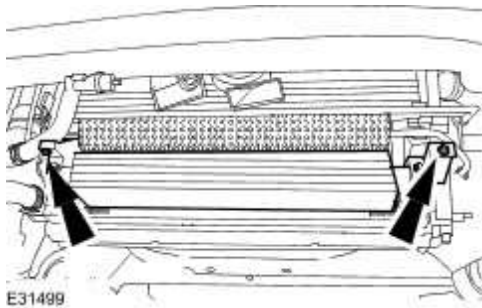
Place a suitable container underneath oil cooler to prevent oil spillage.

Detach the oil cooler lines.

▶ Remove and discard the oil cooler O-ring seals.



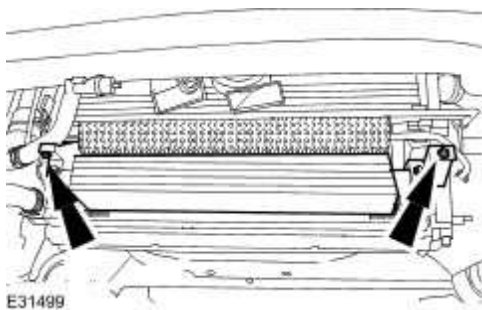
5 . Remove the oil cooler.



Installation

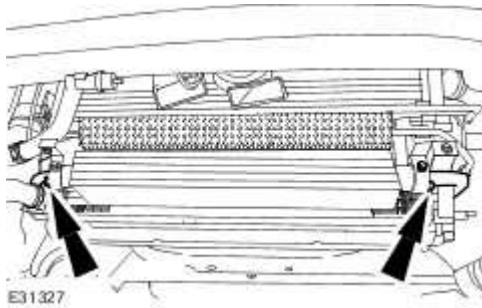
1 . Install the oil cooler.

▶ Tighten to 7 Nm.



2 . Install the oil cooler lines.

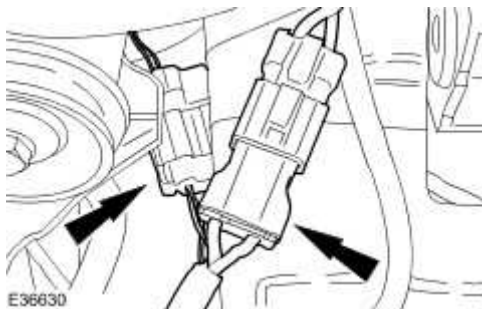
▶ Install new oil cooler O-ring seals.



3 . Install the radiator lower cowl.



4 . Attach the electrical connectors.



5 . Install the radiator splash shield. <<501-02>>

6 . Check and fill the engine oil to the correct level on the oil level indicator.

Oil Cooler - Vehicles Without: Supercharger (12.60.68)

Special Service Tools



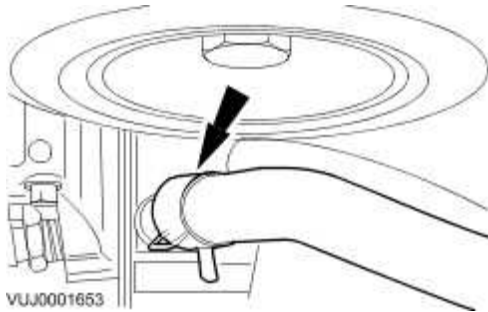
Installer/remover, Oil Filter
303-752

Removal

1 . Drain the cooling system. <<303-03A>>

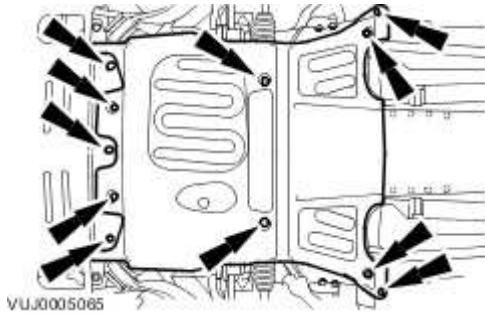
2 . Lower the vehicle.

3 . Disconnect the oil cooler hose.



4 . Raise the vehicle.

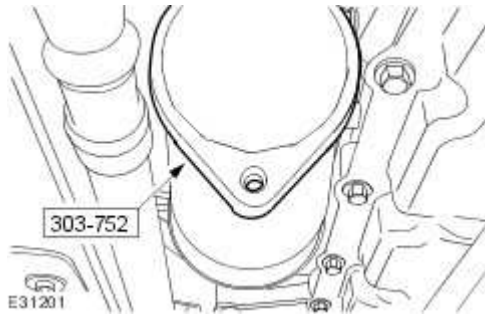
5 . Remove the air deflector.



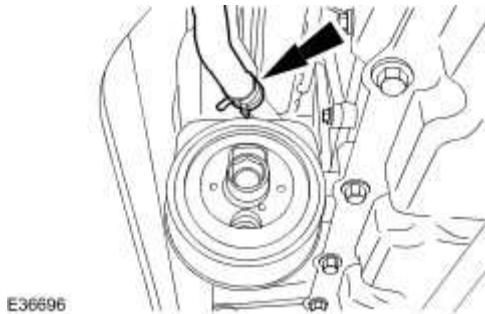
6 . NOTE:

Place a suitable container underneath the filter to prevent oil spillage.

Using the special tool remove and discard the oil filter element.

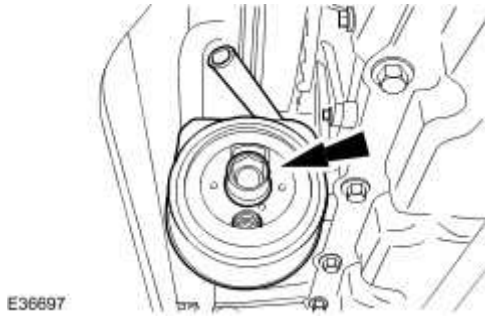


7 . Disconnect the oil cooler hose.



8 . Remove the oil cooler.

▶ Remove and discard the O-ring.

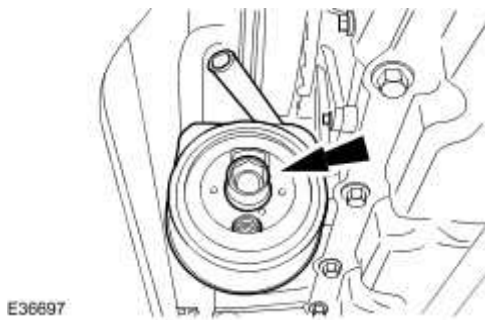


Installation

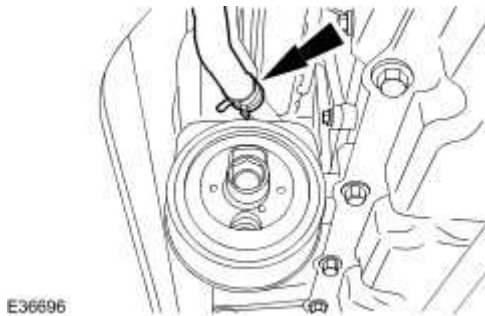
1 . Install the oil cooler.

▶ Install a new O-ring seal.

▶ Tighten to 55 Nm.



2 . Connect the oil cooler hose.

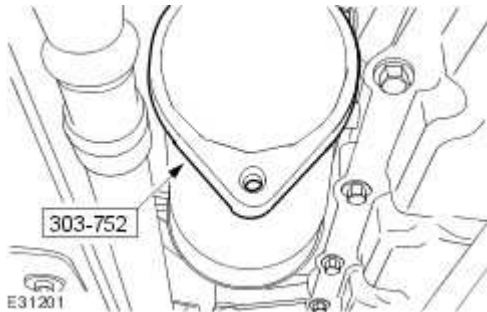


3 . **NOTE:**

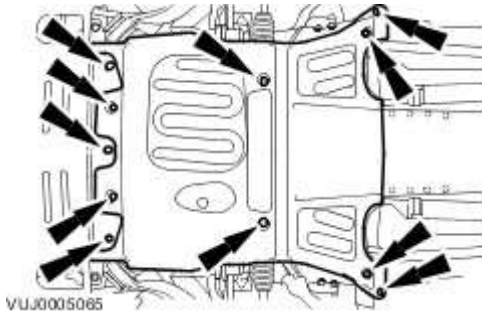
Apply a suitable amount of clean engine oil to lubricate the oil filter O-ring seal.

Using the special tool, install a new oil filter.

▶ Tighten to 18 Nm.

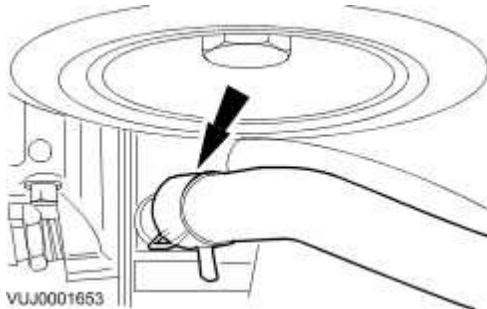


4 . Install the air deflector.



5 . Lower the vehicle.

6 . Connect the oil cooler hose.



7 . Check and fill the engine oil to the correct level on the oil level indicator.

8 . Carry out cooling system filling and bleeding procedure. <<303-03A>>

Oil Pan (12.60.44)

Removal

- 1 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

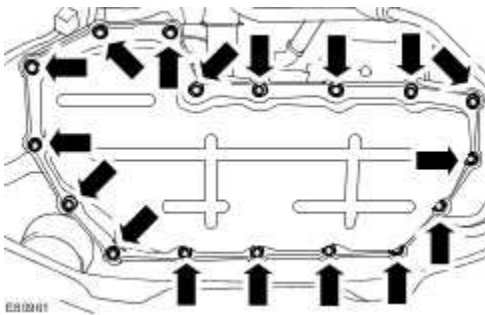
- 2 . Drain the engine oil.

▶ Place suitable container under the vehicle.

▶ Remove the drain plug and drain the engine oil.

- 3 . Remove the oil pan.

▶ Remove and discard the gasket.

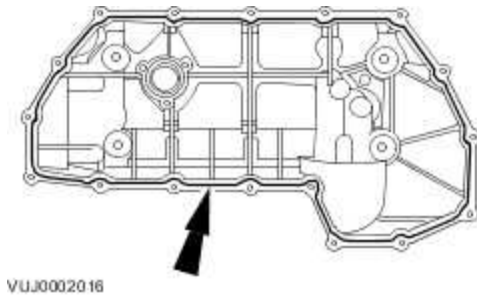


Installation

- 1 . **NOTE:**

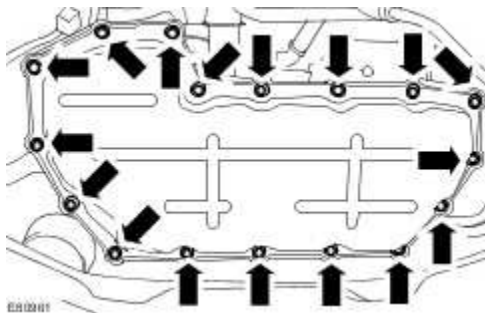
Make sure all surfaces are clean.

Install the oil pan gasket to the oil pan extension.



2 . Install the oil pan.

▶ Install, but do not fully tighten the retaining bolts.



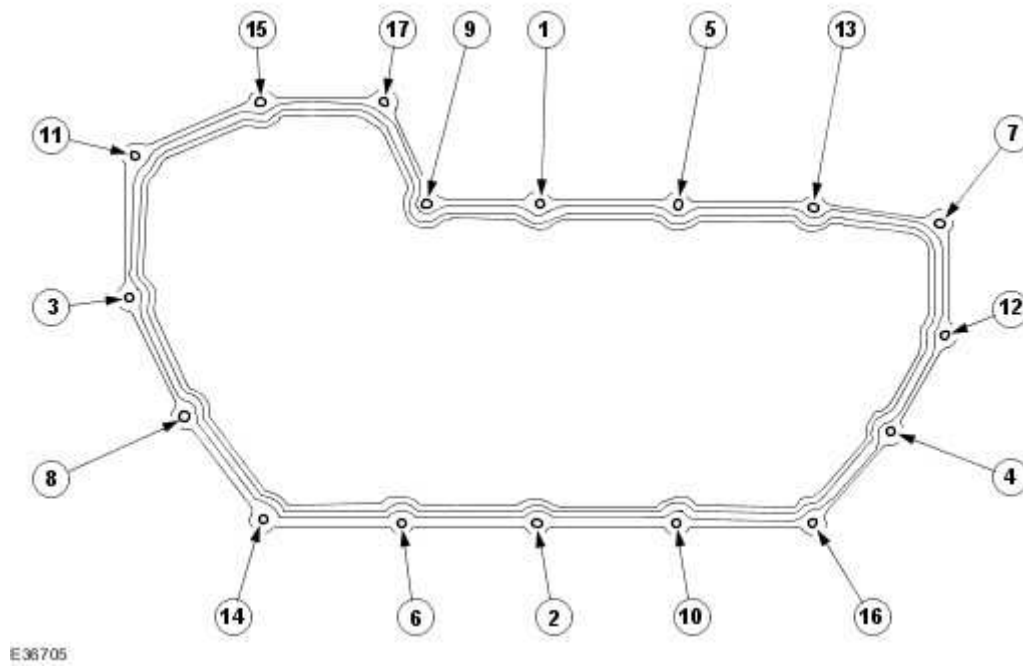
3 NOTE:

A new oil pan is supplied with the drain plug installed. Check that the drain plug is tightened to 25 Nm.

Tighten the retaining bolts in the indicated sequence in two stages.

▶ Stage 1: bolts 1 to 7, tighten to 5 Nm.

▶ Stage 2: bolts 1 to 17, tighten to 12 Nm.



4 . Install the air deflector.

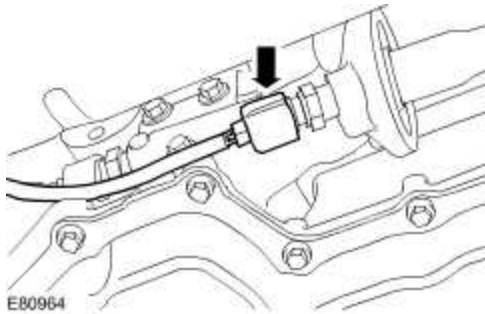
For additional information, refer to Air Deflector (76.11.41)

5 . Check and top-up the engine oil.

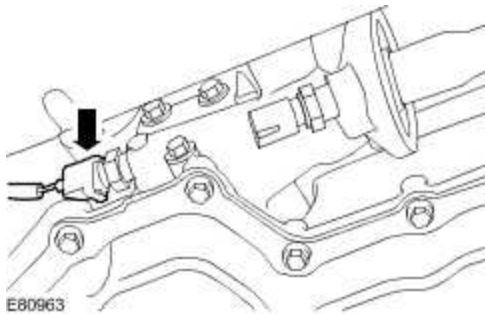
Oil Pan Extension (12.60.48)

Removal

- 1 Remove the engine front cover.
 - For additional information, refer to Engine Front Cover - VIN Range: G00442->G45703 (12.65.01)
 - For additional information, refer to Engine Front Cover - VIN Range: G45704->G99999 (12.65.01)
- 2 . Remove the oil pan.
 - For additional information, refer to Oil Pan (12.60.44)
- 3 . Disconnect the engine oil temperature sensor electrical connector.

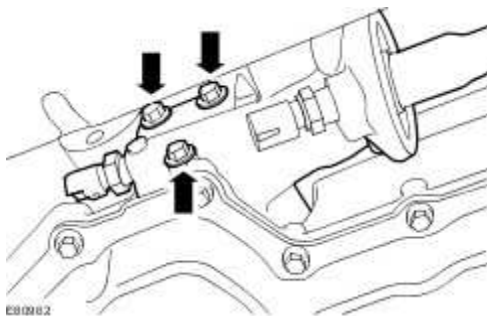


- 4 . Disconnect the engine oil pressure sensor electrical connector.



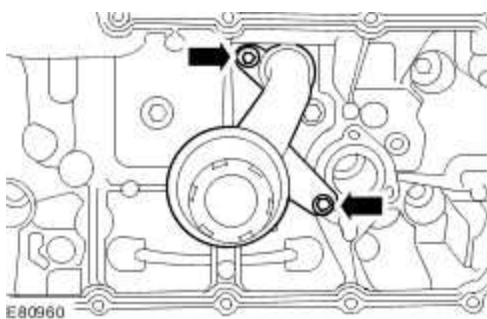
- 5 . Remove the oil filter housing.

- ▶ Remove and discard the O-ring seal.
- ▶ Using suitable blanking plugs, blank the exposed ports.



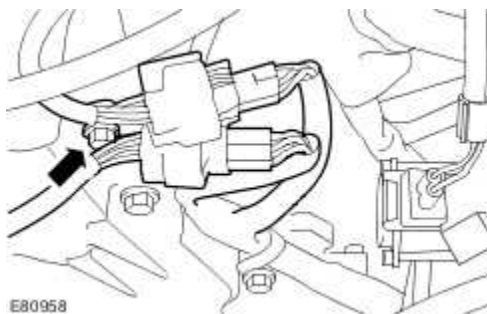
6 . Remove the oil strainer.

▶ Remove and discard the O-ring seal.

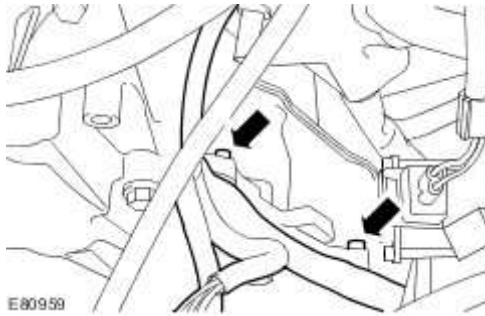


7 . Detach the right-hand heated oxygen sensor (HO2S) electrical connector retaining bracket.

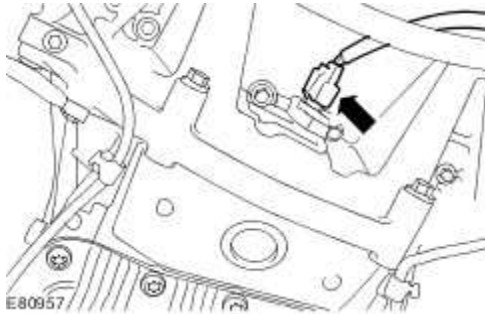
▶ Remove the retaining bolt.



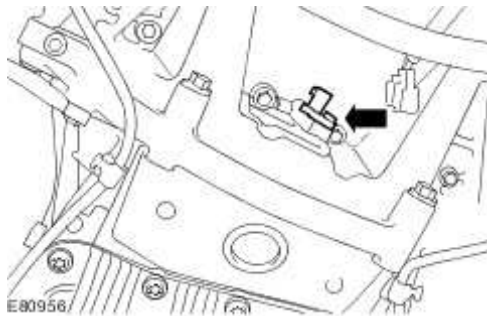
8 . Detach the engine wiring harness.



9 . Disconnect the crankshaft position (CKP) sensor electrical connector.

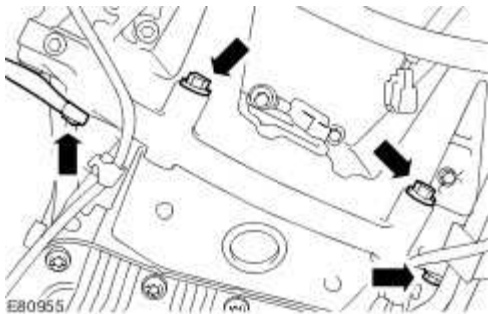


10 . Remove the CKP sensor.



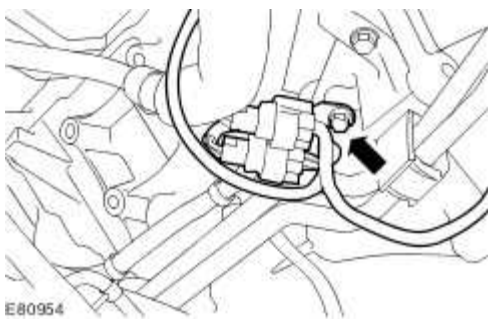
11 . Remove the transmission bell housing to oil pan retaining bolts.

▶ Detach the engine ground cable.

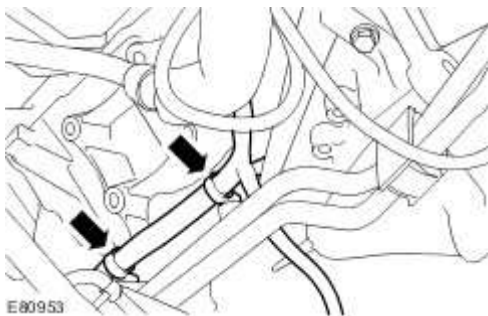


12 . Detach the left-hand HO2S electrical connector retaining bracket.

▶ Remove the retaining bolt.

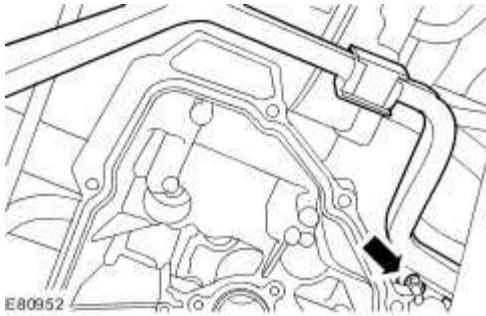


13 . Detach the engine wiring harness.

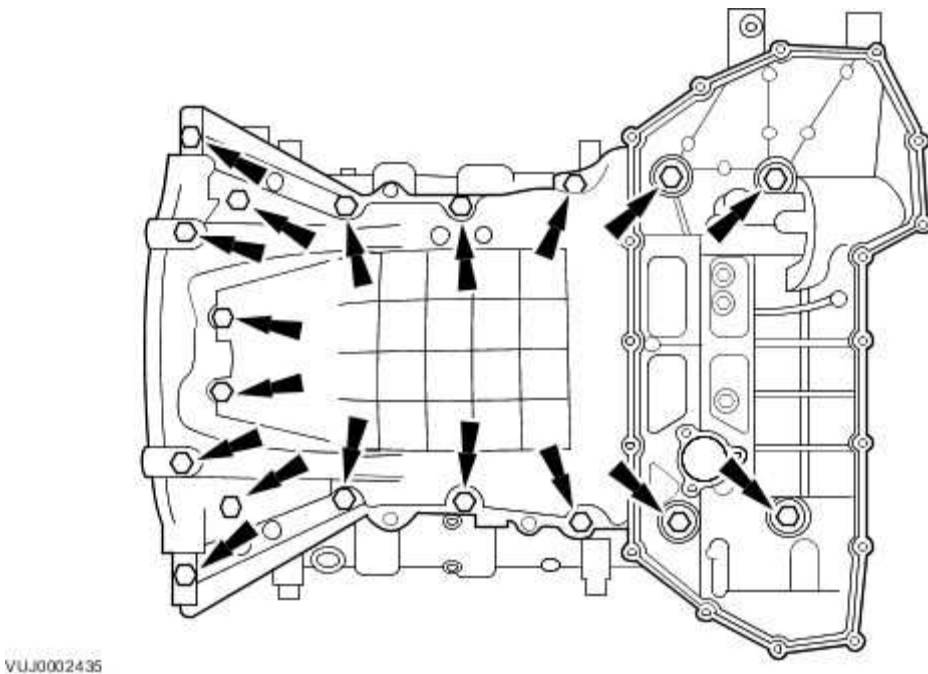


14 . Detach the transmission fluid cooler pipes.

▶ Remove the retaining nut.



15 . Remove the oil pan extension.



Installation

1 . NOTE:

Use only a plastic scraper when removing old gasket material.

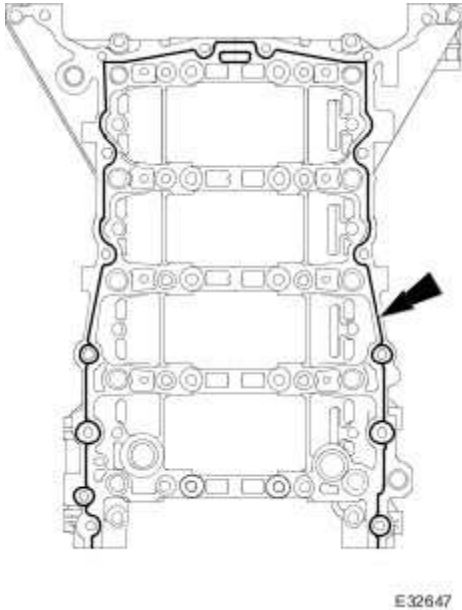
Clean all the mating faces and reusable parts thoroughly and check for damage.

2 NOTE:

It is important that the oil pan extension is bolted to the bedplate within 20 minutes of

applying the RTV sealant.

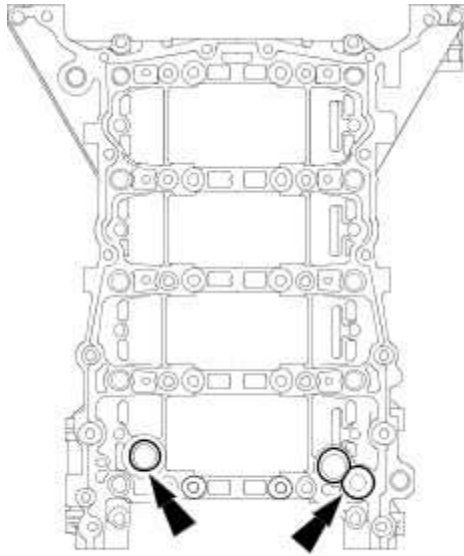
Apply a continuous bead of RTV sealant (Loctite 5699) 3 mm diameter, around the flange as indicated.



3 NOTE:

It is important that the oil pan extension is bolted to the bedplate within 20 minutes of applying the RTV sealant.

Apply a continuous bead of RTV sealant (Loctite 5699) 2 mm diameter, around the diverter valve flange as indicated.



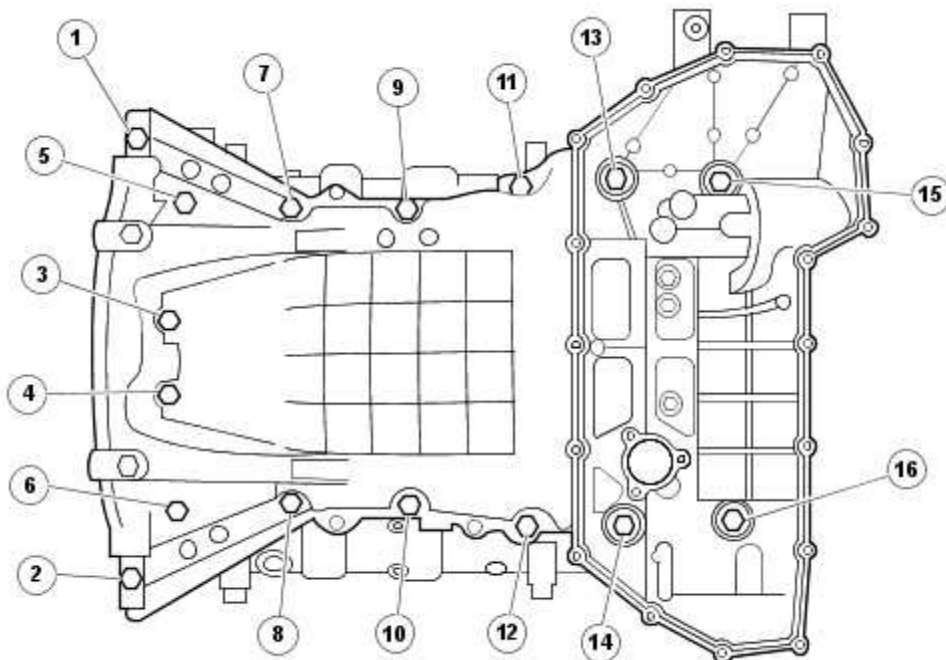
E 32648

4 . NOTE:

Tighten the retaining bolts in the indicated sequence.

Install the oil pan extension to the bedplate.

1) Tighten to 21 Nm.

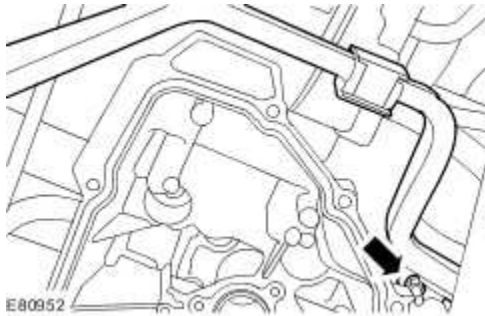


E81046

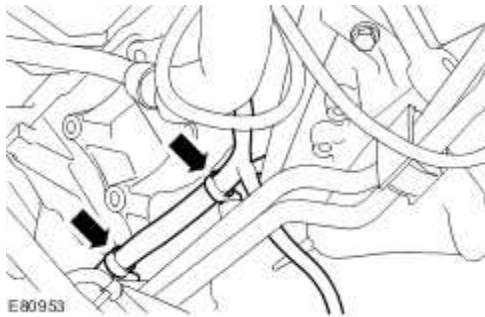
5 . Attach the transmission fluid cooler pipes.

▶ Install the retaining nut.

▶ Tighten to 10 Nm.



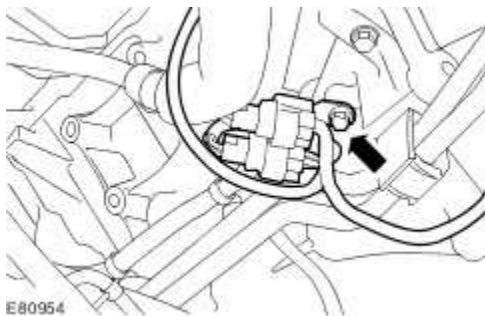
6 . Attach the engine wiring harness.



7 . Attach the left-hand HO2S electrical connector retaining bracket.

▶ Install the retaining bolt.

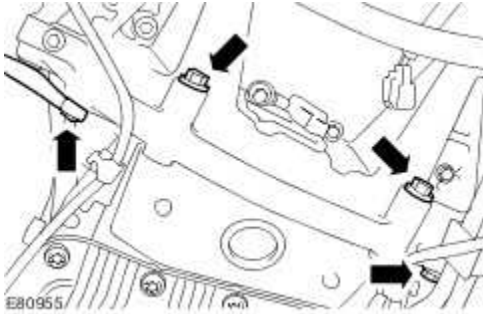
▶ Tighten to 10 Nm.



8 . Install the transmission bell housing to oil pan retaining bolts.

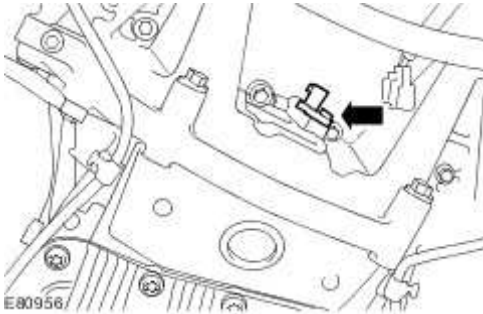
▶ Attach the engine ground cable.

▶ Tighten to 48 Nm.

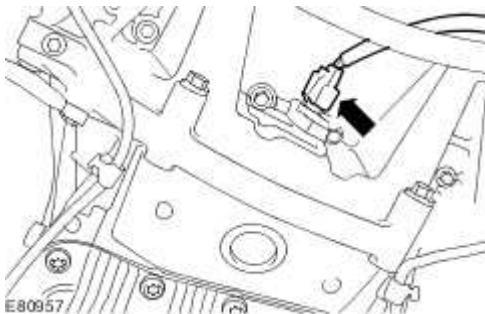


9 . Install the CKP sensor.

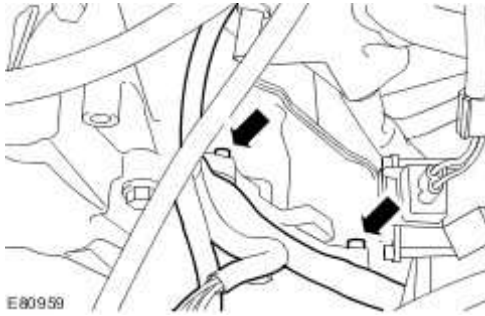
▶ Tighten to 10 Nm.



10 . Connect the CKP sensor electrical connector.



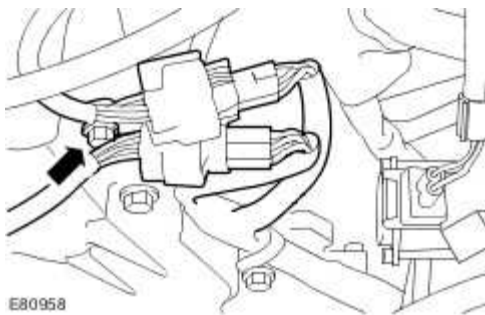
11 . Attach the engine wiring harness.



12 . Attach the right-hand HO2S electrical connector retaining bracket.

▶ Install the retaining bolt.

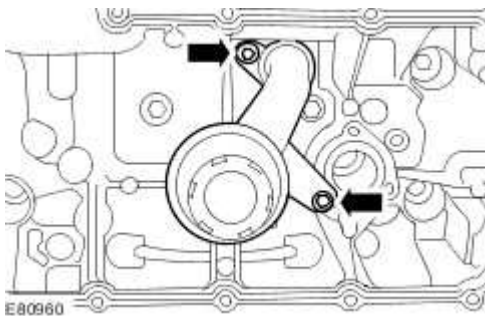
▶ Tighten to 10 Nm.



13 . Install the oil strainer.

▶ Install a new O-ring seal.

▶ Tighten to 12 Nm.

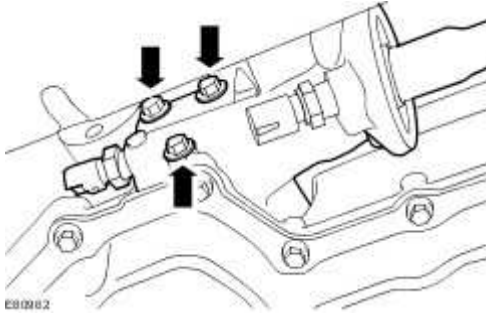


14 . Install the oil filter housing.

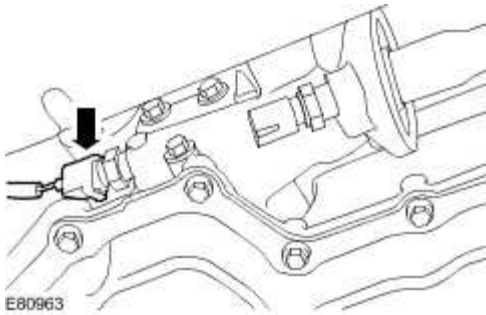
▶ Remove the blanking plugs.

▶ Install a new O-ring seal.

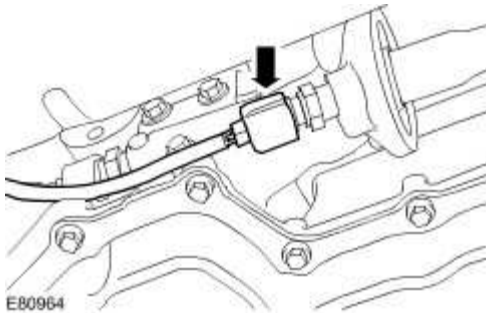
▶ Tighten to 21 Nm.



15 . Connect the engine oil pressure sensor electrical connector.



16 . Connect the engine oil temperature sensor electrical connector.



17 . Install the oil pan.

For additional information, refer to Oil Pan (12.60.44)

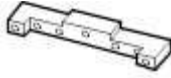
18 Install the engine front cover.

. For additional information, refer to Engine Front Cover - VIN Range: G00442->G45703
(12.65.01)

For additional information, refer to Engine Front Cover - VIN Range: G45704->G99999
(12.65.01)

Oil Pump - VIN Range: G00442->G45703 (12.60.26)

Special Service Tools



303-530

Camshaft setting

303-530



303-532

Timing chain tensioning tool

303-532



303-645

Crankshaft setting, main tool

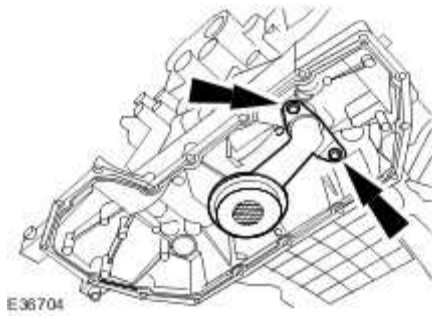
303-645

Removal

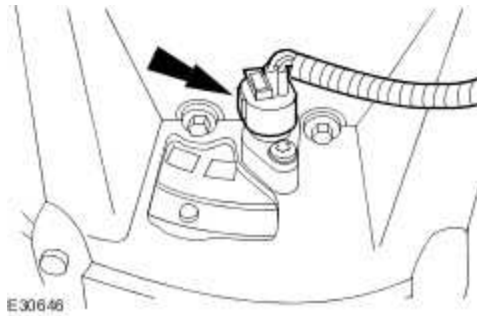
All vehicles

- 1 . Remove the oil pan.
For additional information, refer to Oil Pan (12.60.44)
- 2 . Remove the oil strainer.

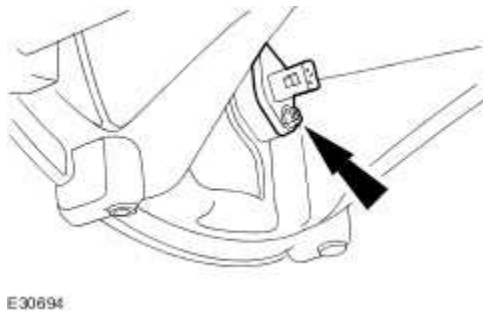
 Remove and discard the O-ring seal.



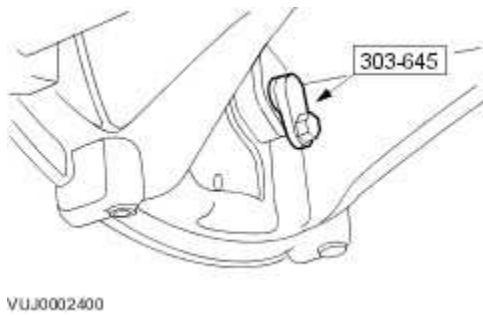
3 . Disconnect the crankshaft position (CKP) sensor electrical connector.



4 . Remove the CKP sensor.



5 . Install the special tool.

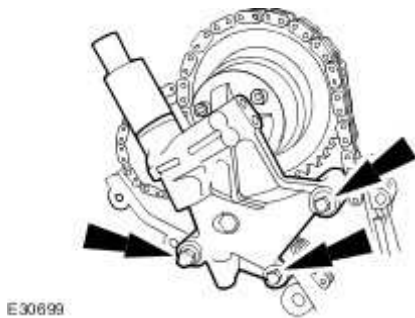


- 6 Remove the engine front cover.
 - . For additional information, refer to Engine Front Cover - VIN Range: G00442->G45703 (12.65.01)

Vehicles without supercharger

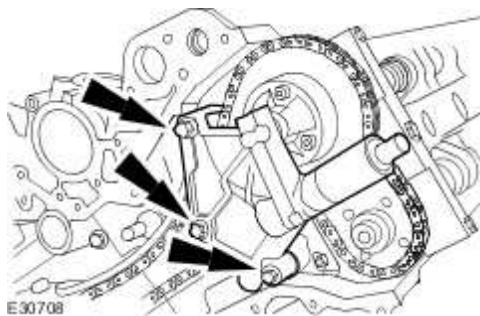
- 7 . Remove the right-hand variable camshaft timing oil control unit housing.

▶ Remove and discard the O-ring seals.



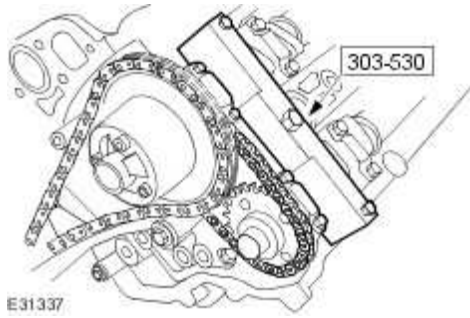
- 8 . Remove the left-hand variable camshaft timing oil control unit housing.

▶ Remove and discard the O-ring seals.

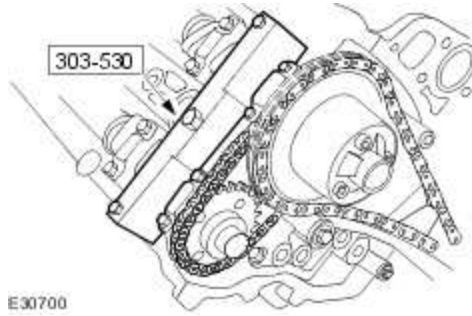


All vehicles

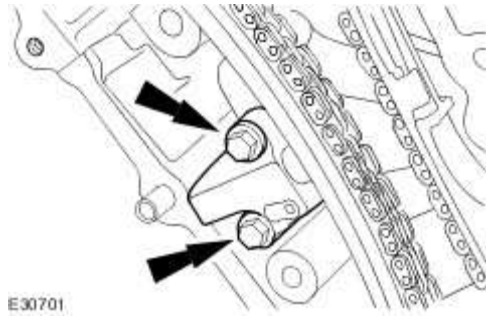
- 9 . Install the special tool to the left-hand cylinder head.



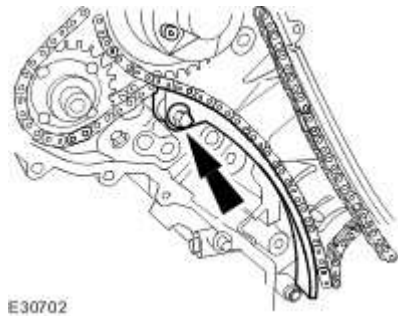
10 . Install the special tool to the right-hand cylinder head.



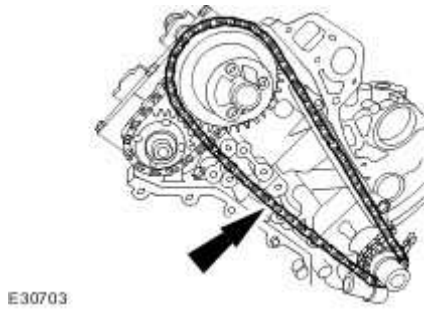
11 . Remove the primary timing chain tensioner assembly.



12 . Remove the primary timing chain tensioner guide.



13 . Remove the primary timing chain.

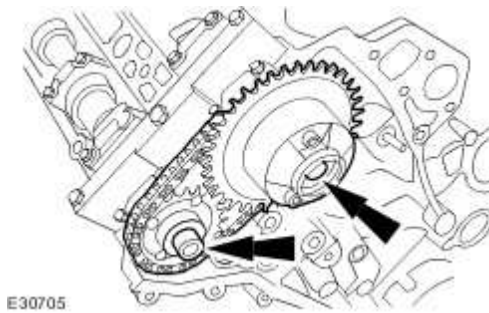


14

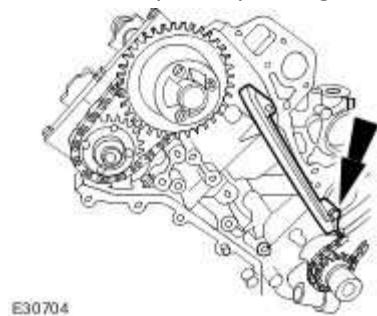


CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

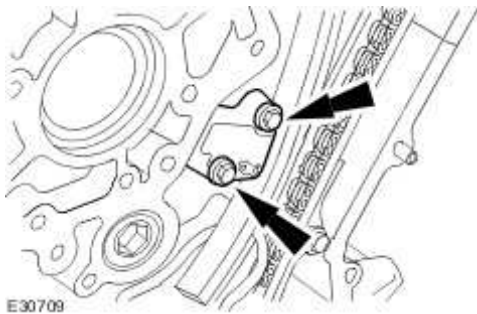
Loosen the camshaft sprockets.



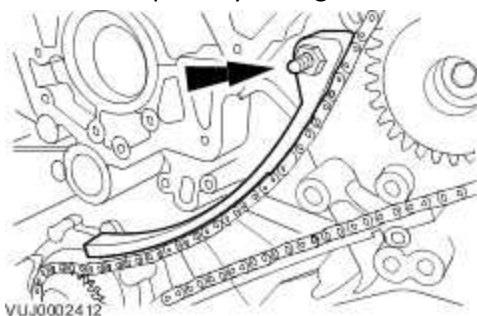
15 . Remove the primary timing chain guide.



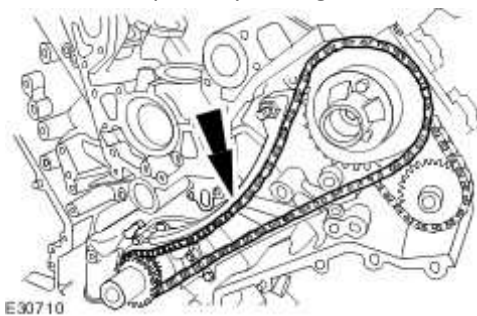
16 . Remove the primary timing chain tensioner assembly.



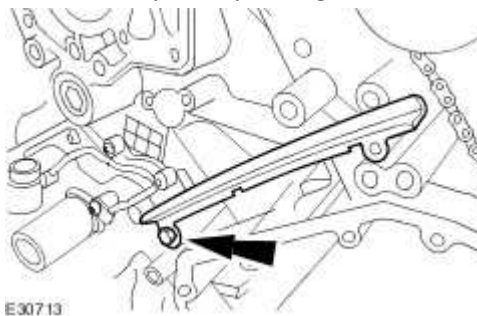
17 . Remove the primary timing chain tensioner guide.



18 . Remove the primary timing chain.



19 . Remove the primary timing chain tensioner guide.

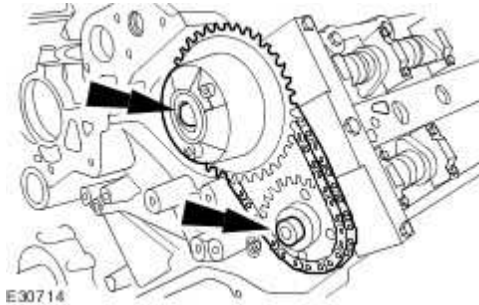


20



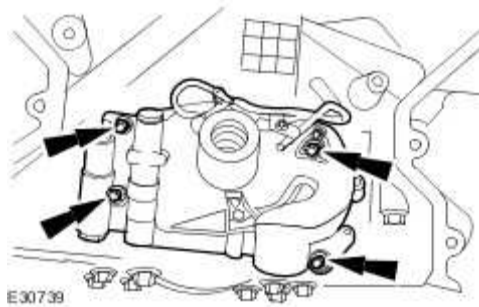
CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

Loosen the camshaft sprockets.



21 . Remove the oil pump.

▶ Remove and discard the gasket.



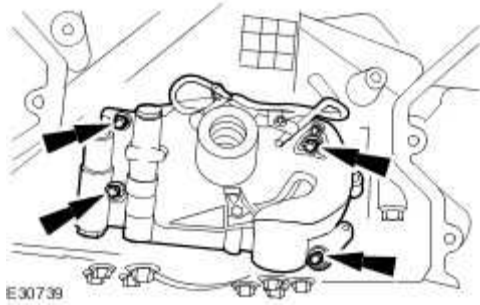
Installation

All vehicles


1 . Install the oil pump.

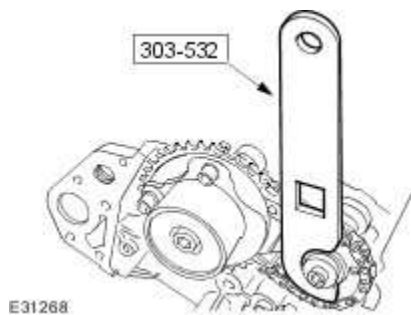
▶ Install a new gasket.

▶ Tighten to 12 Nm.




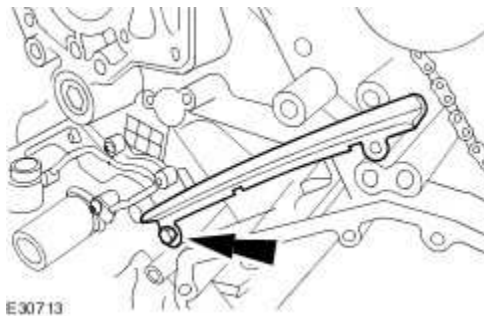
2 Install the special tool to the exhaust camshaft sprocket.

-  Reposition the camshaft sprockets for the most advantageous position for use of the tool.



3 . Install the primary timing chain tensioner guide.

-  Tighten to 12 Nm.



4

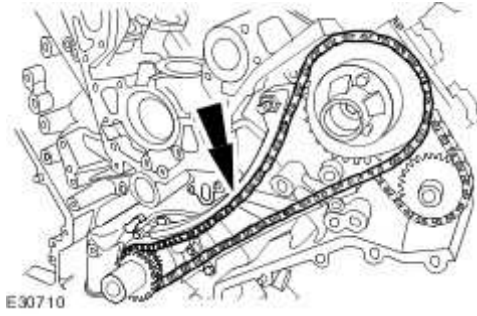


• **CAUTION:** Make sure the timing chain slack is on the tensioned side of the timing

chain.

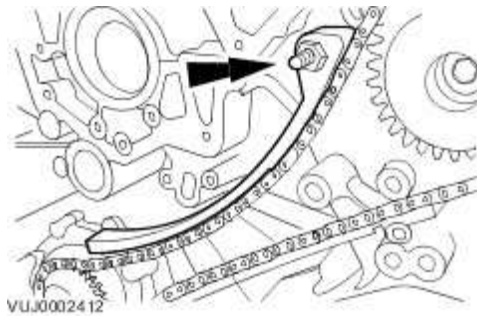
Install the primary timing chain.

- ▶ Install the primary chain over the crankshaft sprocket and the intake sprocket.



5 . Install the primary timing chain tensioner guide.

- ▶ Tighten to 12 Nm.

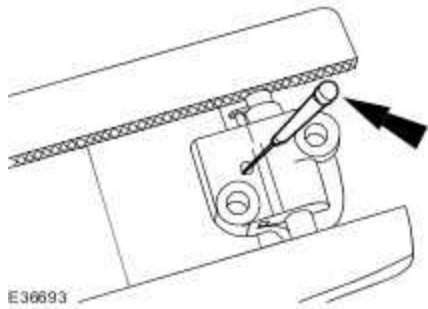


6



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the left-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



7 NOTE:

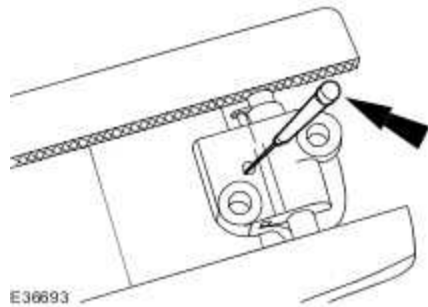
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the left-hand timing chain tensioner.

8 NOTE:

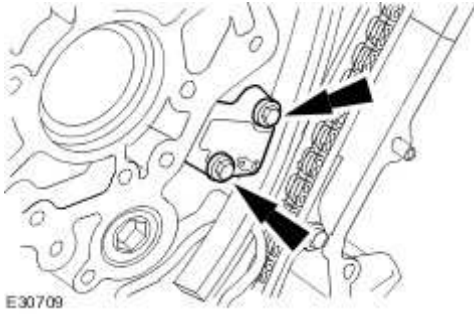
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the left-hand timing chain tensioner piston.



9 . Install the primary timing chain tensioner assembly.

► Tighten to 12 Nm.



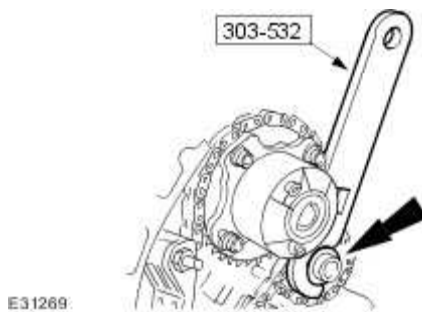
10 . Release the tension in the left-hand timing chain tensioner.


▶ Remove the retaining tool.

- 11  **CAUTION:** While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

Using the special tool, apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

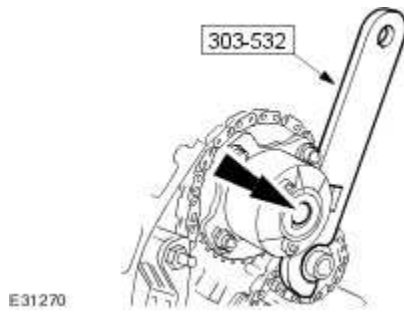
▶ Tighten to 120 Nm.



- 12  **CAUTION:** While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

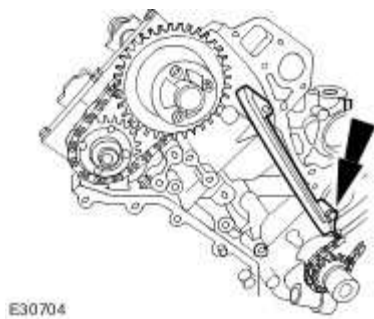
Using the special tool, apply force to the tool in an anti-clockwise direction.

► Tighten to 120 Nm.



13 . Install the primary timing chain guide.

► Tighten to 12 Nm.



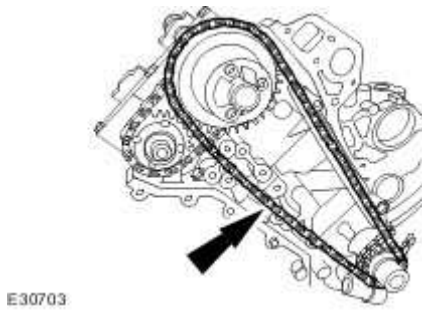
14



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

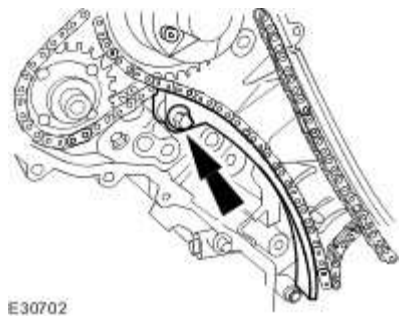
Install the primary timing chain.

► Install the primary chain over the crankshaft sprocket and the intake sprocket.



15 . Install the primary timing chain tensioner guide.

► Tighten to 12 Nm.

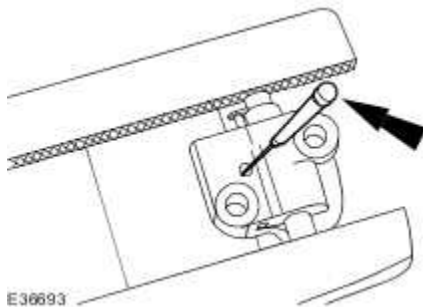


16



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the right-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



17 NOTE:

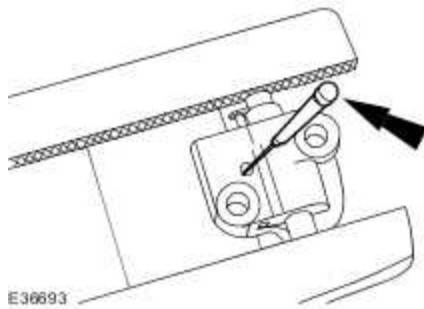
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the right-hand timing chain tensioner.

18 NOTE:

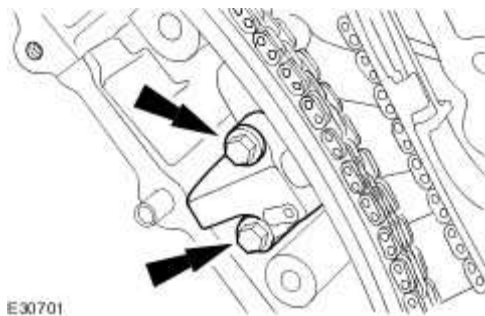
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the right-hand timing chain tensioner piston.



19 . Install the primary timing chain tensioner assembly.

► Tighten to 12 Nm.



20 . Release the tension in the right-hand timing chain tensioner.

► Remove the retaining tool.

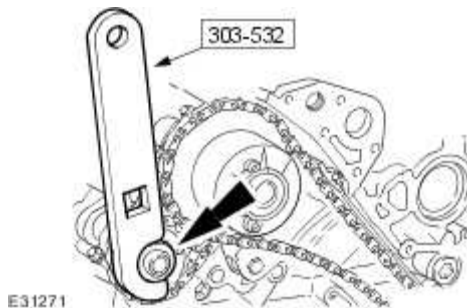
21



CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

Using the special tool, apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

► Tighten to 120 Nm.



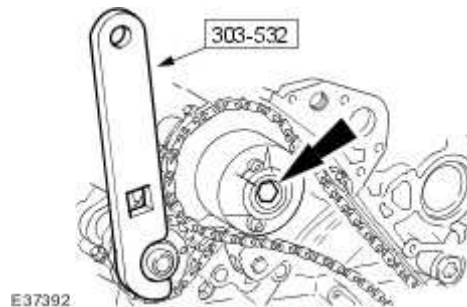
22



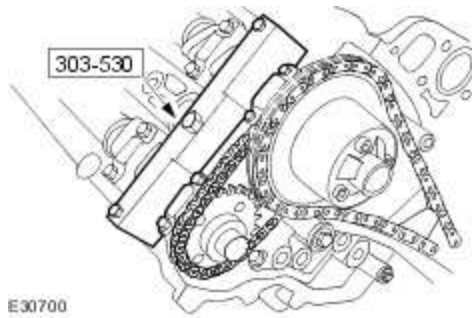
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

Using the special tool, apply force to the tool in an anti-clockwise direction.

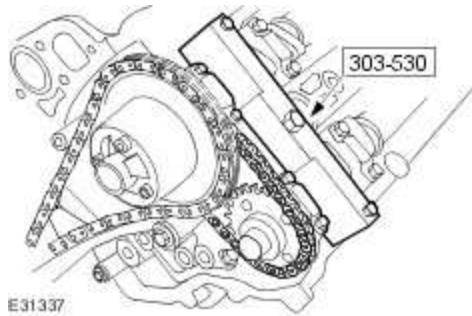
► Tighten to 120 Nm.



23 . Remove the special tool from the right-hand cylinder head.



24 . Remove the special tool from the left-hand cylinder head.

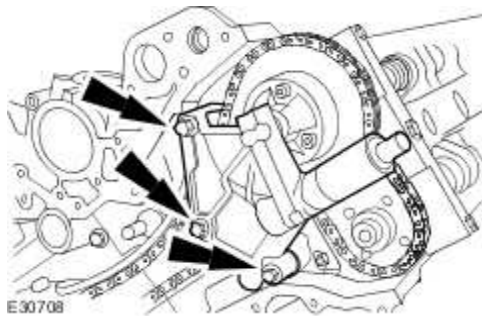


Vehicles without supercharger

25 . Install the left-hand variable camshaft timing oil control unit housing.

▶ Install new O-ring seals.

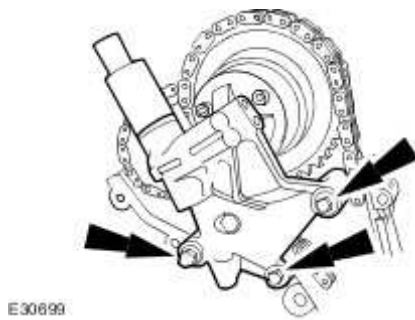
▶ Tighten to 22 Nm.



26 . Install the right-hand variable camshaft timing oil control unit housing.

▶ Install new O-ring seals.

► Tighten to 22 Nm.

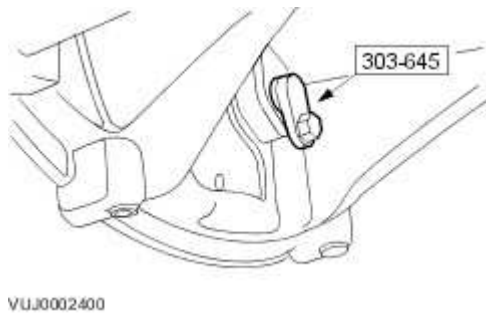


All vehicles

27 Install the engine front cover.

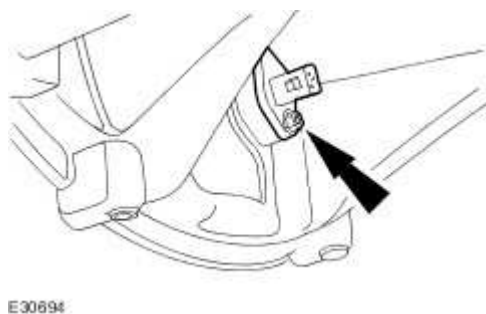
. For additional information, refer to Engine Front Cover - VIN Range: G00442->G45703 (12.65.01)

28 . Remove the special tool.

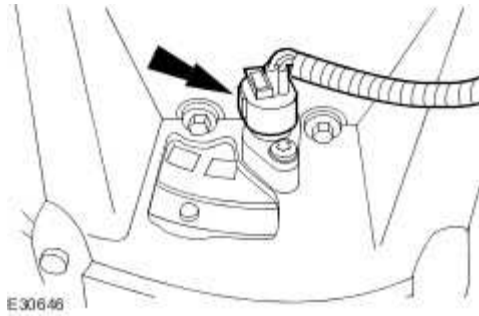


29 . Install the CKP sensor.

► Tighten to 10 Nm.



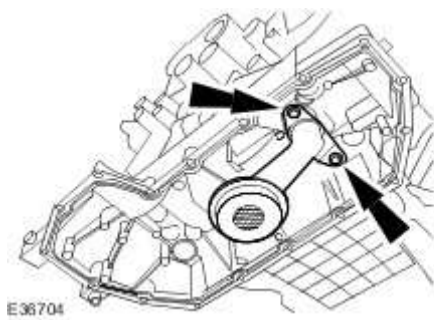
30 . Connect the CKP sensor electrical connector.



31 . Install the oil strainer.

▶ Install new O-ring seals.

▶ Tighten to 12 Nm.

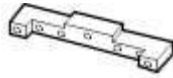


32 . Install the oil pan.

For additional information, refer to Oil Pan (12.60.44)

Oil Pump - VIN Range: G45704->G99999 (12.60.26)

Special Service Tools



303-530

Camshaft setting

303-530



303-532

Timing chain tensioning tool

303-532



303-645

Crankshaft setting, main tool

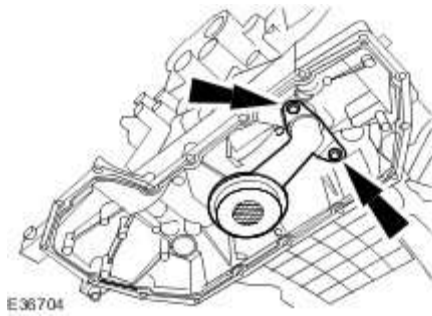
303-645

Removal

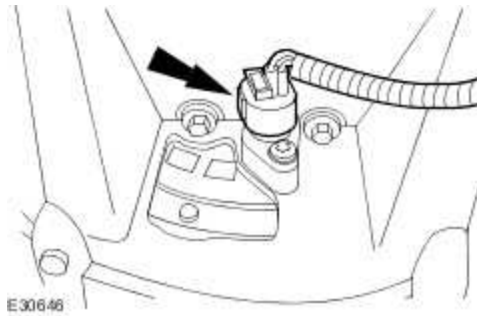
- 1 . Remove the oil pan.
For additional information, refer to Oil Pan (12.60.44)

- 2 . Remove the oil strainer.

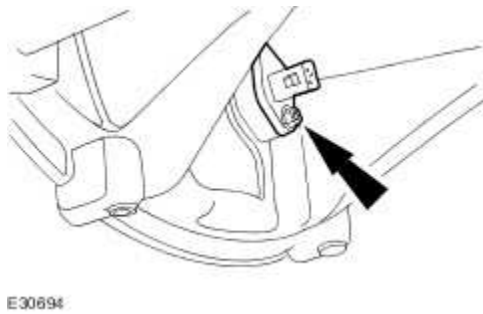
 Remove and discard the O-ring seal.



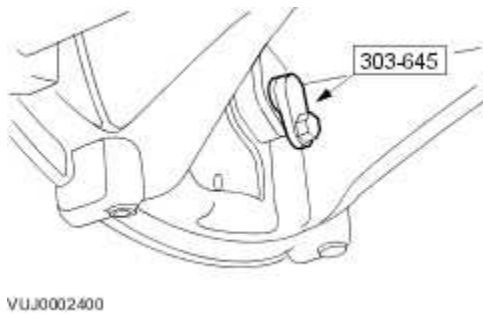
3 . Disconnect the crankshaft position (CKP) sensor electrical connector.



4 . Remove the CKP sensor.



5 . Install the special tool.

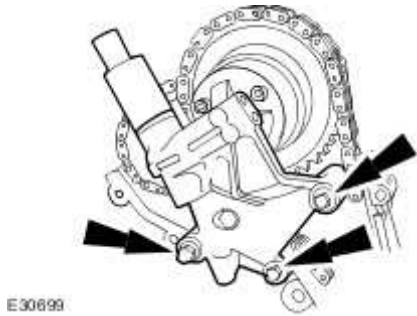


6 Remove the engine front cover.

- For additional information, refer to Engine Front Cover - VIN Range: G45704->G99999 (12.65.01)

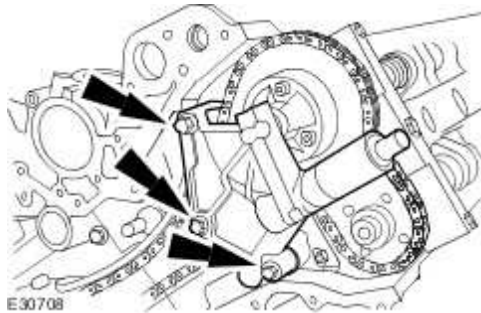
7 . Remove the right-hand variable camshaft timing oil control unit housing.

- Remove and discard the O-ring seals.

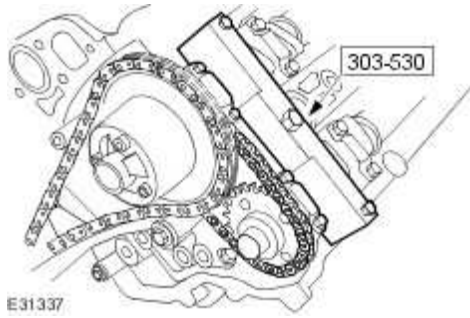


8 . Remove the left-hand variable camshaft timing oil control unit housing.

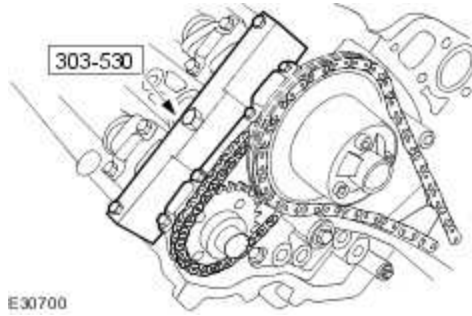
- Remove and discard the O-ring seals.



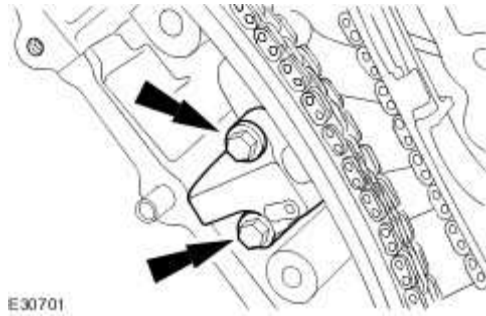
9 . Install the special tool to the left-hand cylinder head.



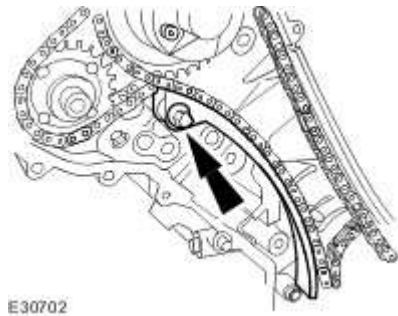
10 . Install the special tool to the right-hand cylinder head.



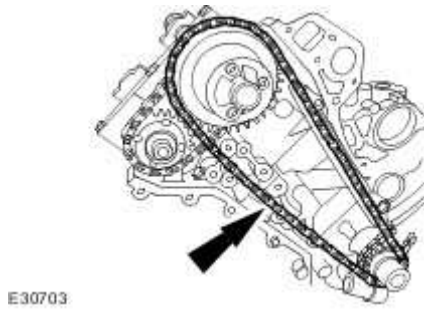
11 . Remove the primary timing chain tensioner assembly.



12 . Remove the primary timing chain tensioner guide.



13 . Remove the primary timing chain.

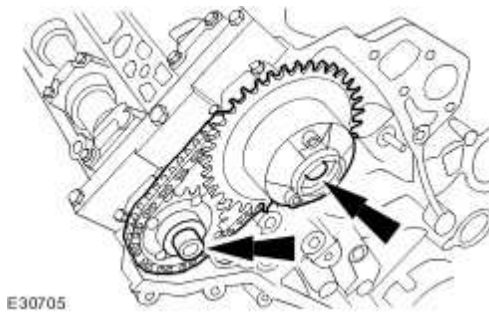


14

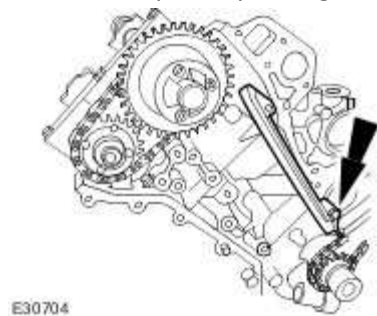


CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

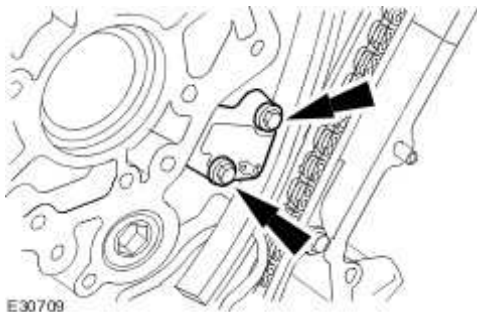
Loosen the camshaft sprockets.



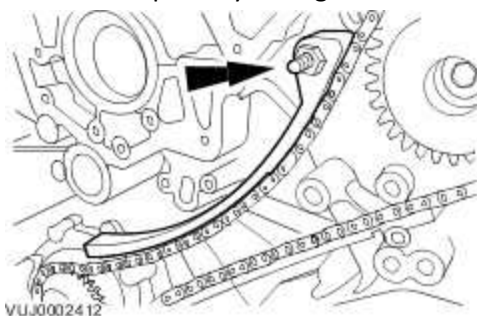
15 . Remove the primary timing chain guide.



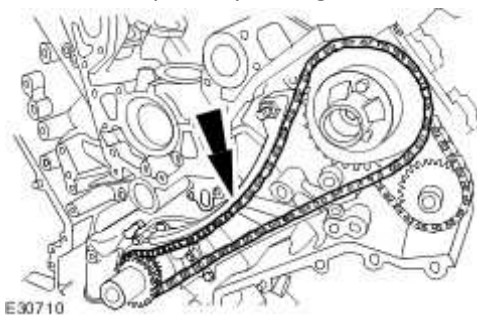
16 . Remove the primary timing chain tensioner assembly.



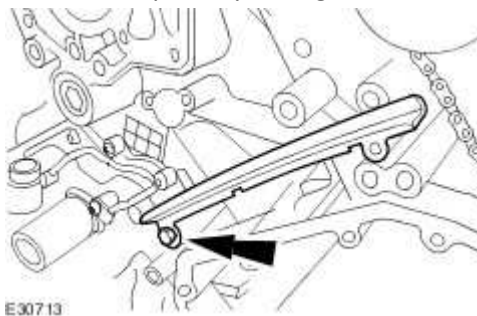
17 . Remove the primary timing chain tensioner guide.



18 . Remove the primary timing chain.



19 . Remove the primary timing chain tensioner guide.

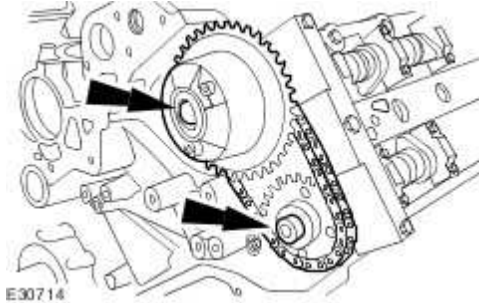


20



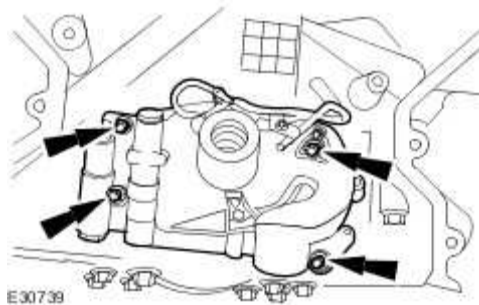
CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

Loosen the camshaft sprockets.



21 . Remove the oil pump.

▶ Remove and discard the gasket.

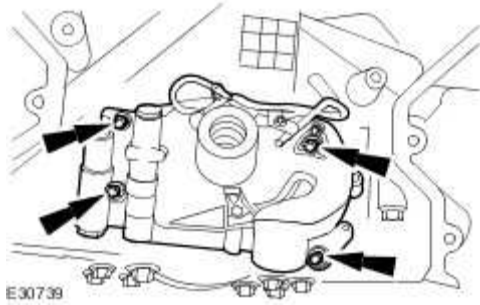


Installation


1 . Install the oil pump.

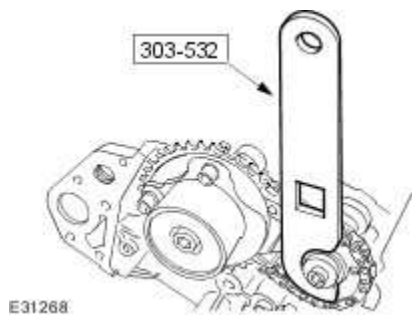
▶ Install a new gasket.

▶ Tighten to 12 Nm.




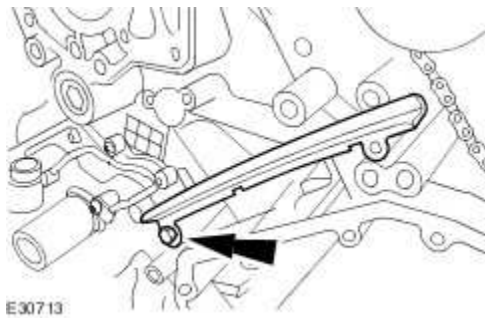
2 Install the special tool to the exhaust camshaft sprocket.

-  Reposition the camshaft sprockets for the most advantageous position for use of the tool.



3 . Install the primary timing chain tensioner guide.

-  Tighten to 12 Nm.



4

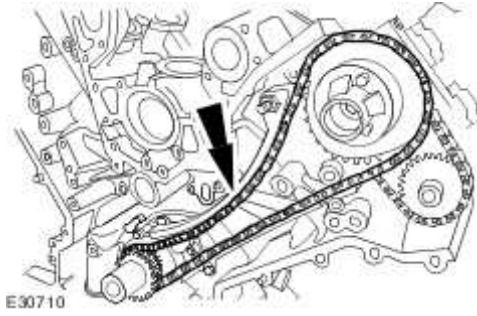


- **CAUTION:** Make sure the timing chain slack is on the tensioned side of the timing

chain.

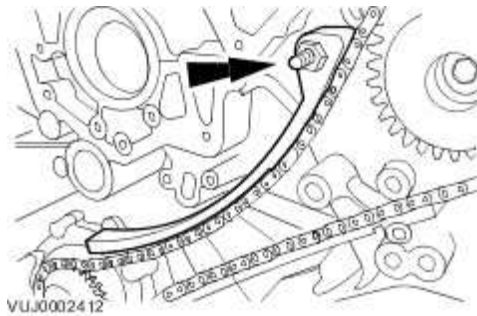
Install the primary timing chain.

- ▶ Install the primary chain over the crankshaft sprocket and the intake sprocket.



5 . Install the primary timing chain tensioner guide.

- ▶ Tighten to 12 Nm.

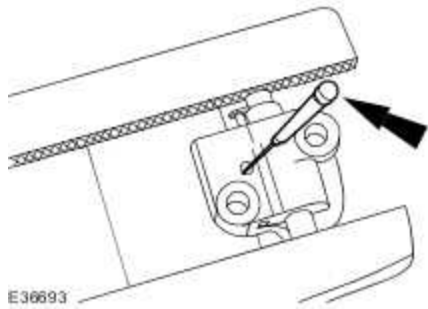


6



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the left-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



7 NOTE:

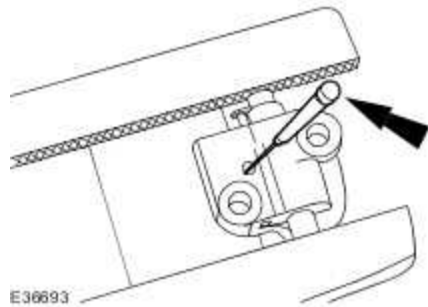
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the left-hand timing chain tensioner.

8 NOTE:

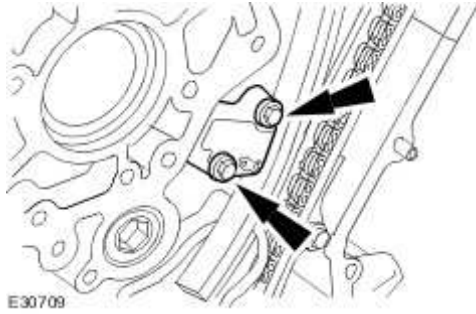
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the left-hand timing chain tensioner piston.




9 . Install the primary timing chain tensioner assembly.

▶ Tighten to 12 Nm.



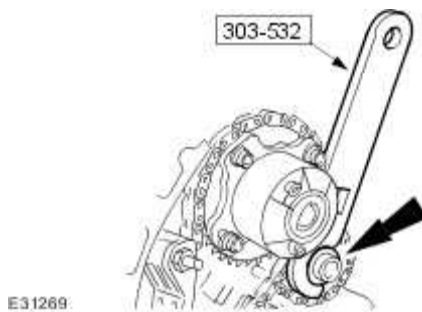
10 . Release the tension in the left-hand timing chain tensioner.


► Remove the retaining tool.

- 11  **CAUTION:** While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

Using the special tool, apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

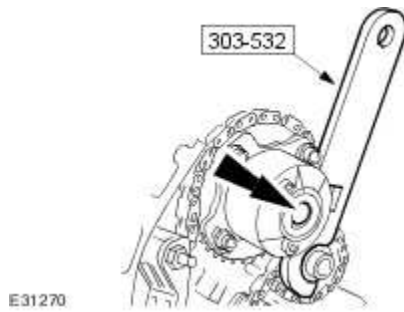
► Tighten to 120 Nm.



- 12  **CAUTION:** While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

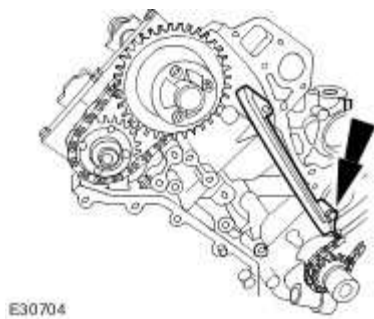
Using the special tool, apply force to the tool in an anti-clockwise direction.

► Tighten to 120 Nm.



13 . Install the primary timing chain guide.

► Tighten to 12 Nm.



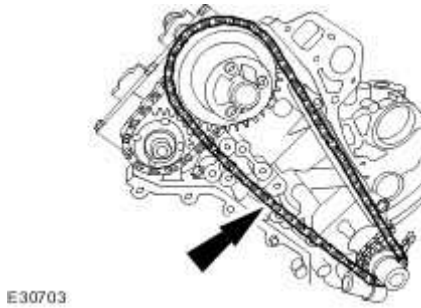
14



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

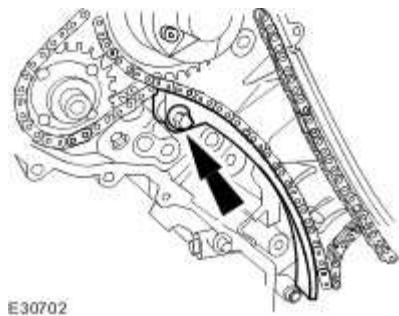
Install the primary timing chain.

► Install the primary chain over the crankshaft sprocket and the intake sprocket.



15 . Install the primary timing chain tensioner guide.

► Tighten to 12 Nm.

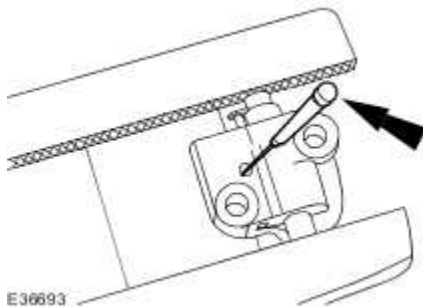


16



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the right-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



17 NOTE:

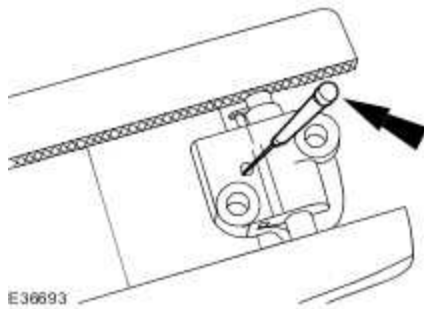
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the right-hand timing chain tensioner.

18 NOTE:

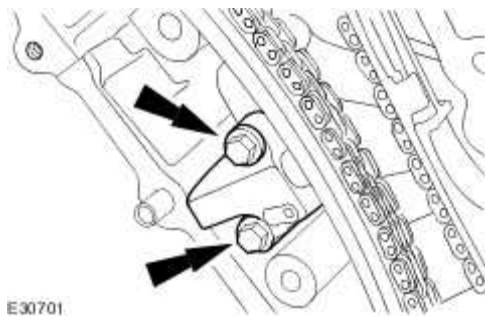
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the right-hand timing chain tensioner piston.



19 . Install the primary timing chain tensioner assembly.

► Tighten to 12 Nm.



20 . Release the tension in the right-hand timing chain tensioner.

► Remove the retaining tool.

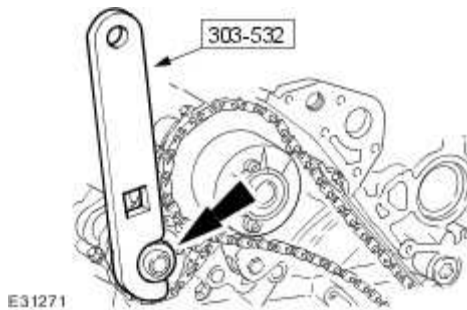
21



CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

Using the special tool, apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

▶ Tighten to 120 Nm.



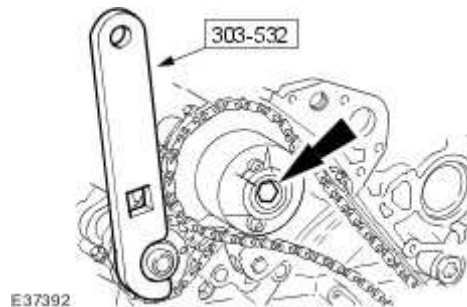
22



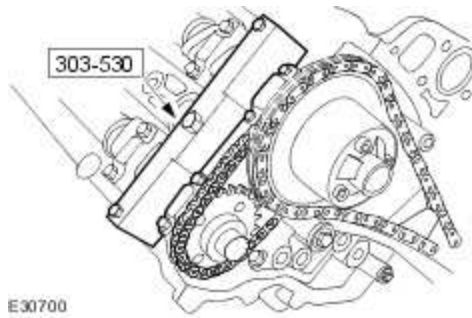
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

Using the special tool, apply force to the tool in an anti-clockwise direction.

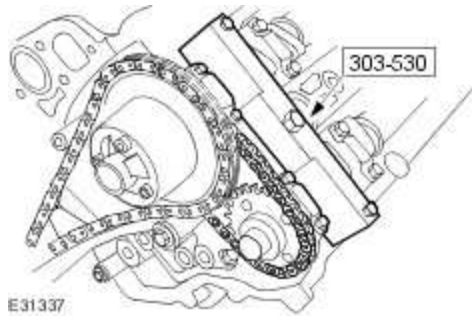
▶ Tighten to 120 Nm.



23 . Remove the special tool to the right-hand cylinder head.



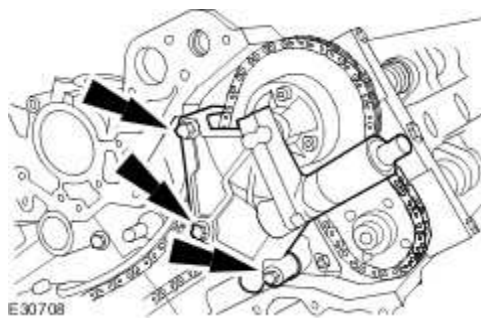
24 . Remove the special tool to the left-hand cylinder head.



25 . Install the left-hand variable camshaft timing oil control unit housing.

▶ Install new O-ring seals.

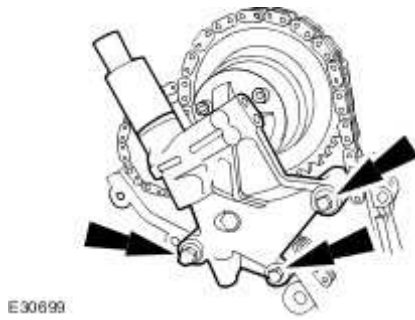
▶ Tighten to 22 Nm.



26 . Install the right-hand variable camshaft timing oil control unit housing.

▶ Install new O-ring seals.

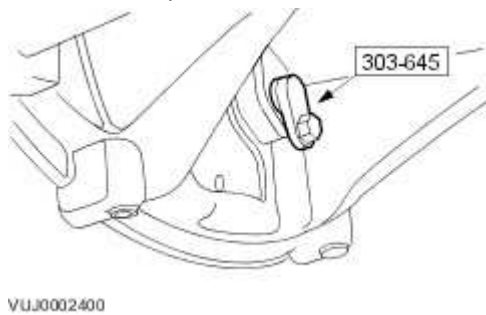
▶ Tighten to 22 Nm.



27 Install the engine front cover.

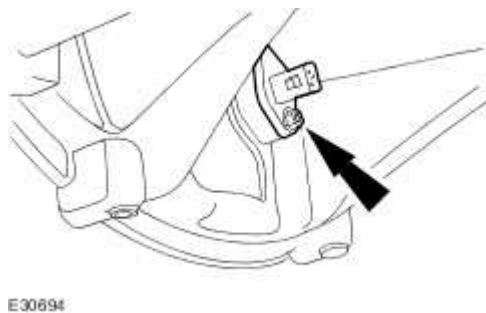
- For additional information, refer to Engine Front Cover - VIN Range: G45704->G99999 (12.65.01)

28 . Remove the special tool.

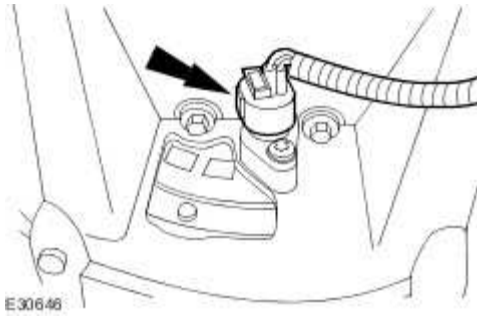


29 . Install the CKP sensor.

▶ Tighten to 10 Nm.



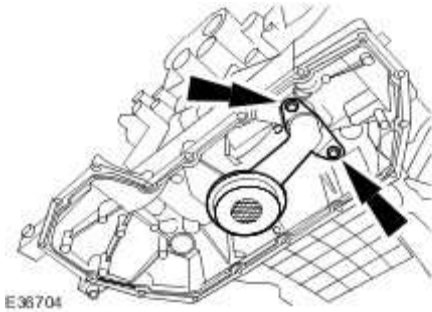
30 . Connect the CKP sensor electrical connector.



31 . Install the oil strainer.

▶ Install new O-ring seals.

▶ Tighten to 12 Nm.



32 . Install the oil pan.

For additional information, refer to Oil Pan (12.60.44)

Secondary Timing Chain Tensioner

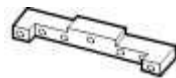
Special Service Tools

303-1077A



12mm Ribe bit socket

303-1077A



Camshaft setting tool

303-530



Timing chain tensioning tool

303-532



Crankshaft setting, main tool

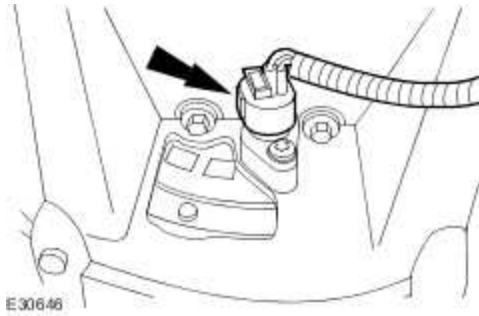
303-645

Removal

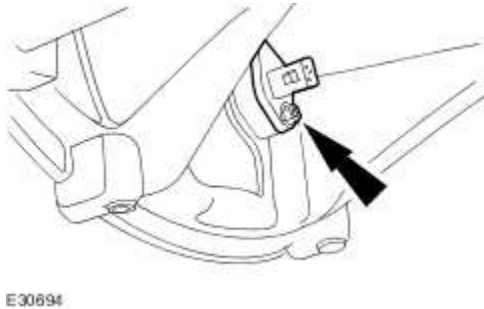
- 1 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

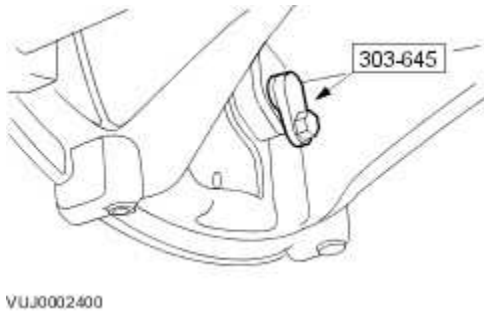
- 2 . Disconnect the crankshaft position (CKP) sensor electrical connector.



3 . Remove the CKP sensor.



4 . Install the special tool.



5 . Remove the valve cover.

For additional information, refer to Valve Cover LH - VIN Range: G00442->G45703 (12.29.43)

For additional information, refer to Valve Cover LH - VIN Range: G45704->G99999 (12.29.43)

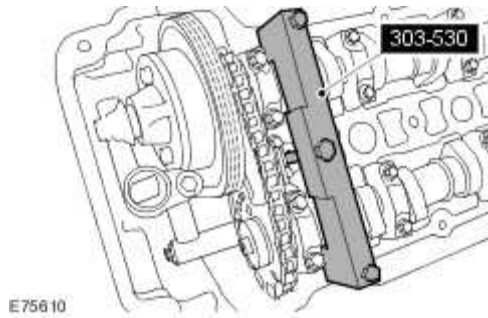
For additional information, refer to Valve Cover RH - VIN Range: G00442->G45703 (12.29.44)

For additional information, refer to Valve Cover RH - VIN Range: G45704->G99999 (12.29.44)

6 . **NOTE:**

Left-hand shown, right-hand similar.

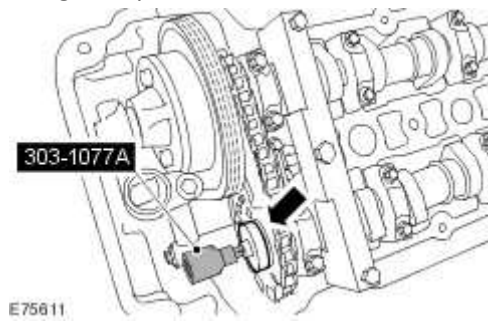
Install the special tool to the left-hand cylinder head.



7 . NOTE:

Left-hand shown, right-hand similar.

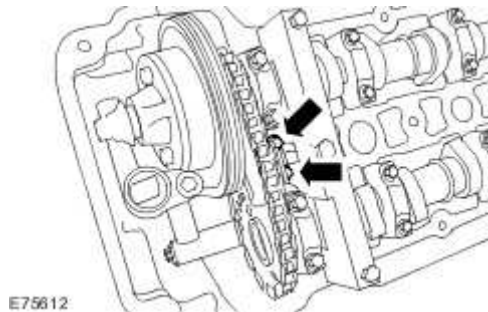
Using the special tool, remove the exhaust camshaft sprocket retaining bolt.



8 . NOTE:

Left-hand shown, right-hand similar.

Remove the secondary timing chain tensioner retaining bolts.

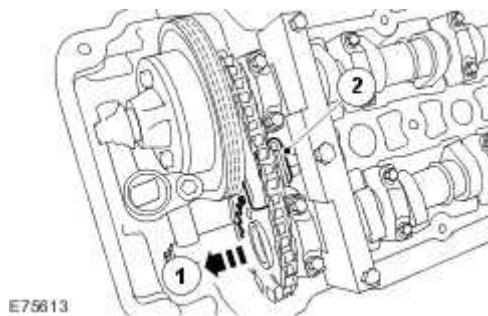


9 . NOTE:

Left-hand shown, right-hand similar.

Remove the secondary timing chain tensioner.

- 1) Reposition the exhaust camshaft sprocket and secondary timing chain.
- 2) Remove the secondary timing chain tensioner.



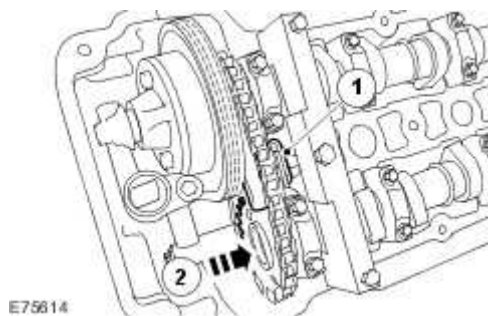
Installation

1 . NOTE:

Left-hand shown, right-hand similar.

Install the secondary timing chain tensioner.

- 1) Install the secondary timing chain tensioner.
- 2) Reposition the exhaust camshaft sprocket and secondary timing chain.

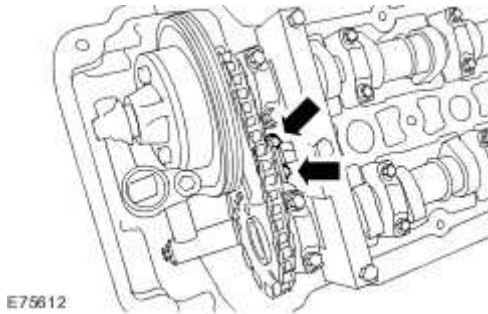


2 . **NOTE:**

Left-hand shown, right-hand similar.

Install the secondary timing chain tensioner retaining bolts.

▶ Tighten to 12 Nm.



3 . Release the tension in the secondary timing chain tensioner.

▶ Remove the retaining tool.

4 .



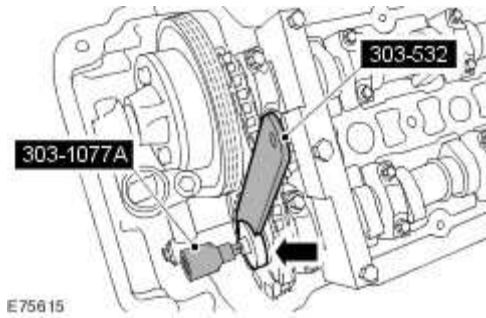
CAUTION: Make sure that a new bolt is installed.

NOTE:

Left-hand shown, right-hand similar.

Using the special tools, install the exhaust camshaft sprocket retaining bolt.

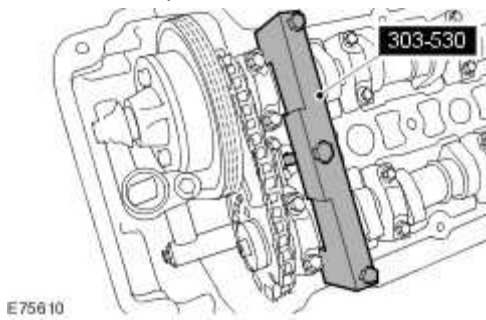
▶ Tighten to 20 Nm + 90 deg.



5 . NOTE:

Left-hand shown, right-hand similar.

Remove the special tool.



6 . Install the valve cover.

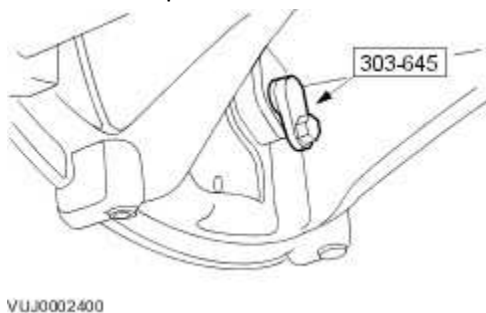
For additional information, refer to Valve Cover LH - VIN Range: G00442->G45703 (12.29.43)

For additional information, refer to Valve Cover LH - VIN Range: G45704->G99999 (12.29.43)

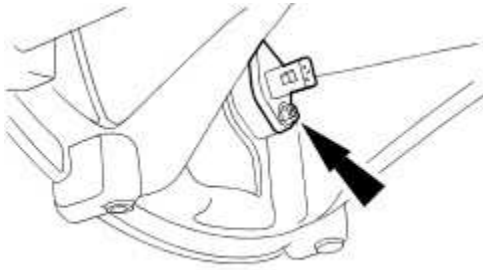
For additional information, refer to Valve Cover RH - VIN Range: G00442->G45703 (12.29.44)

For additional information, refer to Valve Cover RH - VIN Range: G45704->G99999 (12.29.44)

7 . Remove the special tool.

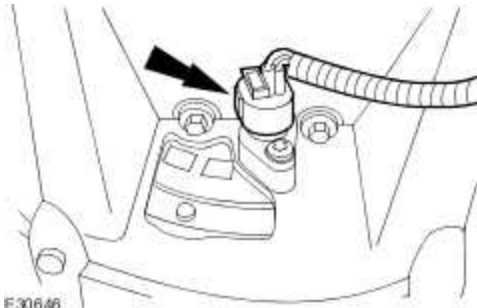


8 . Install the CKP sensor.



E30694

9 . Connect the crankshaft position (CKP) sensor electrical connector.



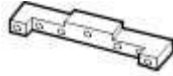
E30646

10 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

Timing Drive Components - VIN Range: G00442->G45703 (12.65.13)

Special Service Tools



303-530

Camshaft setting tool

303-530



303-532

Timing chain tensioning tool

303-532



303-645

Crankshaft setting tool

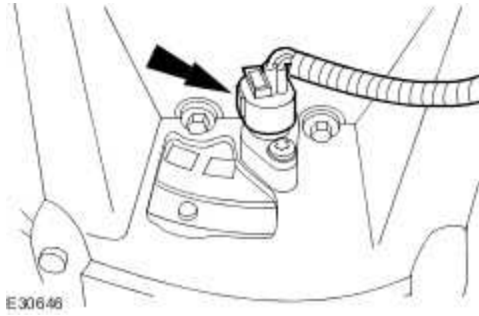
303-645

Removal

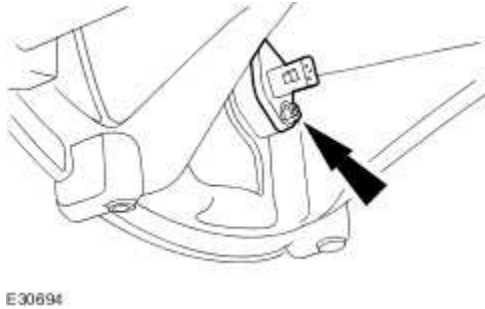
All vehicles

- 1 Remove the engine front cover.
 - . For additional information, refer to Engine Front Cover - VIN Range: G00442->G45703 (12.65.01)
- 2 . Remove the spark plugs.
- 3 . Remove the air deflector.
 - For additional information, refer to Air Deflector (76.11.41)

4 . Disconnect the crankshaft position sensor electrical connector.



5 . Remove the crankshaft position sensor.



6



· **CAUTION:** Make sure the spark plugs are removed to enable the engine to rotate freely.

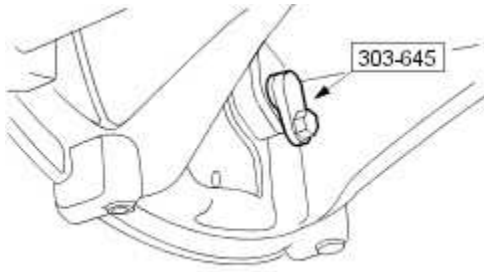


CAUTION: Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.



CAUTION: Rotate the crankshaft clockwise to position the engine to top dead center (TDC) No. 1 cylinder

Install the special tool 303-645.



VUJ0002400

Vehicles without supercharger

7 . Remove the right-hand variable camshaft timing oil control unit housing.

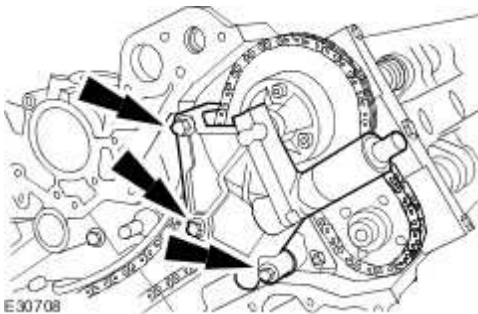
▶ Remove and discard the O-ring seals.



E30699

8 . Remove the left-hand variable camshaft timing oil control unit housing.

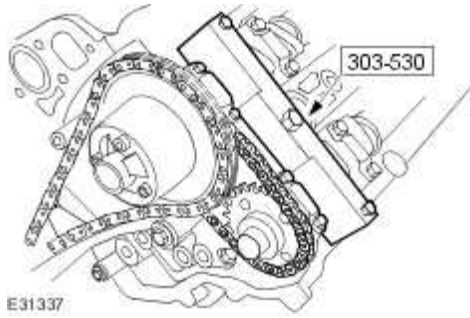
▶ Remove and discard the O-ring seals.



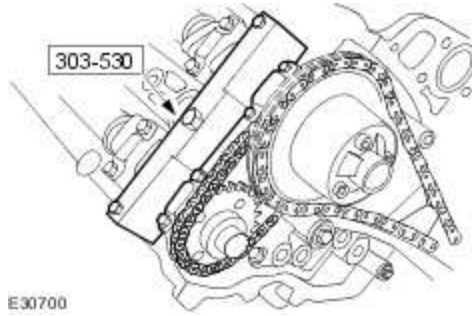
E30708

All vehicles

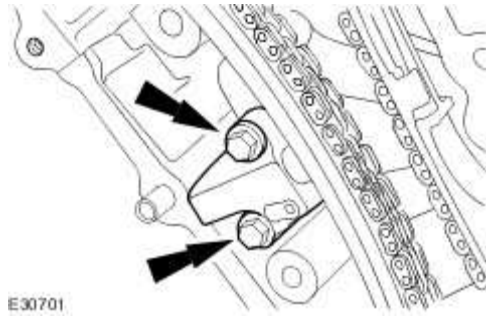
9 . Install the special tool to the left-hand cylinder head.



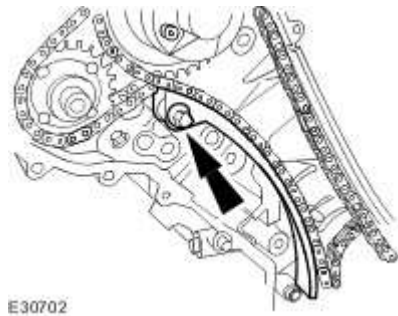
10 . Install the special tool to the right-hand cylinder head.



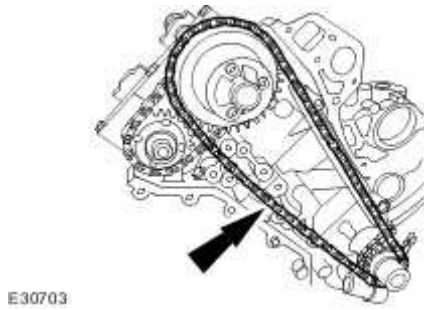
11 . Remove the primary timing chain tensioner assembly.



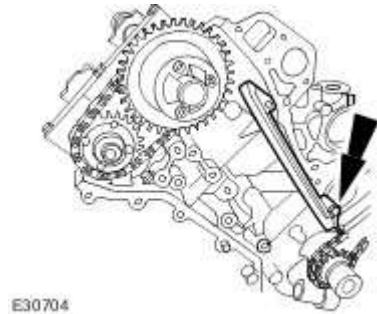
12 . Remove the primary timing chain tensioner guide.



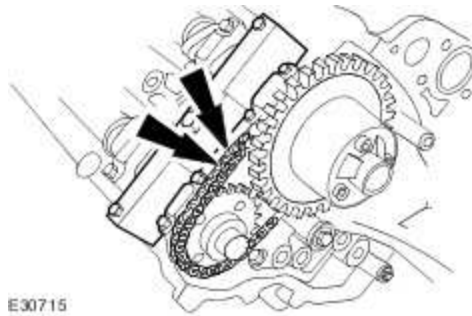
13 . Remove the primary timing chain.



14 . Remove the primary timing chain guide.

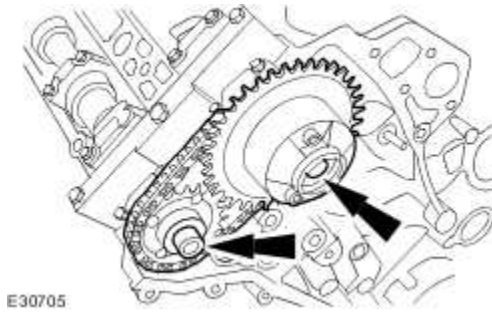


15 . Remove the secondary timing chain tensioner retaining bolts.

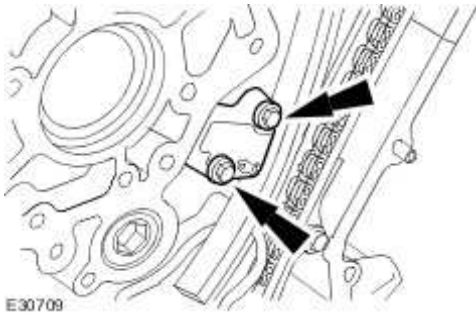


16 Remove the camshaft sprockets.

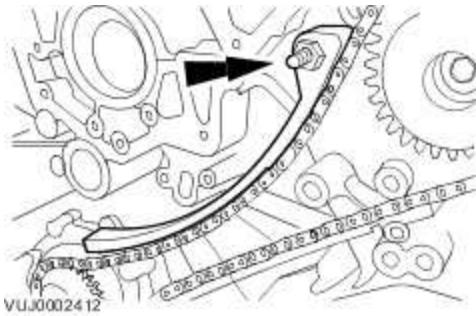
- ▶ Remove the secondary timing chain tensioner and secondary timing chain from the camshaft sprockets.



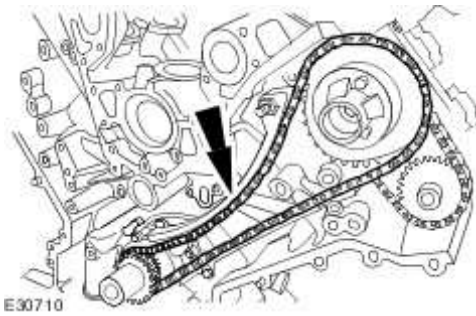
17 . Remove the primary timing chain tensioner assembly.



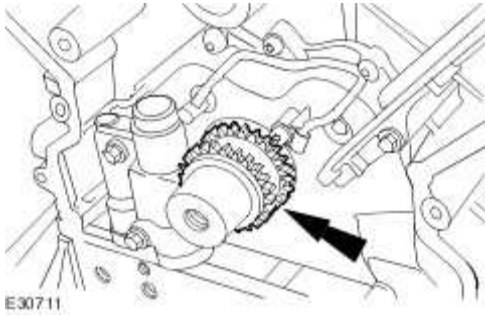
18 . Remove the primary timing chain tensioner guide.



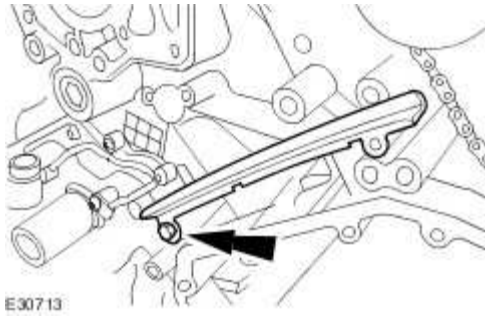
19 . Remove the primary timing chain.



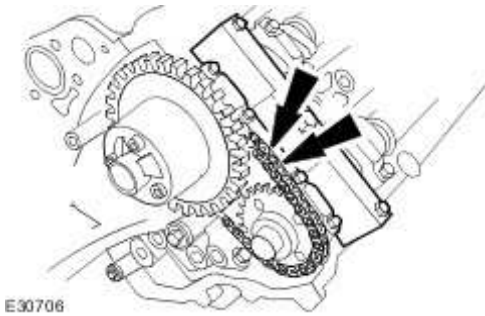
20 . Remove the crankshaft sprocket.



21 . Remove the primary timing chain tensioner guide.

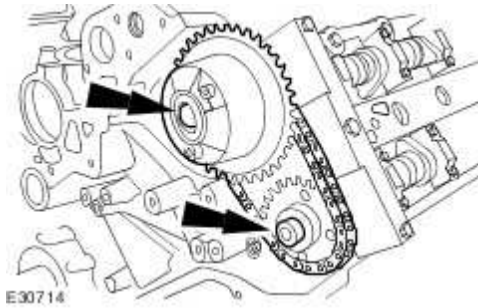


22 . Remove the secondary timing chain tensioner retaining bolts.



23 Remove the camshaft sprockets.

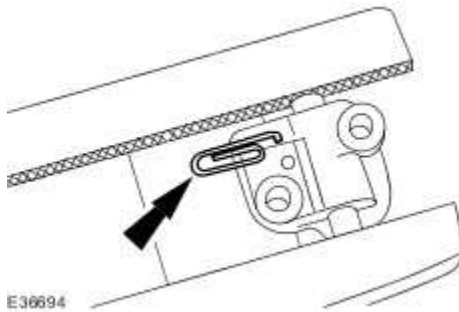
- ▶ Remove the secondary timing chain tensioner and secondary timing chain from the camshaft sprockets.



Installation

All vehicles

- 1 . Using a suitable tool, retain the left-hand timing chain tensioner piston.



2



CAUTION: Do not tighten the camshaft sprocket retaining bolts.

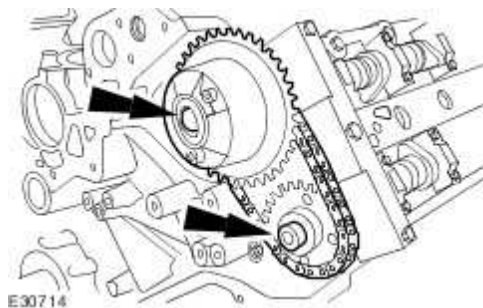


CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

Install the camshaft sprockets.

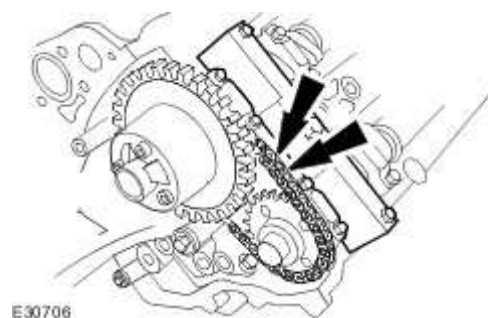


Install the secondary timing chain tensioner and secondary timing chain to the camshaft sprockets.



3 . Install the secondary timing chain tensioner retaining bolts.

► Tighten to 12 Nm.

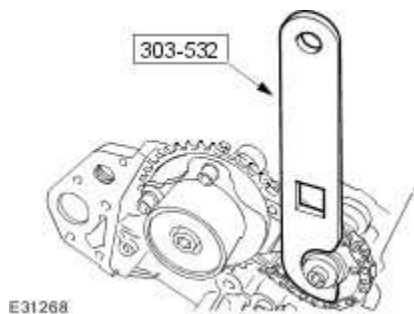


4 . Release the tension in the left-hand timing chain tensioner.

► Remove the retaining tool.

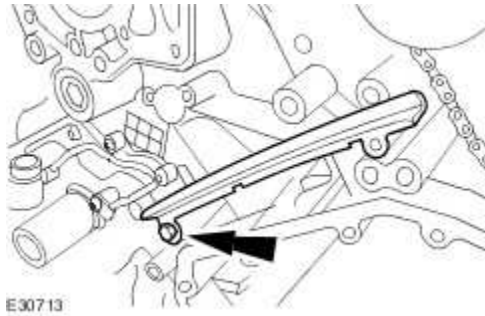
5 Install the timing chain tensioning tool 303-532 to the exhaust camshaft sprocket.

► Reposition the camshaft sprockets for the most advantageous position for use of the tool.

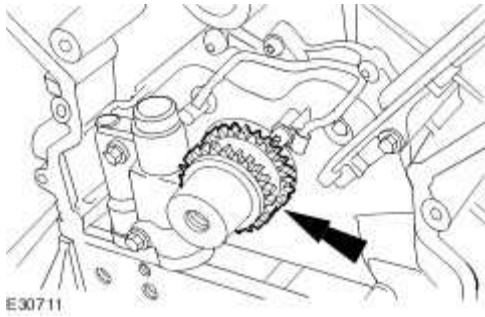


6 . Install the primary timing chain tensioner guide.

▶ Tighten to 12 Nm.



7 . Install the crankshaft sprocket.



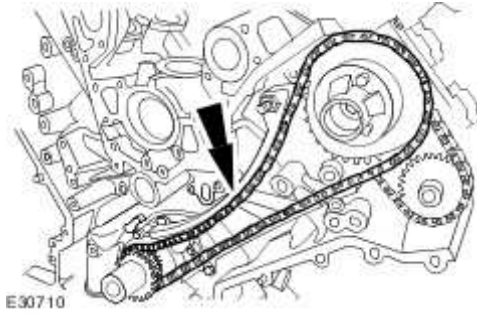
8



· **CAUTION:** Make sure the timing chain slack is on the tensioned side of the timing chain.

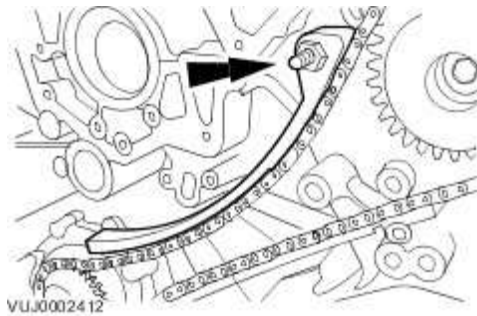
Install the primary timing chain.

▶ Install the primary chain over the crankshaft sprocket and the intake sprocket.



9 . Install the primary timing chain tensioner guide.

► Tighten to 12 Nm.

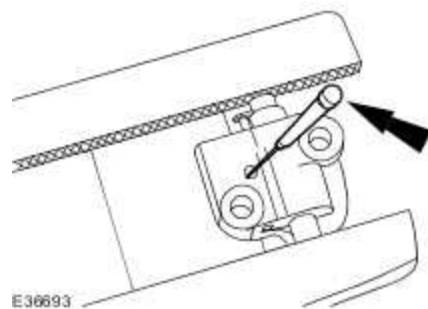


10



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the left-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



11 NOTE:

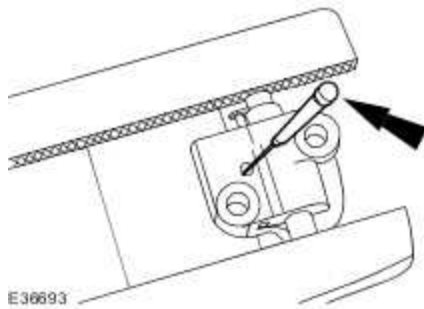
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the left-hand timing chain tensioner.

12 NOTE:

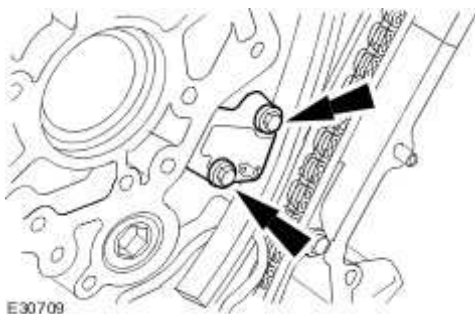
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the left-hand timing chain tensioner piston.



13 . Install the primary timing chain tensioner assembly.

► Tighten to 12 Nm.



14 . Release the tension in the left-hand timing chain tensioner.

► Remove the retaining tool.

15



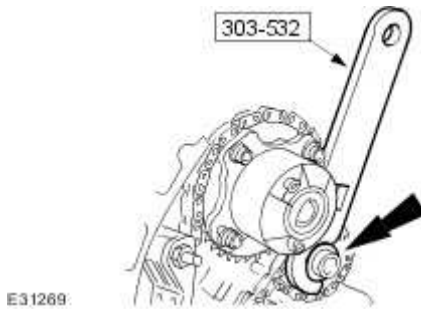
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

► Tighten to 20 Nm + 90 deg.



16



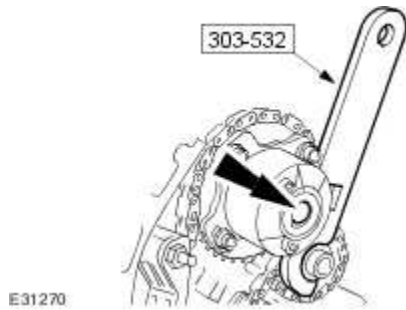
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



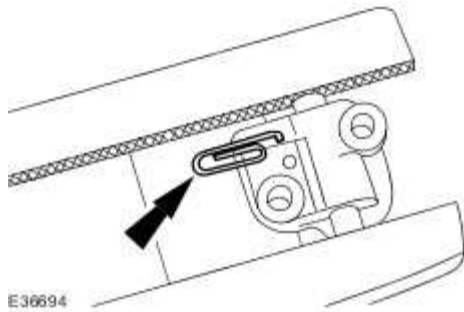
CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction.

► Tighten to 20 Nm + 90 deg.



17 . Using a suitable tool, retain the right-hand timing chain tensioner piston.



18



CAUTION: Do not tighten the camshaft sprocket retaining bolts.

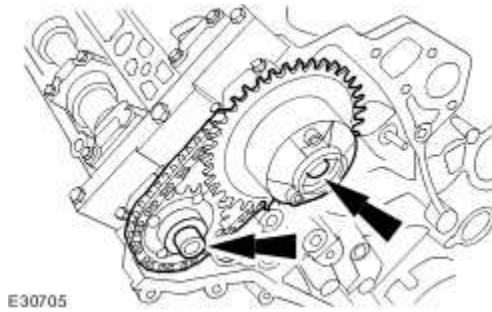


CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

Install the camshaft sprockets.

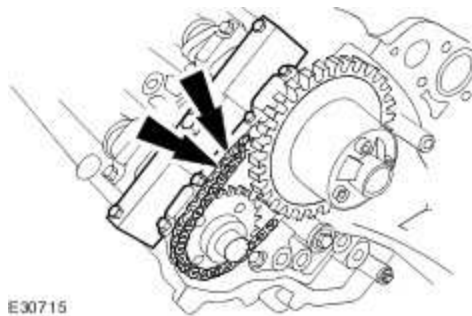


Install the secondary timing chain tensioner and secondary timing chain to the camshaft sprockets.



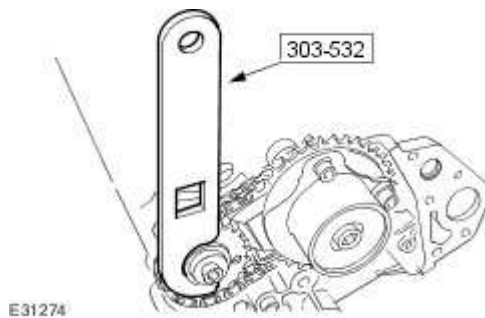
19 . Install the secondary timing chain tensioner retaining bolts.

► Tighten to 12 Nm.



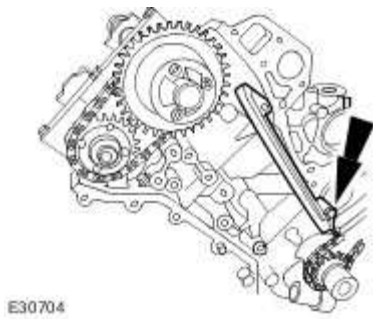
20 Install the timing chain tensioning tool 303-532 to the exhaust camshaft sprocket.

► Reposition the camshaft sprockets for the most advantageous position for use of the tool.



21 . Install the primary timing chain guide.

► Tighten to 12 Nm.



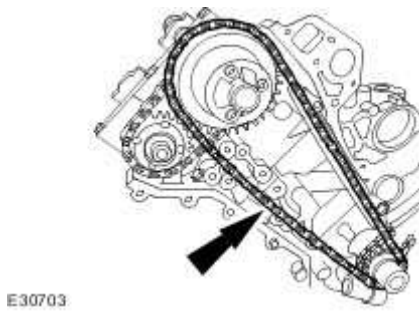
22



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

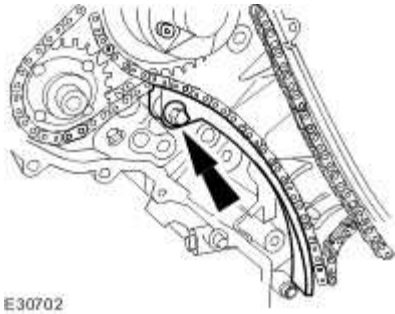
Install the primary timing chain.

- ▶ Install the primary chain over the crankshaft sprocket and the intake sprocket.



23 . Install the primary timing chain tensioner guide.

- ▶ Tighten to 12 Nm.

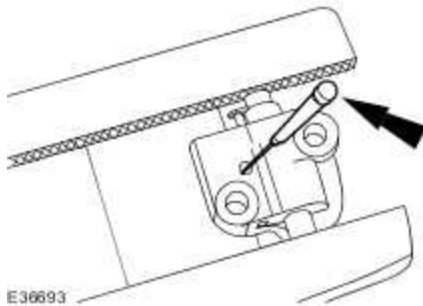


24



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the right-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



25 **NOTE:**

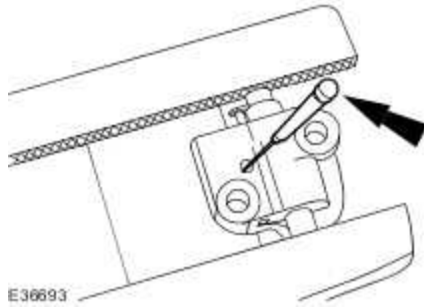
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the right-hand timing chain tensioner.

26 **NOTE:**

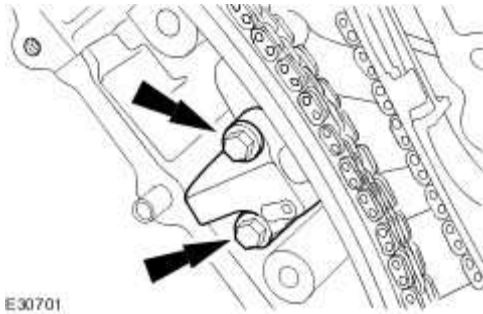
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the right-hand timing chain tensioner piston.



27 . Install the primary timing chain tensioner assembly.

▶ Tighten to 12 Nm.



28 . Release the tension in the right-hand timing chain tensioner.

▶ Remove the retaining tool.

29



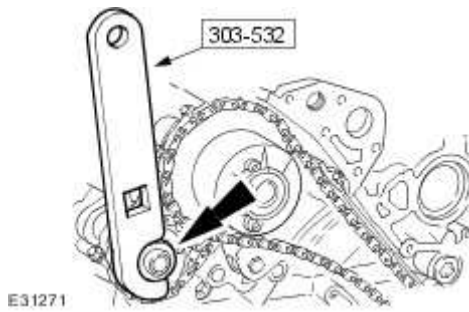
· **CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.**



CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

► Tighten to 20 Nm + 90 deg.



30



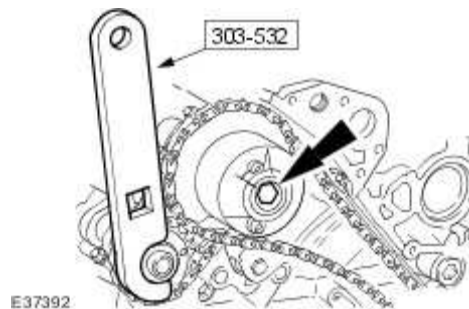
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



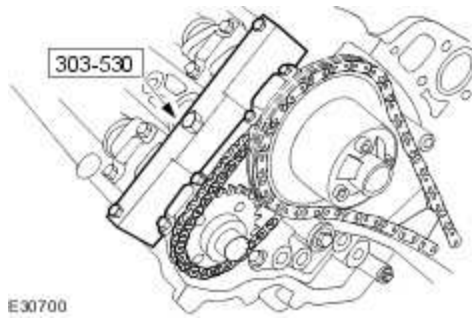
CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction.

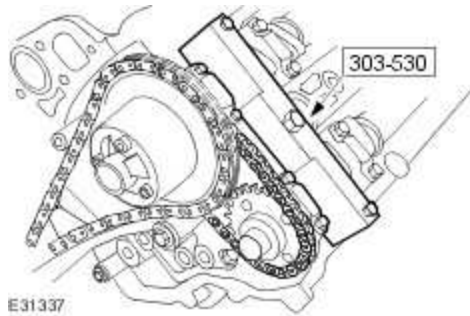
► Tighten to 20 Nm + 90 deg.



31 . Remove the special tool from the right-hand cylinder head.



32 . Remove the special tool from the left-hand cylinder head.

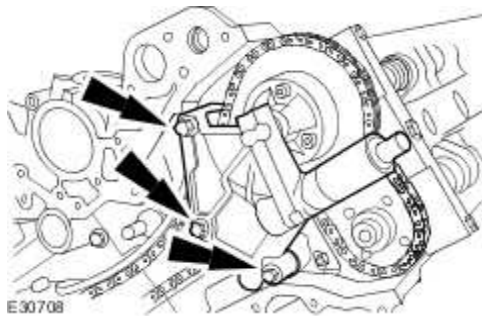


Vehicles without supercharger

33 . Install the left-hand variable camshaft timing oil control unit housing.

▶ Install new O-ring seals.

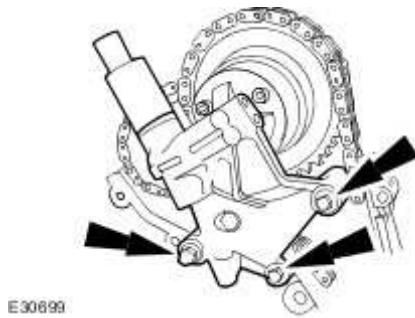
▶ Tighten to 22 Nm.



34 . Install the right-hand variable camshaft timing oil control unit housing.

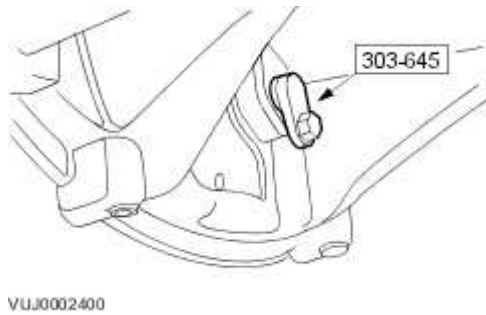
▶ Install new O-ring seals.

► Tighten to 22 Nm.



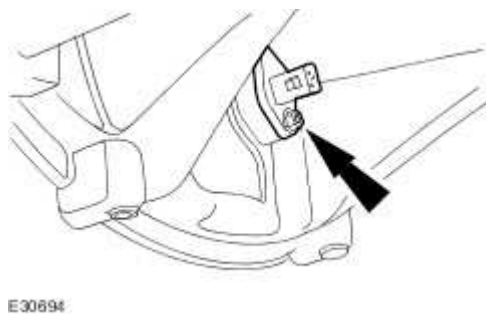
All vehicles

35 . Remove the special tool.

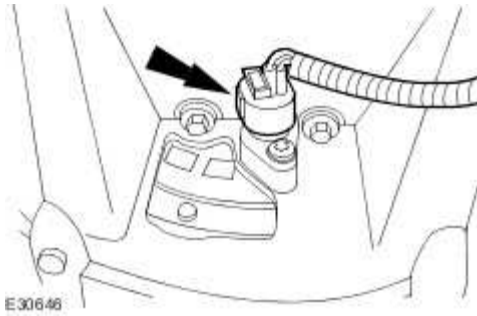


36 . Install the crankshaft position sensor.

► Tighten to 10 Nm.



37 . Connect the crankshaft position sensor electrical connector.



38 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

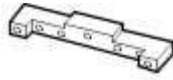
39 . Install the spark plugs.

40 Install the engine front cover.

. For additional information, refer to Engine Front Cover - VIN Range: G00442->G45703
(12.65.01)

Timing Drive Components - VIN Range: G45704->G99999 (12.65.13)

Special Service Tools



303-530

Camshaft setting tool

303-530



303-532

Timing chain tensioning tool

303-532



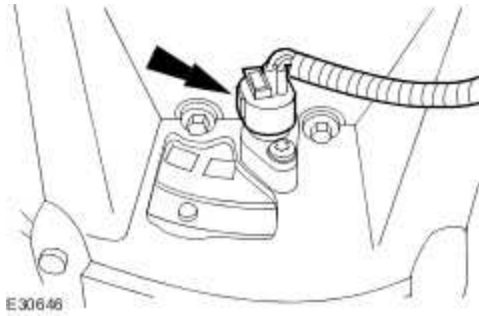
303-645

Crankshaft setting tool

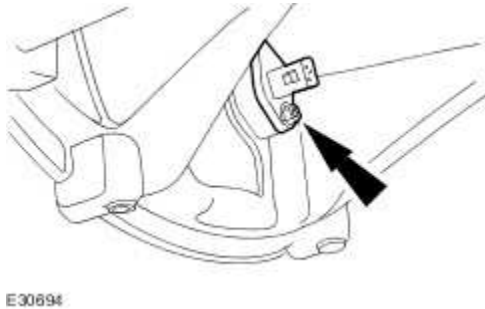
303-645

Removal

- 1 Remove the engine front cover.
 - . For additional information, refer to Engine Front Cover - VIN Range: G45704->G99999 (12.65.01)
- 2 . Remove the spark plugs.
- 3 . Raise the vehicle.
- 4 . Disconnect the crankshaft position (CKP) sensor electrical connector.




5 . Remove the CKP sensor.

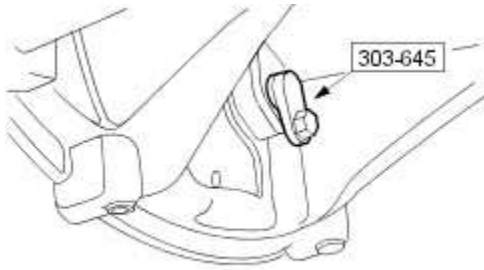


6  **CAUTION:** Make sure the spark plugs are removed to enable the engine to rotate freely.

 **CAUTION:** Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.

 **CAUTION:** Rotate the crankshaft clockwise to position the engine to top dead center (TDC) No. 1 cylinder

Install the special tool 303-645.

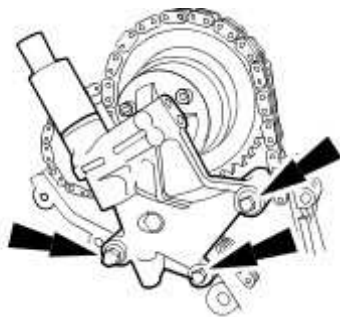


VUJ0002400

7 . Lower the vehicle.

8 . Remove the right-hand variable camshaft timing oil control unit housing.

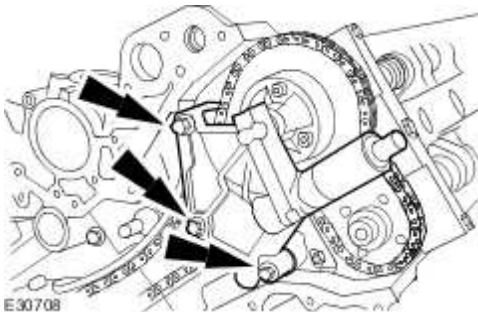
▶ Remove and discard the O-ring seals.



E30699

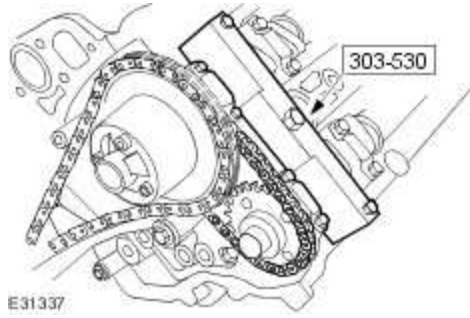
9 . Remove the left-hand variable camshaft timing oil control unit housing.

▶ Remove and discard the O-ring seals.

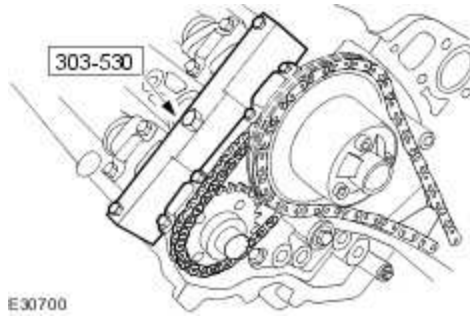


E30708

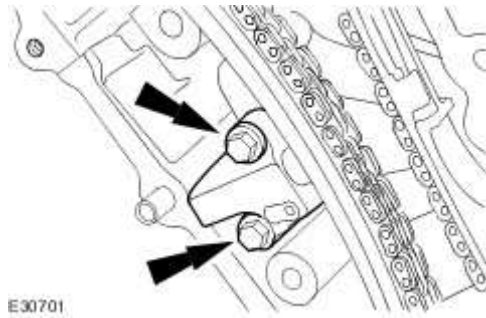
10 . Install the special tool to the left-hand cylinder head.



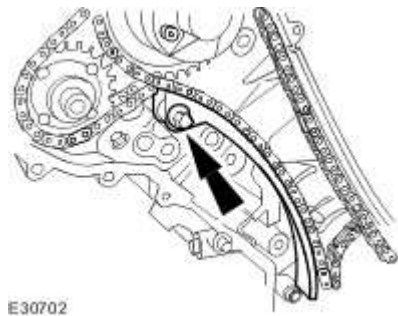
11 . Install the special tool to the right-hand cylinder head.



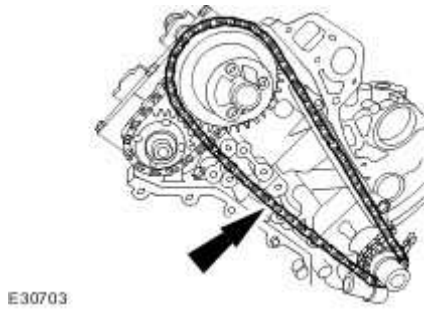
12 . Remove the primary timing chain tensioner assembly.



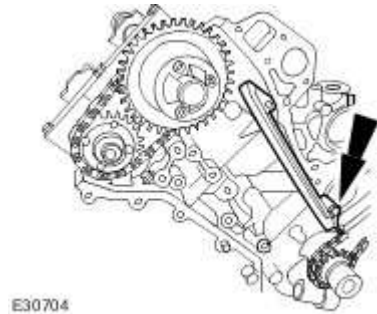
13 . Remove the primary timing chain tensioner guide.



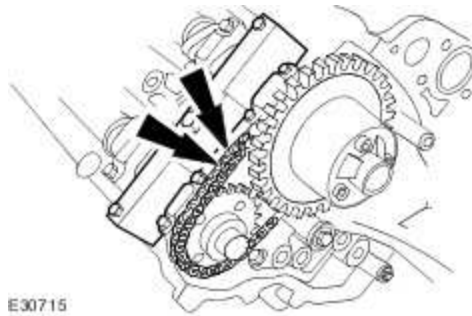
14 . Remove the primary timing chain.



15 . Remove the primary timing chain guide.

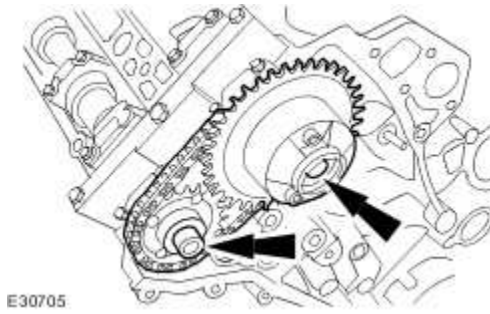


16 . Remove the secondary timing chain tensioner retaining bolts.

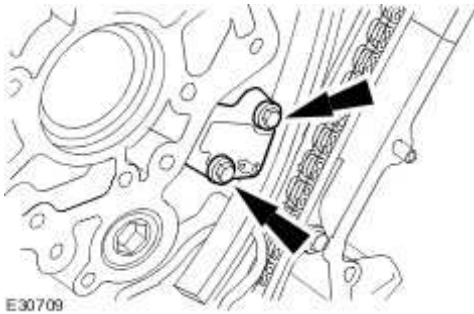


17 Remove the camshaft sprockets.

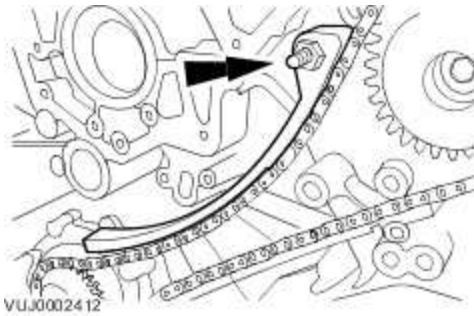
Remove the secondary timing chain tensioner and secondary timing chain from the camshaft sprockets.



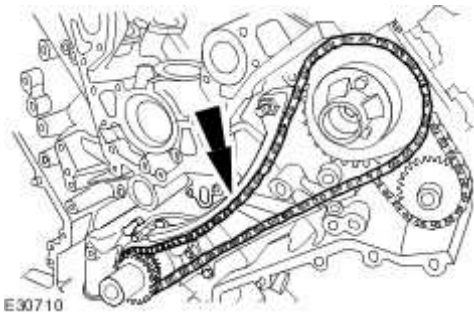
18 . Remove the primary timing chain tensioner assembly.



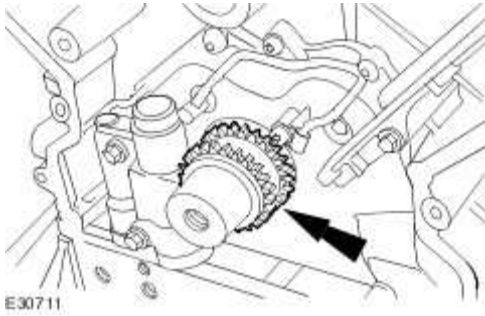
19 . Remove the primary timing chain tensioner guide.



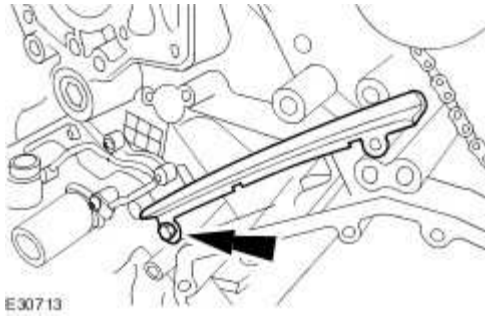
20 . Remove the primary timing chain.



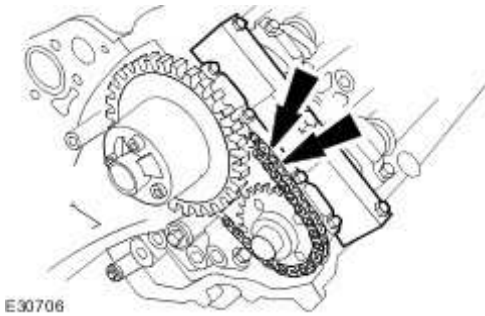
21 . Remove the crankshaft sprocket.



22 . Remove the primary timing chain tensioner guide.

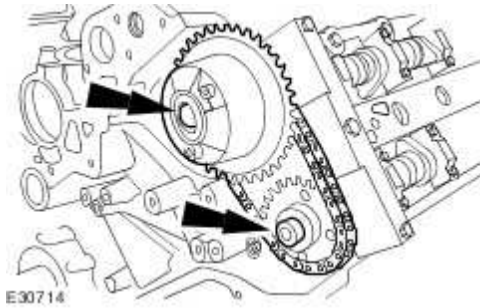


23 . Remove the secondary timing chain tensioner retaining bolts.



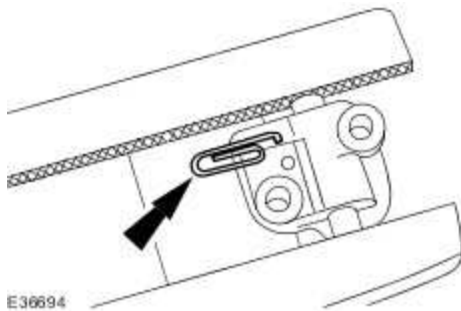
24 Remove the camshaft sprockets.


- ▶ Remove the secondary timing chain tensioner and secondary timing chain from the camshaft sprockets.




Installation


- 1 . Using a suitable tool, retain the left-hand timing chain tensioner piston.

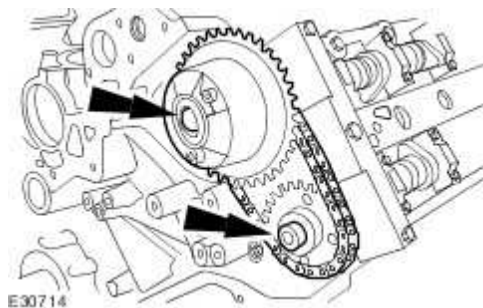


- 2  **CAUTION:** Do not tighten the camshaft sprocket retaining bolts.

 **CAUTION:** Make sure the secondary timing chain and camshaft sprockets are free to rotate.

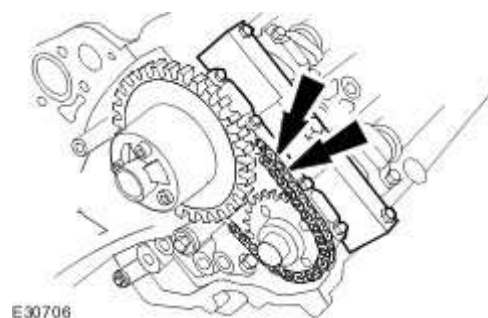
Install the camshaft sprockets.

-  Install the secondary timing chain tensioner and secondary timing chain to the camshaft sprockets.



3 . Install the secondary timing chain tensioner retaining bolts.

► Tighten to 12 Nm.

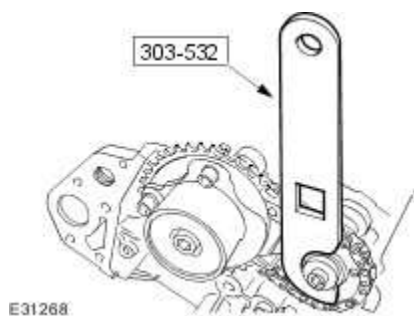


4 . Release the tension in the left-hand timing chain tensioner.

► Remove the retaining tool.

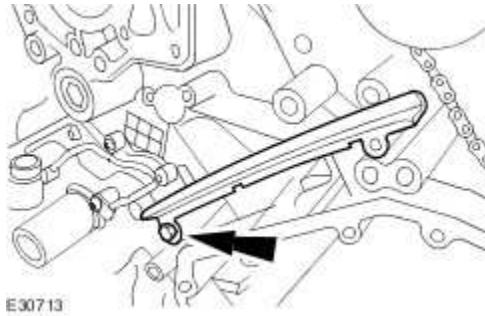
5 Install the timing chain tensioning tool 303-532 to the exhaust camshaft sprocket.

► Reposition the camshaft sprockets for the most advantageous position for use of the tool.

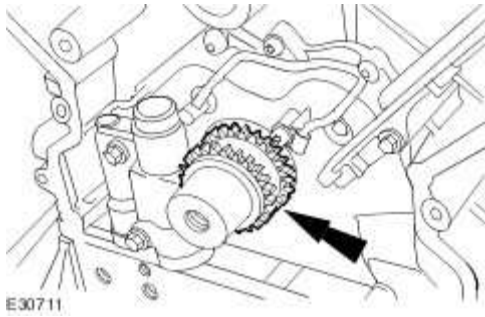


6 . Install the primary timing chain tensioner guide.

▶ Tighten to 12 Nm.



7 . Install the crankshaft sprocket.



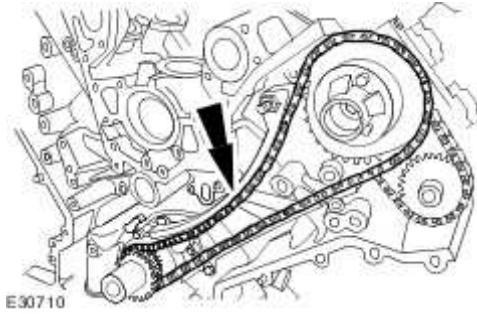
8



· **CAUTION:** Make sure the timing chain slack is on the tensioned side of the timing chain.

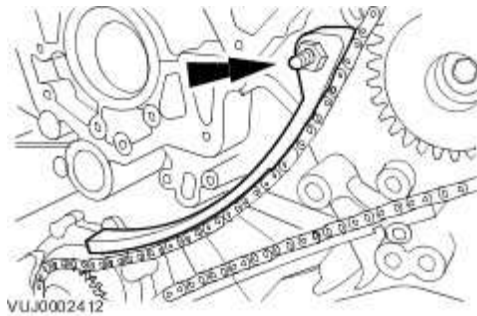
Install the primary timing chain.

▶ Install the primary chain over the crankshaft sprocket and the intake sprocket.



9 . Install the primary timing chain tensioner guide.

▶ Tighten to 12 Nm.

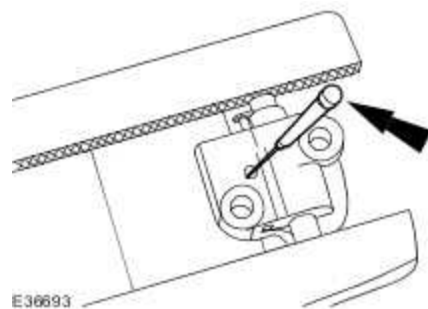


10



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the left-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



11 NOTE:

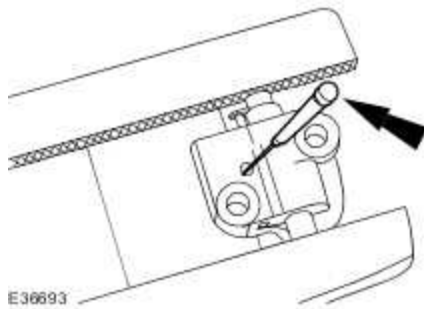
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the left-hand timing chain tensioner.

12 NOTE:

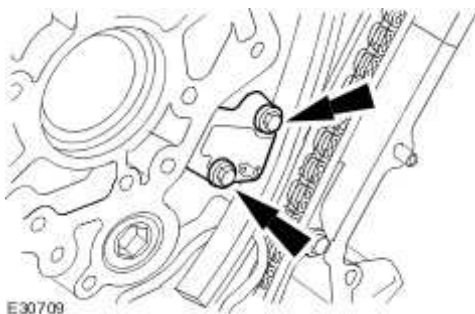
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the left-hand timing chain tensioner piston.



13 . Install the primary timing chain tensioner assembly.

► Tighten to 12 Nm.



14 . Release the tension in the left-hand timing chain tensioner.

► Remove the retaining tool.

15



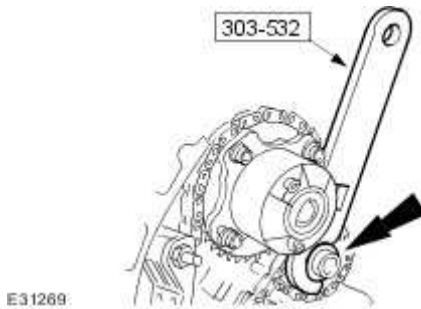
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

► Tighten to 20 Nm + 90 deg.



16



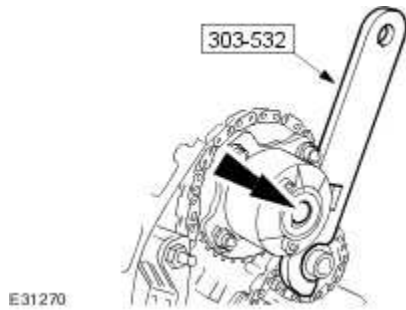
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



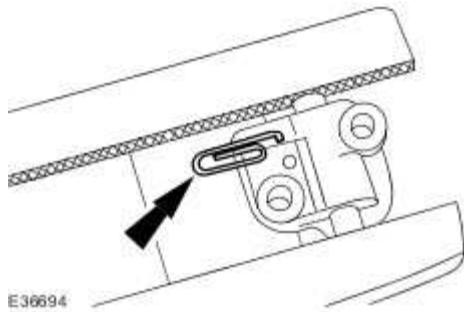
CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction.

► Tighten to 20 Nm + 90 deg.



17 . Using a suitable tool, retain the right-hand timing chain tensioner piston.



18



CAUTION: Do not tighten the camshaft sprocket retaining bolts.

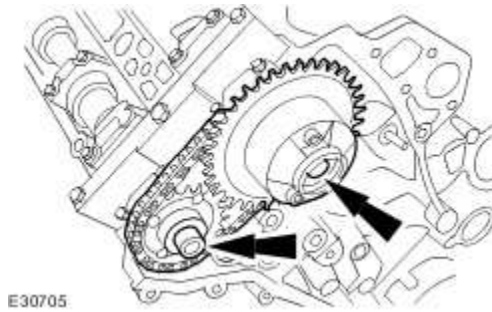


CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

Install the camshaft sprockets.

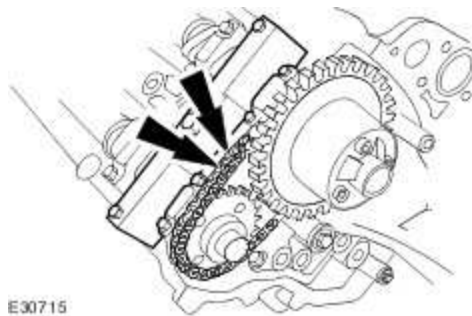


Install the secondary timing chain tensioner and secondary timing chain to the camshaft sprockets.



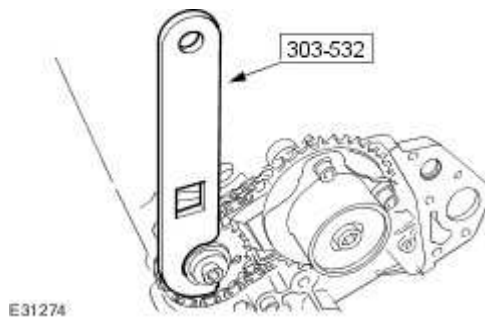
19 . Install the secondary timing chain tensioner retaining bolts.

► Tighten to 12 Nm.



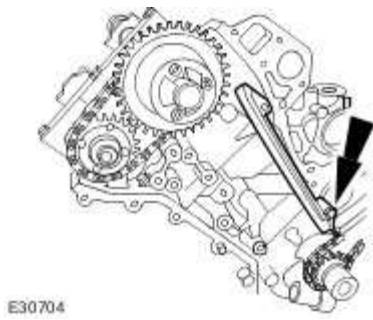
20 Install the timing chain tensioning tool 303-532 to the exhaust camshaft sprocket.

► Reposition the camshaft sprockets for the most advantageous position for use of the tool.



21 . Install the primary timing chain guide.

► Tighten to 12 Nm.



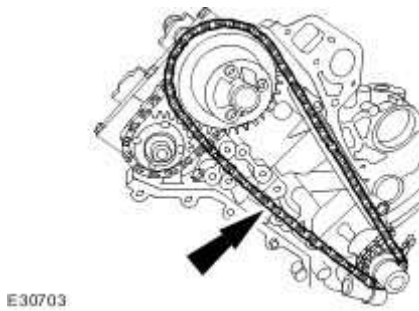
22



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

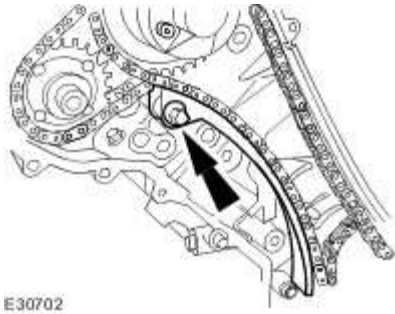
Install the primary timing chain.

- ▶ Install the primary chain over the crankshaft sprocket and the intake sprocket.



23 . Install the primary timing chain tensioner guide.

- ▶ Tighten to 12 Nm.

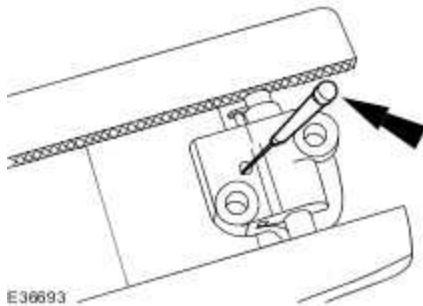


24



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the right-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



25 **NOTE:**

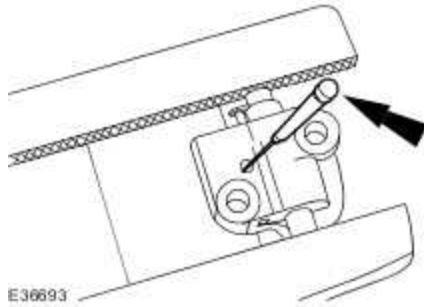
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the right-hand timing chain tensioner.

26 **NOTE:**

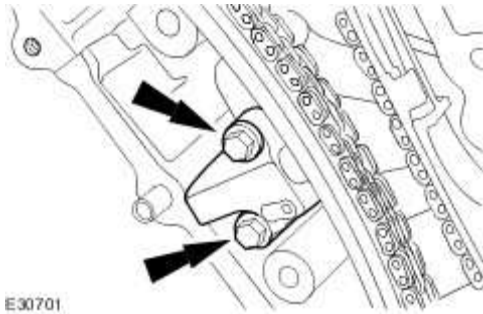
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the right-hand timing chain tensioner piston.



27 . Install the primary timing chain tensioner assembly.

► Tighten to 12 Nm.



28 . Release the tension in the right-hand timing chain tensioner.

► Remove the retaining tool.

29



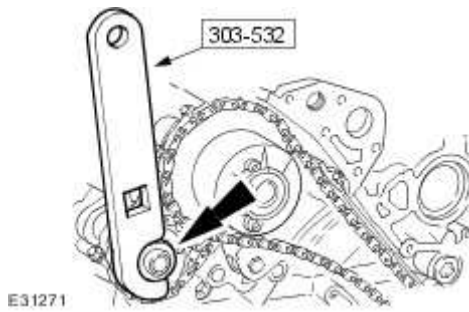
· **CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.**



CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

► Tighten to 20 Nm + 90 deg.



30



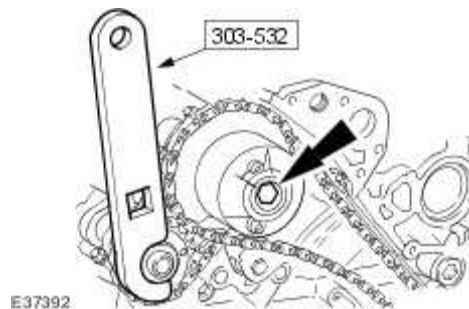
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.



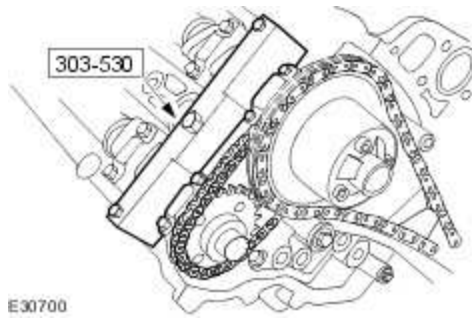
CAUTION: Make sure that a new bolt is installed.

Using the special tool apply force to the tool in an anti-clockwise direction.

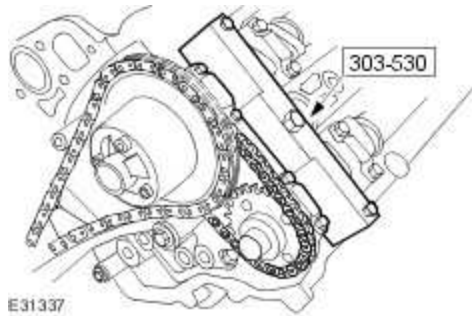
► Tighten to 20 Nm + 90 deg.



31 . Remove the special tool from the right-hand cylinder head.



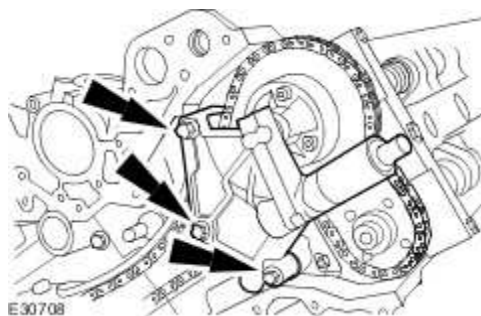
32 . Remove the special tool from the left-hand cylinder head.



33 . Install the left-hand variable camshaft timing oil control unit housing.

▶ Install new O-ring seals.

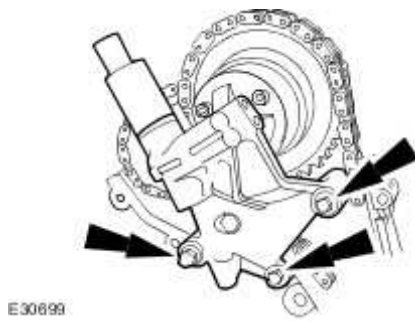
▶ Tighten to 22 Nm.



34 . Install the right-hand variable camshaft timing oil control unit housing.

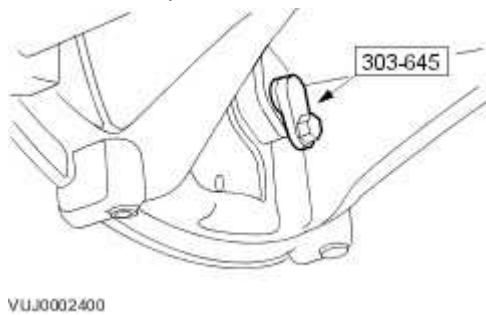
▶ Install new O-ring seals.

▶ Tighten to 22 Nm.



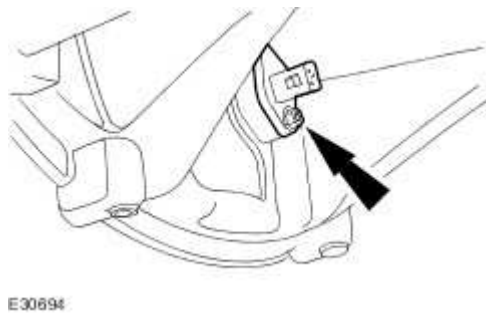
35 . Raise the vehicle.

36 . Remove the special tool.

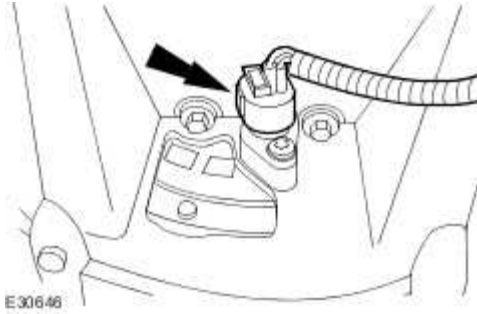


37 . Install the CKP sensor.

► Tighten to 10 Nm.



38 . Connect the CKP sensor electrical connector.



39 . Lower the vehicle.

40 . Install the spark plugs.

41 Install the engine front cover.

- . For additional information, refer to Engine Front Cover - VIN Range: G45704->G99999 (12.65.01)

Valve Cover LH - VIN Range: G00442- >G45703 (12.29.43)

Removal

All vehicles

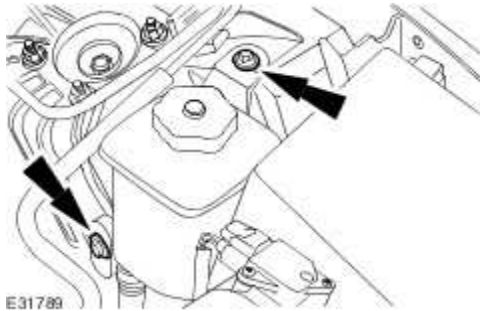
1 . Remove the air cleaner. <<303-12B>>

2

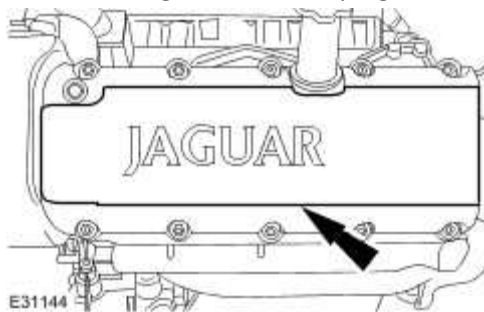


- **CAUTION:** If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.

Detach the power steering fluid reservoir.



3 . Remove the ignition coil-on-plug cover.



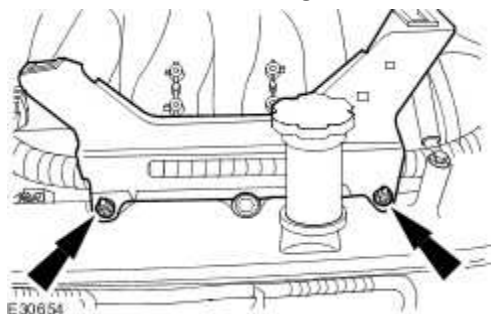
4 . Remove the oil level indicator and tube.

▶ Remove and discard the O-ring seal.



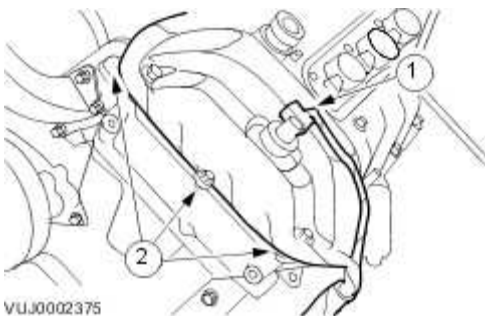
Vehicles without supercharger

5 . Remove the left-hand engine cover bracket.



6 Detach the engine wiring harness.

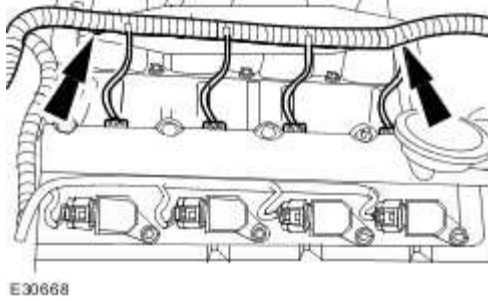
- 1) Disconnect the variable camshaft timing (VCT) oil control solenoid electrical connector.
- 2) Detach the engine wiring harness.



7 . **NOTE:**

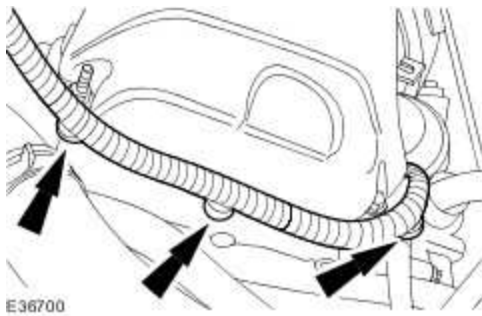
Right-hand shown left-hand similar.

Detach the engine wiring harness.



Vehicles with supercharger

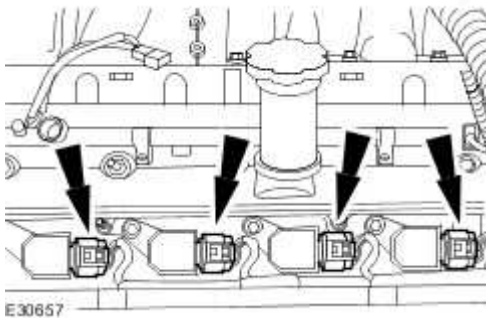
8 . Detach the engine wiring harness.



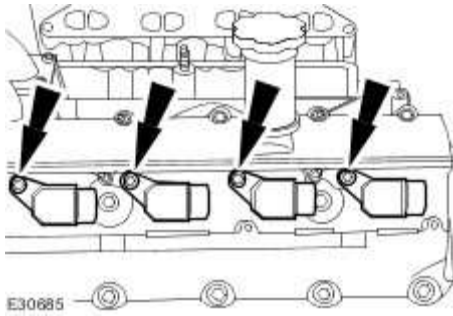
All vehicles

9 . Detach the fuel line. <<310-00>>

10 . Disconnect the ignition coil-on-plug electrical connectors.

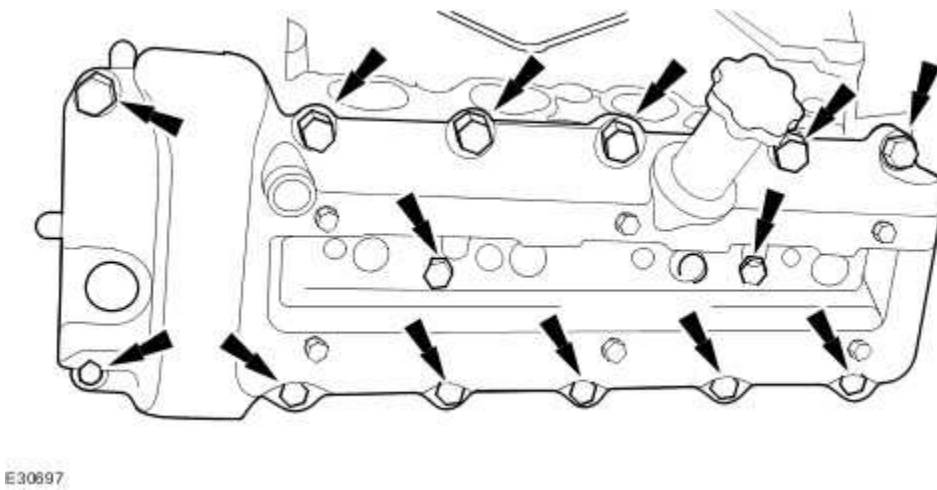


11 . Remove the ignition coil on-plugs.



12 . Remove the valve cover assembly.

▶ Remove and discard valve cover gaskets.

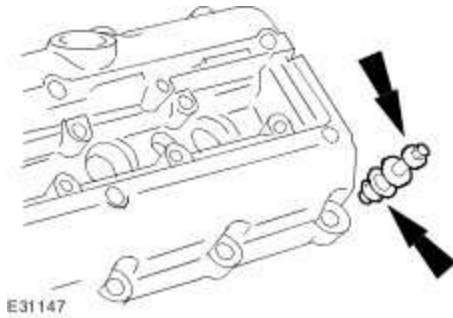


13 . **NOTE:**

On removal of the valve cover retaining bolts note their positions in the valve cover.

Remove the valve cover retaining bolts.

▶ Remove and discard the valve cover retaining bolt O-ring seals.



Installation

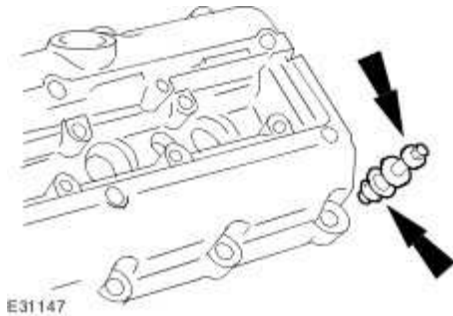
All vehicles

1 . NOTE:

Install the valve cover retaining bolts to their positions previously noted.

Install the valve cover retaining bolts.

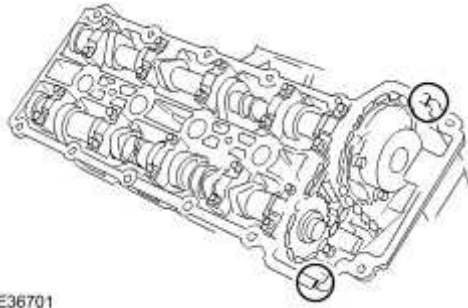
▶ Install new valve cover retaining bolt O-ring seals.



2 Apply bead of silicone gasket sealant or equivalent meeting Jaguar specification on the two places where the cylinder head and front cover join.

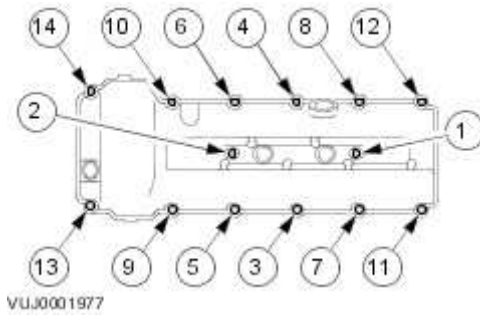
▶ The application of sealant must be 3mm diameter by 12mm long. Install the valve cover immediately after applying the sealant.

▶ The cover should be fitted directly to the head without smearing the sealant or the seals.



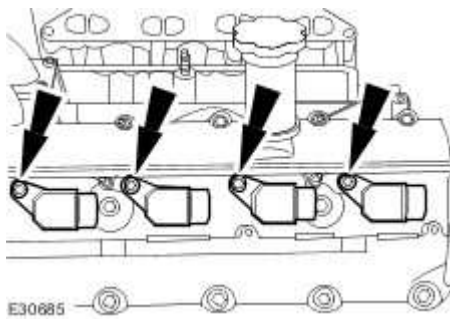
3 . Install the valve cover.

- ▶ Install new valve cover gaskets.
- ▶ Complete the tightening sequence.
- ▶ Tighten to 12 Nm.

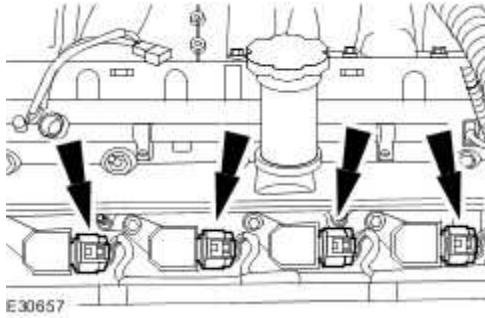


4 . Install the ignition coil-on-plugs.

- ▶ Tighten to 5 Nm.



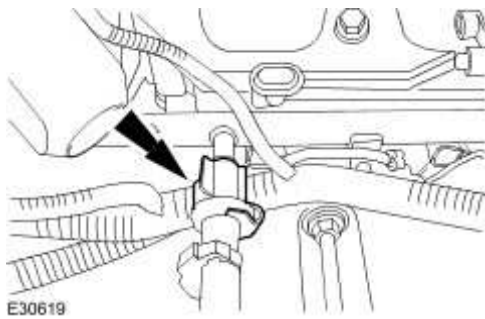
5 . Connect the ignition coil-on-plug electrical connectors.



6 . Connect the fuel line.

▶ Attach the fuel line retaining clip.

▶ Install new O-ring seals.

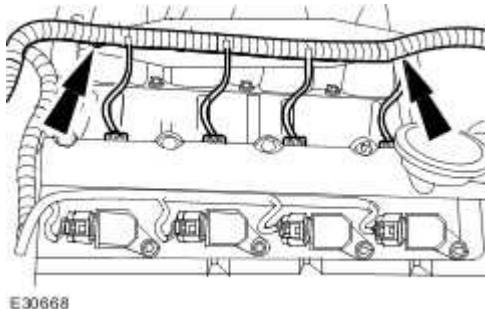


Vehicles without supercharger

7 . **NOTE:**

Right-hand shown left-hand similar.

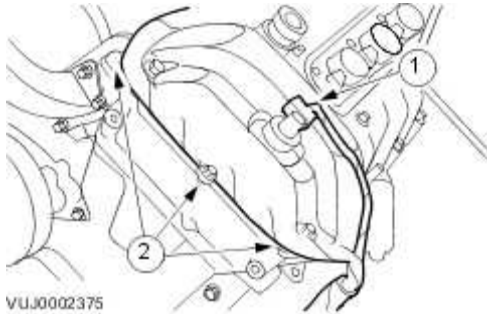
Attach the engine wiring harness.



8 Attach the engine wiring harness.

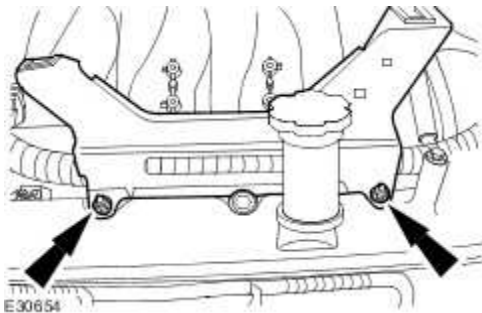
1) Connect the variable camshaft timing (VCT) oil control solenoid electrical connector.

2) Attach the engine wiring harness.



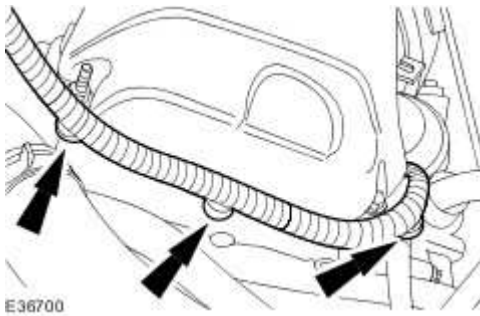
9 . Install the left-hand engine cover bracket.

▶ Tighten to 6 Nm.



Vehicles with supercharger

10 . Attach the engine wiring harness.



All vehicles

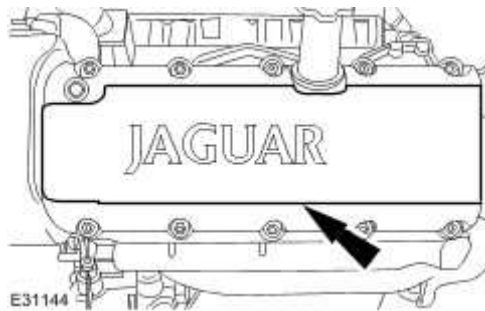
11 . Install the oil level indicator and tube.

▶ Install a new O-ring seal.

▶ Tighten to 6 Nm.



12 . Install the ignition coil-on-plug cover.

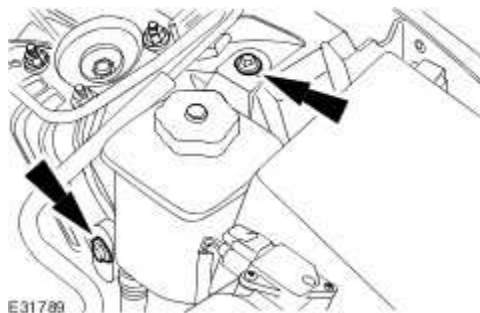


13



· **CAUTION:** If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.

Attach the power steering fluid reservoir.




14 . Install the air cleaner. <<303-12B>>

Valve Cover LH - VIN Range: G45704- >G99999 (12.29.43)

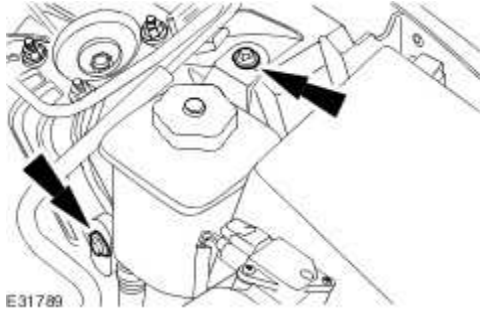
Removal

- 1 . Remove the air cleaner.

For additional information, refer to Air Cleaner (19.10.05)

- 2  **CAUTION:** If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.

Detach the power steering fluid reservoir.

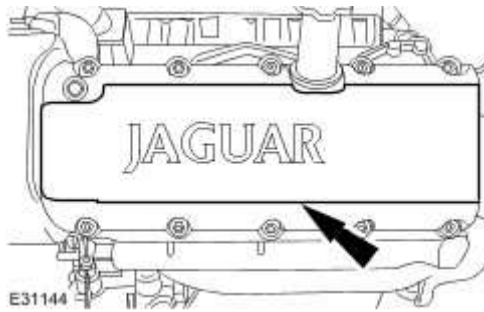


- 3 . Remove the oil level indicator and tube.

 Remove and discard the O-ring seal.



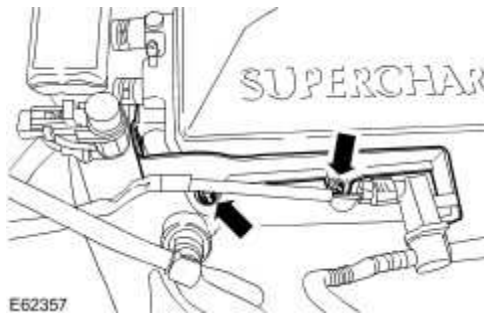
- 4 . Remove the ignition coil-on-plug cover.



5 . NOTE:

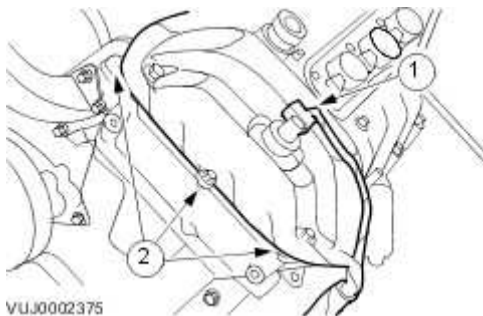
Vehicles with supercharger shown, vehicles without supercharger similar.

Detach the engine cover bracket.



6 Detach the engine wiring harness.

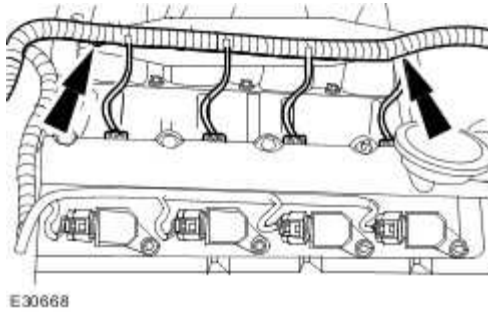
- 1) Disconnect the variable camshaft timing (VCT) oil control solenoid electrical connector.
- 2) Detach the engine wiring harness.



7 . NOTE:

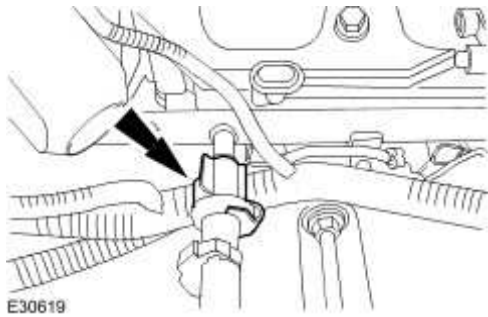
Right-hand shown, left-hand similar.

Detach the engine wiring harness.

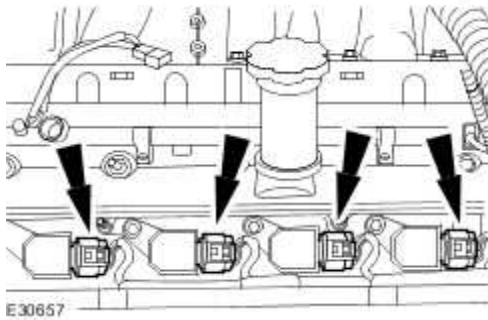


8 . Disconnect the fuel line.

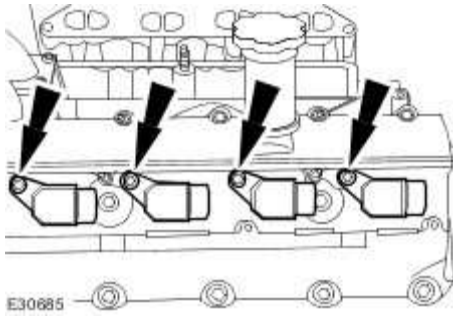
For additional information, refer to Spring Lock Couplings



9 . Disconnect the ignition coil-on-plug electrical connectors.

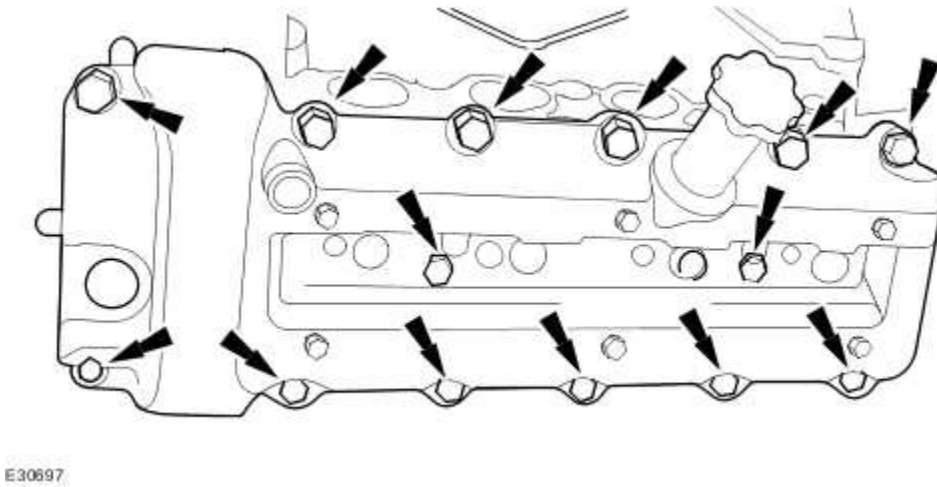


10 . Remove the ignition coil on-plugs.



11 . Remove the valve cover assembly.

▶ Remove and discard valve cover gaskets.

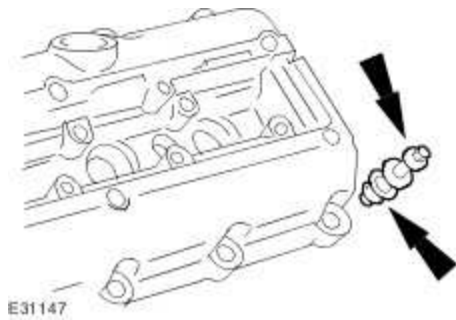


12 . **NOTE:**

On removal of the valve cover retaining bolts note their positions in the valve cover.

Remove the valve cover retaining bolts.

▶ Remove and discard the valve cover retaining bolt O-ring seals.



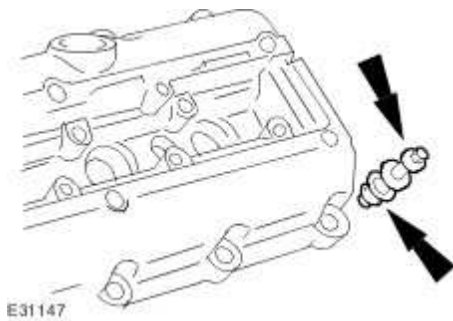
Installation

1 . NOTE:

Install the valve cover retaining bolts to their positions previously noted.

Install the valve cover retaining bolts.

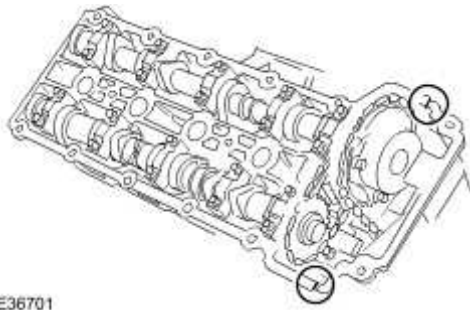
▶ Install new valve cover retaining bolt O-ring seals.



2 Apply bead of silicone gasket sealant or equivalent meeting Jaguar specification on the two . places where the cylinder head and front cover join.

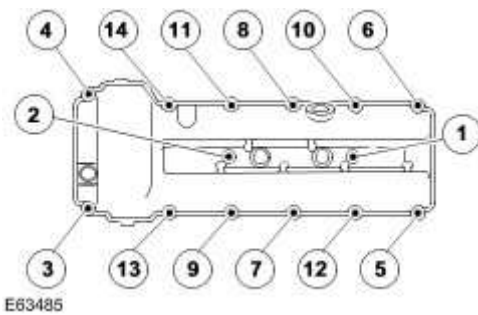
▶ The application of sealant must be 3mm diameter by 12mm long. Install the valve cover immediately after applying the sealant.

▶ The cover should be fitted directly to the head without smearing the sealant or the seals.



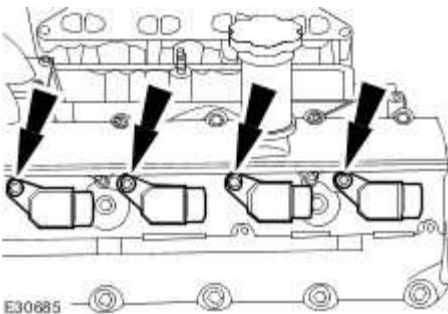
3 . Install the valve cover.

- ▶ Install new valve cover gaskets.
- ▶ Complete the tightening sequence.
- ▶ Tighten to 10 Nm.

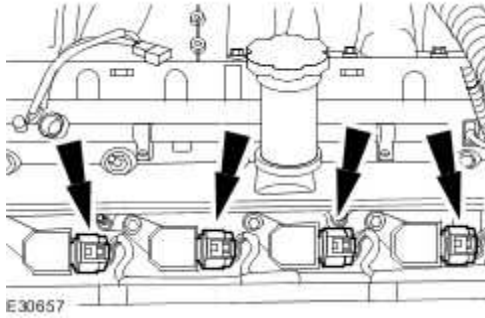


4 . Install the ignition coil-on-plugs.

- ▶ Tighten to 5 Nm.



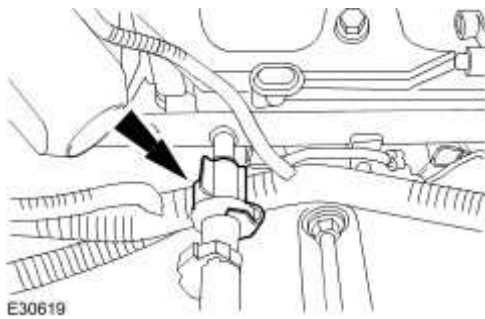
5 . Connect the ignition coil-on-plug electrical connectors.



6 . Connect the fuel line.

▶ Attach the fuel line retaining clip.

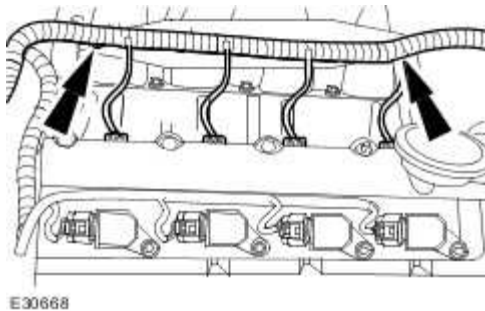
▶ Install new O-ring seals.



7 . **NOTE:**

Right-hand shown, left-hand similar.

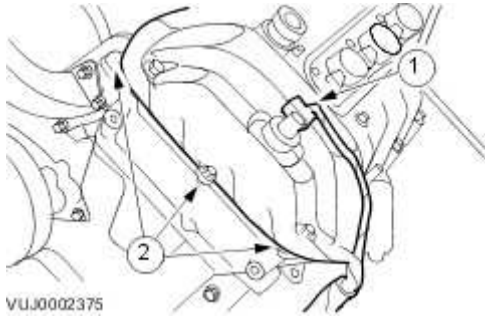
Attach the engine wiring harness.



8 . Attach the engine wiring harness.

1) Connect the VCT oil control solenoid electrical connector.

2) Attach the engine wiring harness.

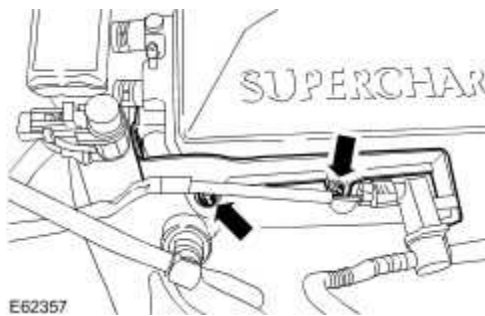


9 . **NOTE:**

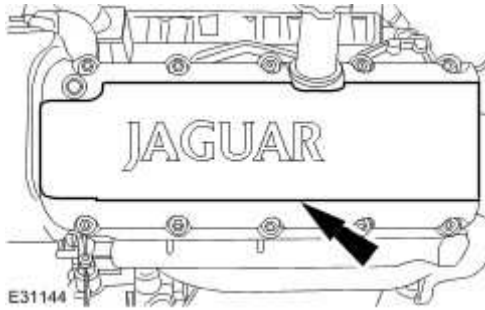
Vehicles with supercharger shown, vehicles without supercharger similar.

Attach the engine cover bracket.

▶ Tighten to 6 Nm.



10 . Install the ignition coil-on-plug cover.



11 . Install the oil level indicator and tube.

▶ Install a new O-ring seal.

▶ Tighten to 6 Nm.

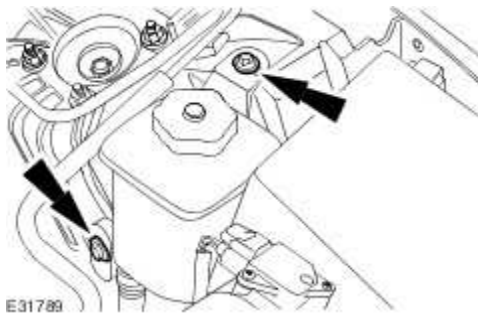


12



CAUTION: If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.

Attach the power steering fluid reservoir.



13 . Install the air cleaner.

For additional information, refer to Air Cleaner (19.10.05)

Valve Cover RH - VIN Range: G00442- >G45703 (12.29.44)

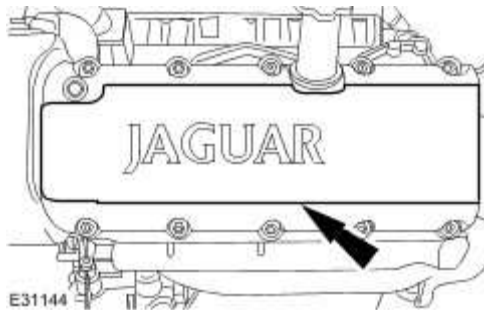
Removal

All vehicles

1 . NOTE:

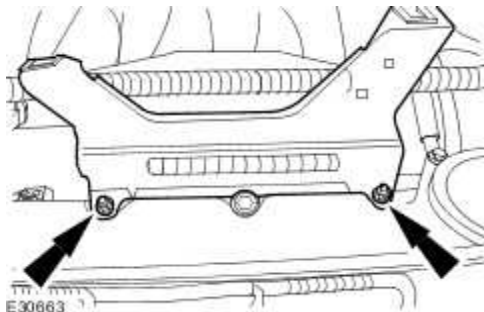
Left-hand shown right-hand similar.

Remove the ignition coil-on-plug cover.



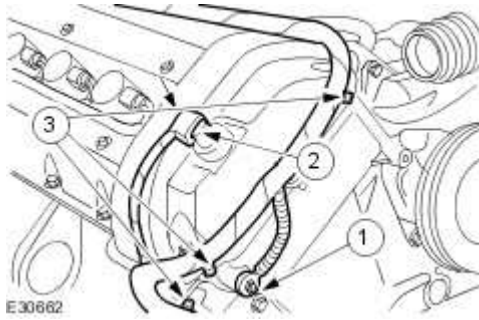
Vehicles without supercharger

2 . Remove the right-hand engine cover bracket.

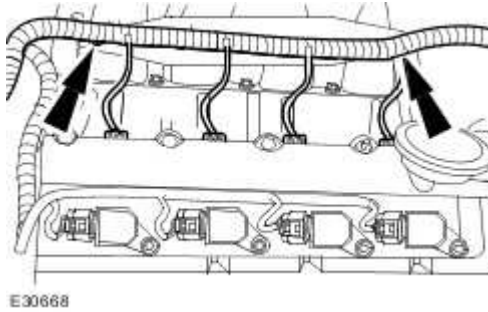


3 Detach the engine wiring harness.

- 1) Detach the ground harness.
- 2) Disconnect the variable camshaft timing (VCT) oil control solenoid electrical connector.
- 3) Detach the engine wiring harness.



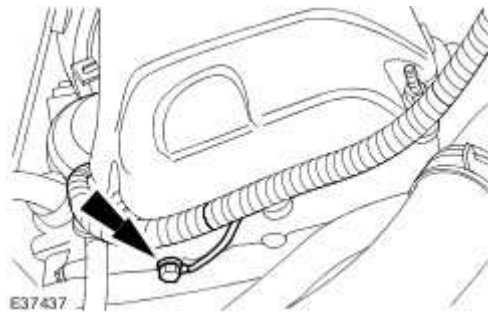
4 . Detach the right-hand engine wiring harness.



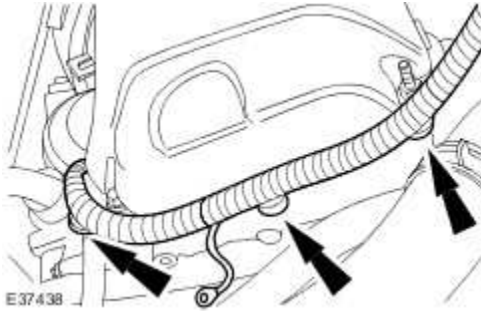
Vehicles with supercharger

5 . Detach the engine wiring harness.

▶ Remove the retaining bolt.

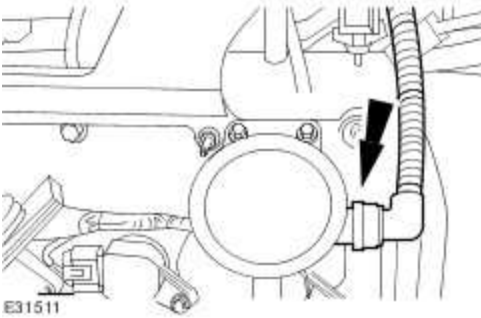


6 . Detach the engine wiring harness.

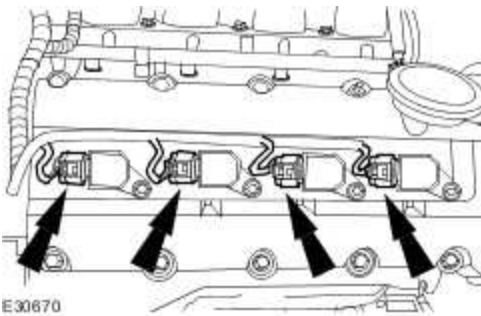


All vehicles

- 7 . Disconnect the positive crank ventilation (PCV) pipe.



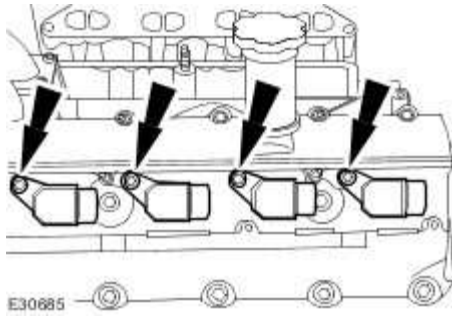
- 8 . Disconnect the ignition coil on-plug electrical connectors.



- 9 . **NOTE:**

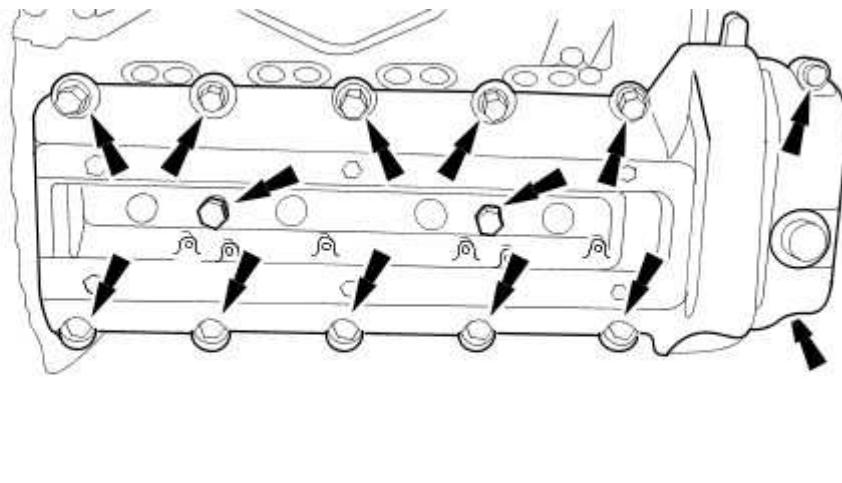
Left-hand shown right-hand similar.

Remove the ignition coil-on-plugs.



10 . Remove the valve cover assembly.

▶ Remove and discard valve cover gaskets.

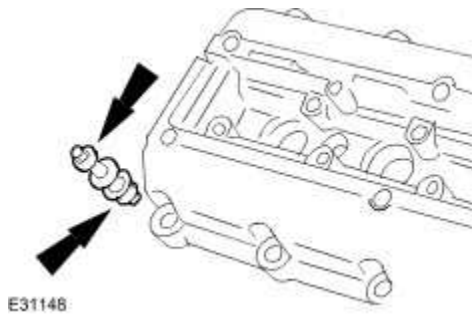


11 . **NOTE:**

On removal of the valve cover retaining bolts note their positions in the valve cover.

Remove the valve cover retaining bolts.

▶ Remove and discard the valve cover retaining bolt O-ring seals.



Installation

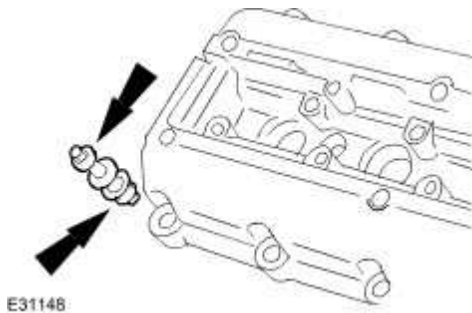
All vehicles

1 . NOTE:

Install the valve cover retaining bolts to their positions previously noted.

Install the valve cover retaining bolts.

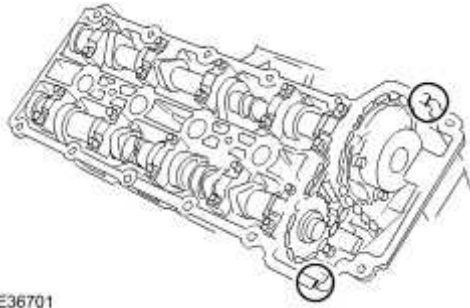
▶ Install new valve cover retaining bolt O-ring seals.



2 Apply bead of silicone gasket sealant or equivalent meeting Jaguar specification on the two
· places where the cylinder head and front cover join.

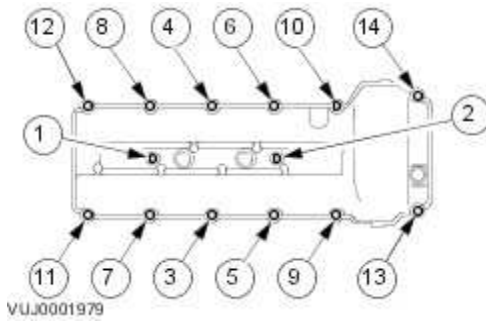
▶ The application of sealant must be 3mm diameter by 12mm long. Install the valve cover immediately after applying the sealant.

▶ The cover should be fitted directly to the head without smearing the sealant or the seals.



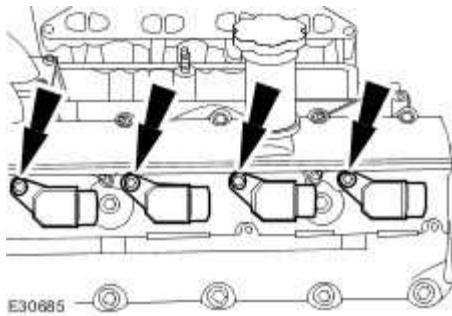
3 . Install the valve cover.

- ▶ Install new valve cover gaskets.
- ▶ Complete the tightening sequence.
- ▶ Tighten to 12 Nm.

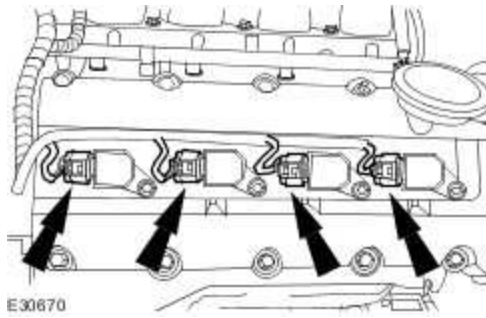


4 . Install the ignition coil-on-plugs.

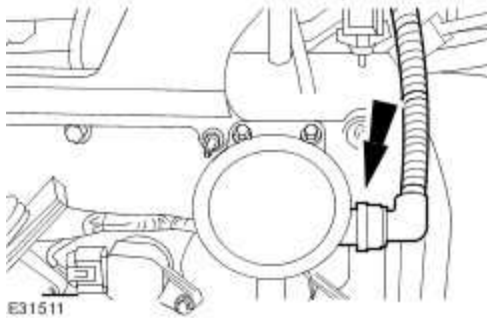
- ▶ Tighten to 5 Nm.



5 . Connect the ignition coil on-plug electrical connectors.

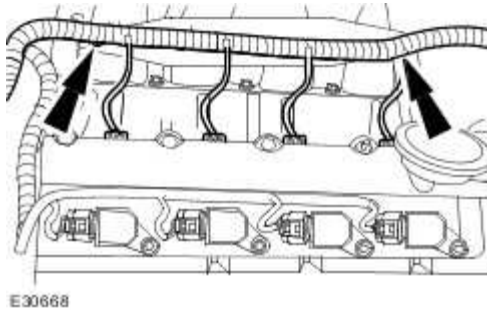


6 . Connect the positive crank ventilation (PCV) pipe.



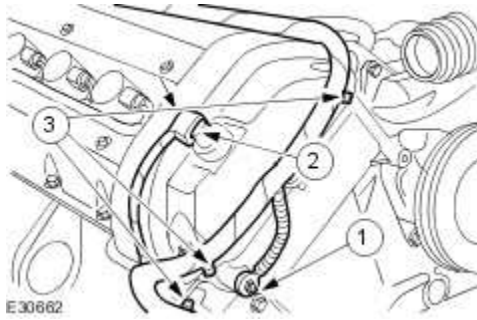
Vehicles without supercharger

7 . Attach the right-hand engine wiring harness.



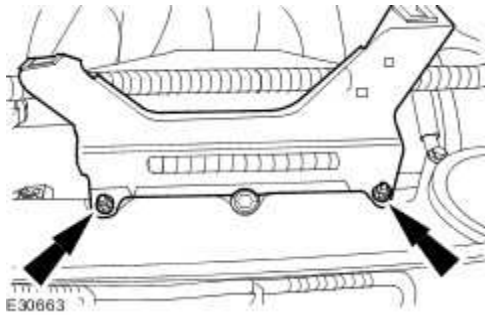
8 . Attach the engine wiring harness.

- 1) Attach the ground harness.
- 2) Connect the VCT oil control solenoid electrical connector.
- 3) Attach the engine wiring harness.



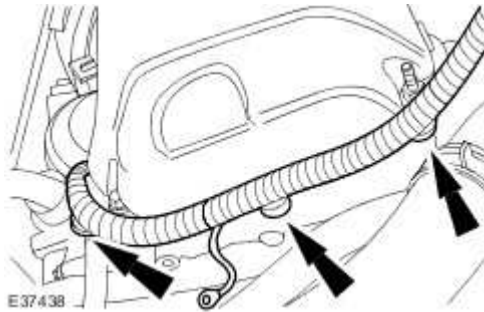
9 . Install the right-hand engine cover bracket.

▶ Tighten to 6 Nm.

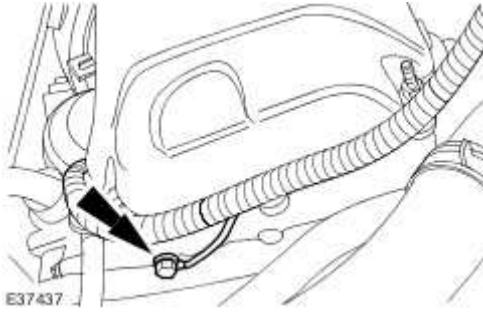


Vehicles with supercharger

10 . Attach the engine wiring harness.



11 . Attach the engine wiring harness.

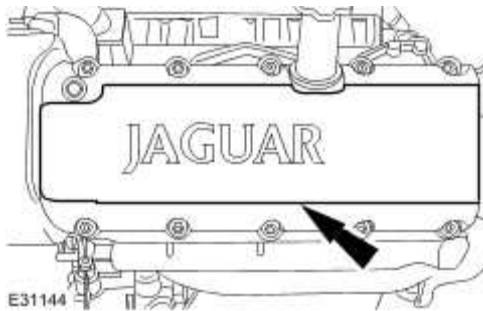


All vehicles

12 . NOTE:

Left-hand shown right-hand similar.

Install the ignition coil-on-plug cover.



Valve Cover RH - VIN Range: G45704- >G99999 (12.29.44)

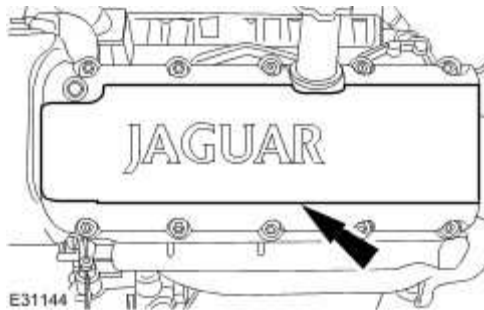
Removal

All vehicles

1 . NOTE:

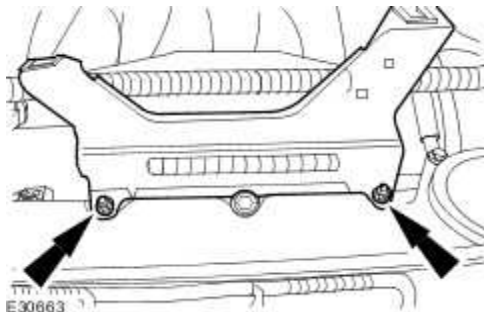
Left-hand shown, right-hand similar.

Remove the ignition coil-on-plug cover.



Vehicles without supercharger

2 . Remove the engine cover right-hand bracket.



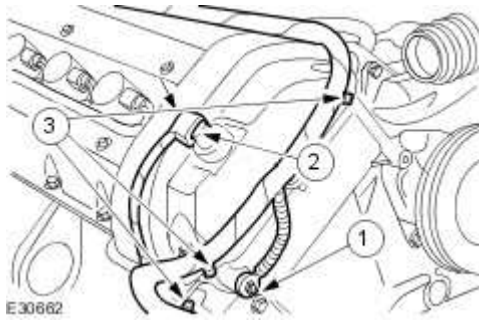
All vehicles

3 Detach the engine wiring harness.

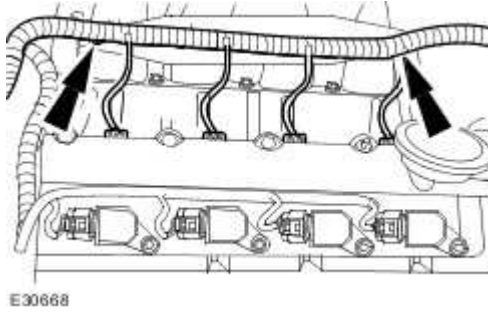
1) Detach the ground harness.

2) Disconnect the variable camshaft timing (VCT) oil control solenoid electrical connector.

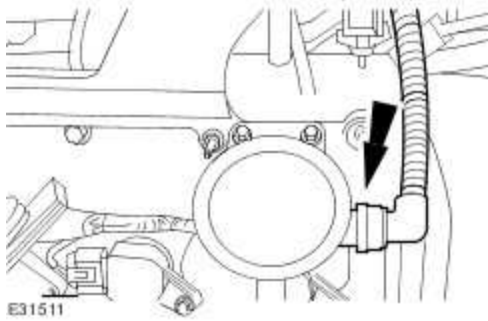
3) Detach the engine wiring harness.



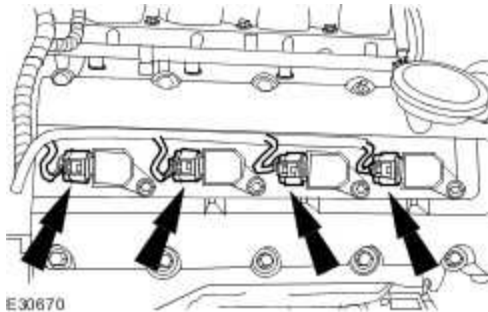
4 . Detach the engine wiring harness.



5 . Disconnect the positive crank ventilation (PCV) pipe.



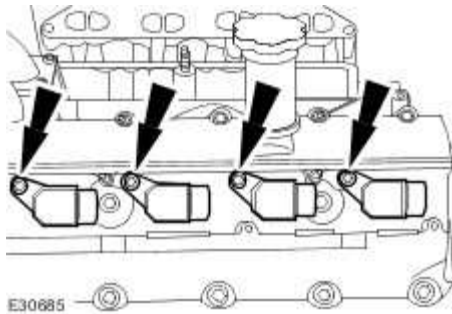
6 . Disconnect the ignition coil on-plug electrical connectors.



7 . NOTE:

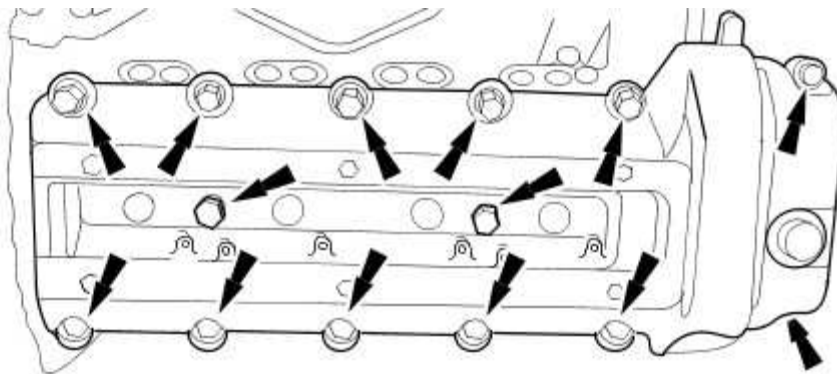
Left-hand shown, right-hand similar.

Remove the ignition coil-on-plugs.



8 . Remove the valve cover assembly.

▶ Remove and discard valve cover gaskets.

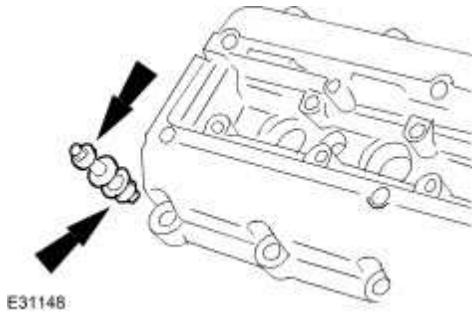


9 . NOTE:

On removal of the valve cover retaining bolts note their positions in the valve cover.

Remove the valve cover retaining bolts.

▶ Remove and discard the valve cover retaining bolt O-ring seals.



Installation

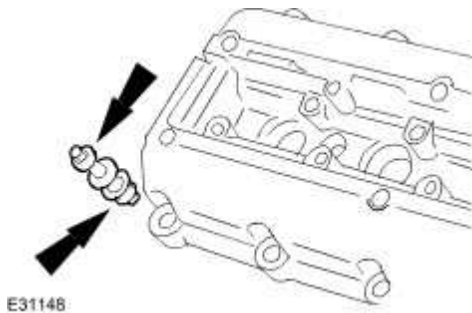
All vehicles

1 . NOTE:

Install the valve cover retaining bolts to their positions previously noted.

Install the valve cover retaining bolts.

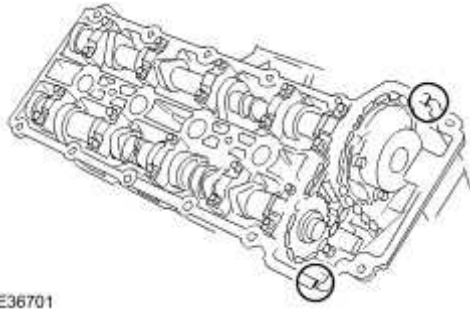
▶ Install new valve cover retaining bolt O-ring seals.



2 Apply bead of silicone gasket sealant or equivalent meeting Jaguar specification on the two
· places where the cylinder head and front cover join.

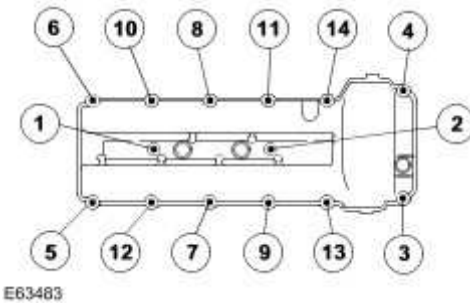
▶ The application of sealant must be 3mm diameter by 12mm long. Install the valve cover immediately after applying the sealant.

▶ The cover should be fitted directly to the head without smearing the sealant or the seals.



3 . Install the valve cover.

- ▶ Install new valve cover gaskets.
- ▶ Complete the tightening sequence.
- ▶ Tighten to 10 Nm.

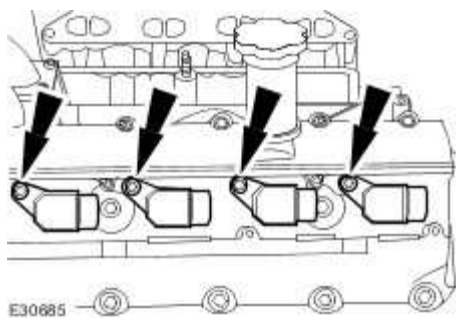


4 . **NOTE:**

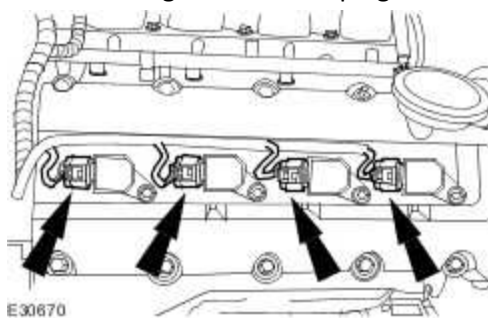
Left-hand shown, right-hand similar.

Install the ignition coil-on-plugs.

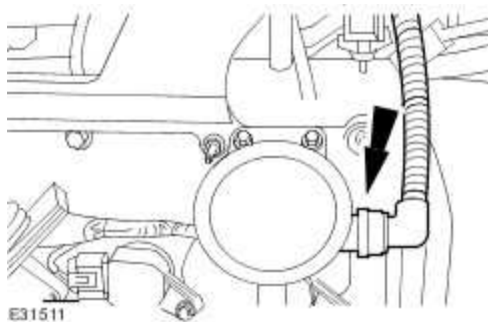
- ▶ Tighten to 5 Nm.



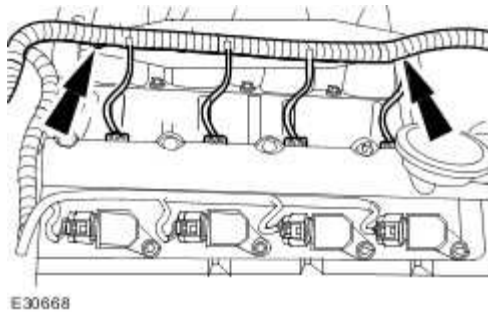
5 . Connect the ignition coil on-plug electrical connectors.



6 . Connect the PCV pipe.

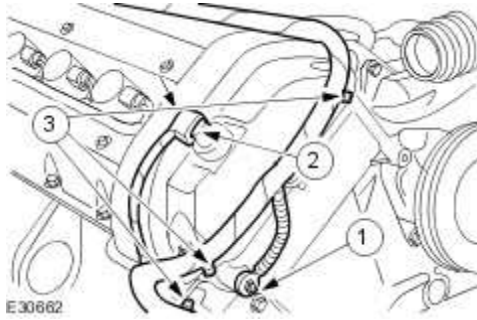


7 . Attach the engine wiring harness.



8 . Attach the engine wiring harness.

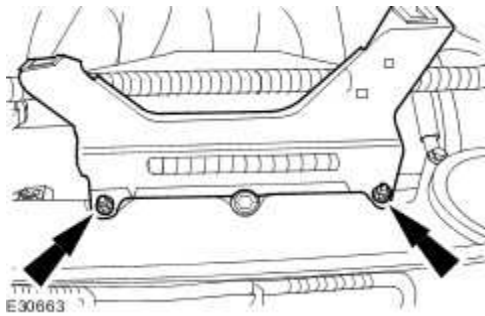
- 1) Attach the ground harness.
- 2) Connect the VCT oil control solenoid electrical connector.
- 3) Attach the engine wiring harness.



Vehicles without supercharger

9 . Install the engine cover bracket.

► Tighten to 6 Nm.

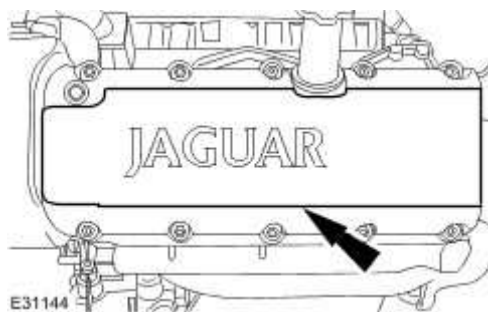


All vehicles

10 . **NOTE:**

Left-hand shown, right-hand similar.

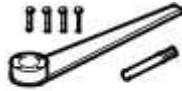
Install the ignition coil-on-plug cover.



E31144

Engine

Special Service Tools



303-191

Crankshaft locking, main tool

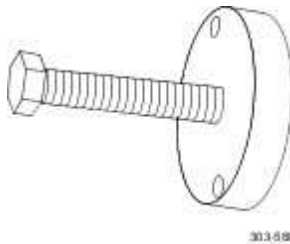
303-191



303-191-02

Adapter

303-191-02



303-588

Crankshaft pulley/damper remover

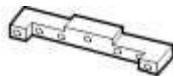
303-588



303-645

Crankshaft setting, main tool

303-645



303-530

Camshaft setting

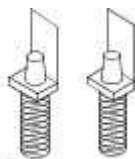
303-530



303D055

Crankshaft damper holding tool

303-D055



303535

Cylinder Bore Protectors

303-535

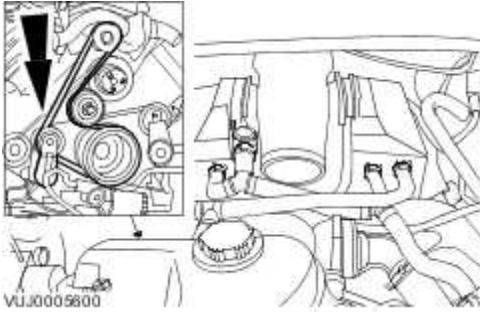
Disassembly

1 . Disconnect the oil cooler hoses.



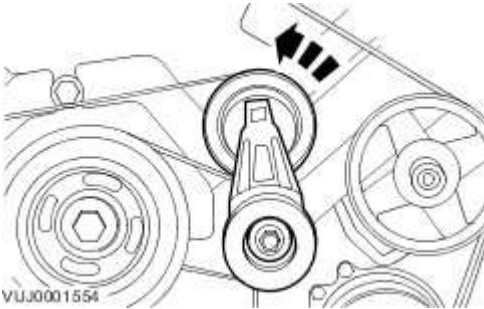
2 . Detach the supercharger belt.

- Use a 1/2 inch square drive bar to rotate the supercharger belt tensioner.
- Detach the supercharger belt.



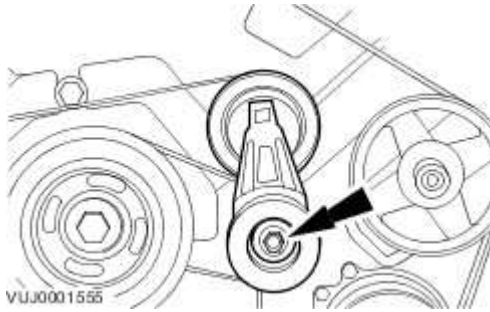
3 . Release the accessory drive belt tension.

- Use a 3/8 inch square drive bar to rotate the drive belt tensioner.
- Detach the accessory drive belt.

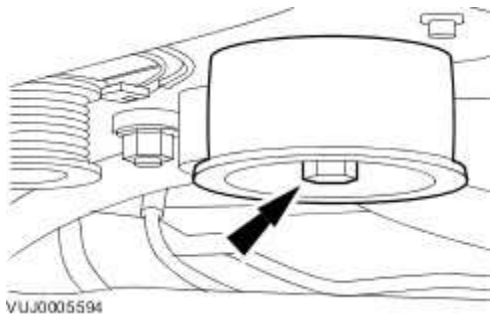


4 . Remove the accessory drive belt tensioner.

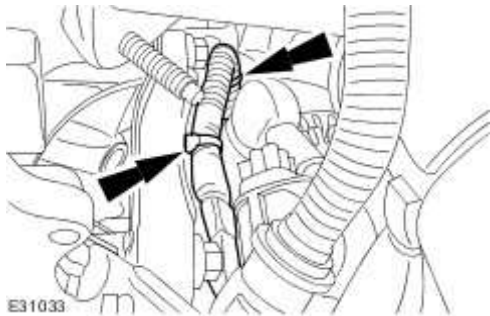
- Remove the accessory drive belt.



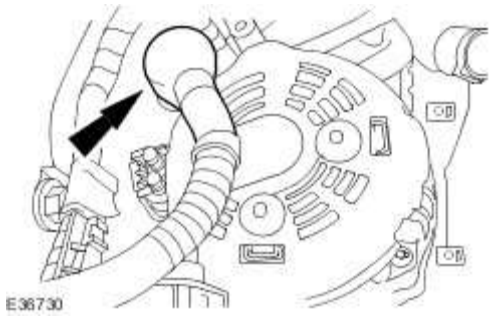
5 . Remove the accessory drive belt idler pulley.



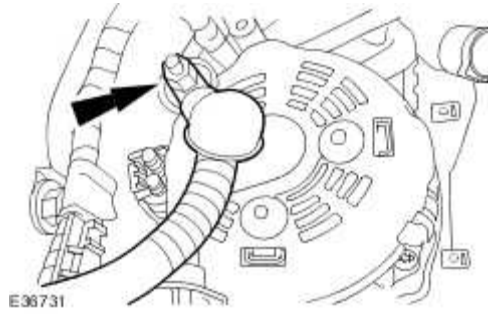
6 . Detach the wiring harness.



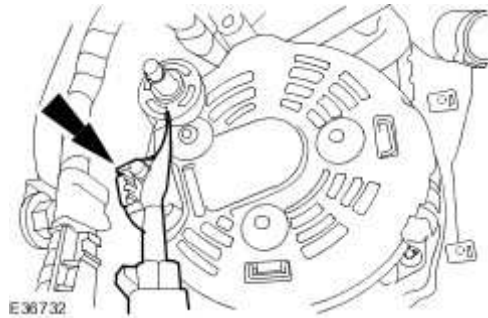
7 . Detach the generator battery positive cable protective cover.



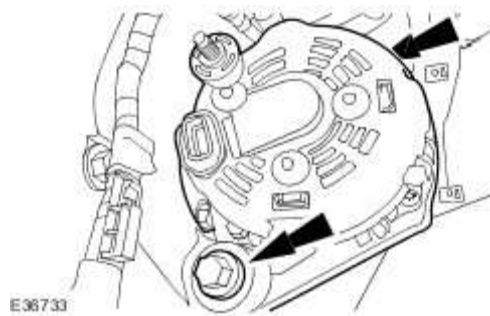
8 . Disconnect the generator battery positive cable.



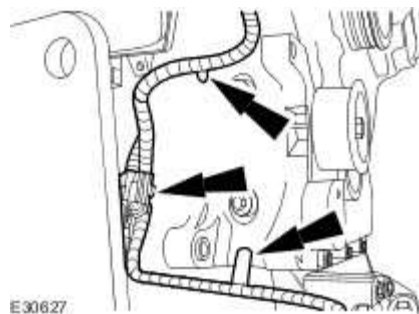
9 . Disconnect the generator electrical connector.



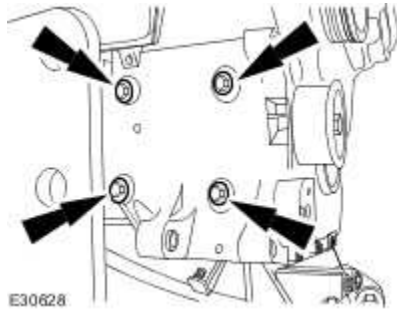
10 . Remove the generator.



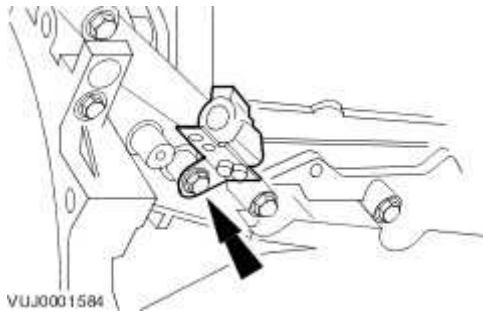
11 . Detach the engine wiring harness.



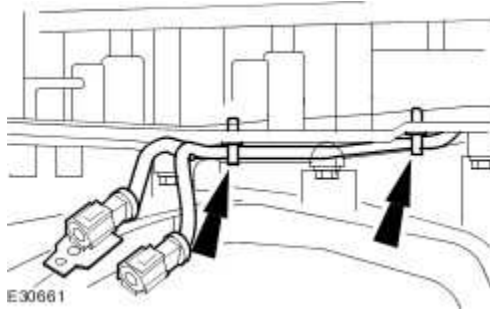
12 . Remove the generator mounting bracket.



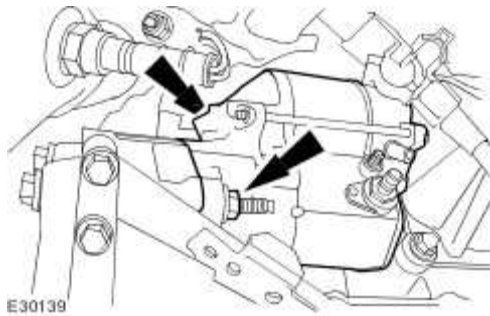
13 . Detach the right-hand oxygen sensor retaining bracket.



14 . Detach the engine wiring harness.



15 . Remove the starter motor.

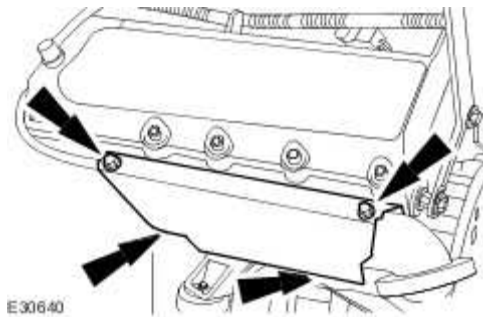


16 . Remove the oil level indicator and tube.

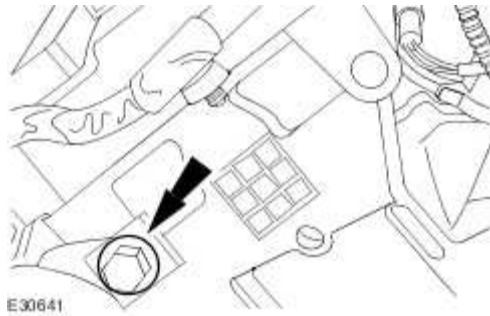
- Remove and discard the O-ring seal.



17 . Remove the heat shield.

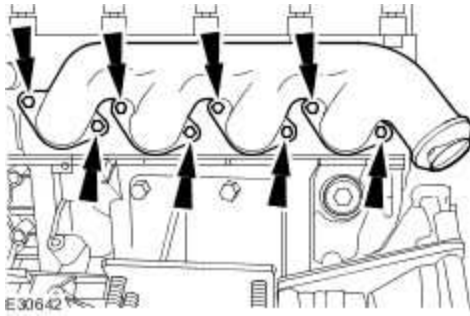


18 . Remove the heat shield retaining bolt.

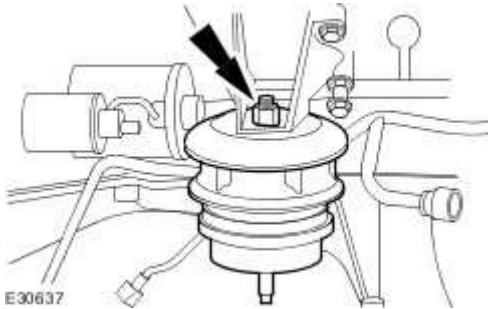


19 . Remove the left-hand exhaust manifold.

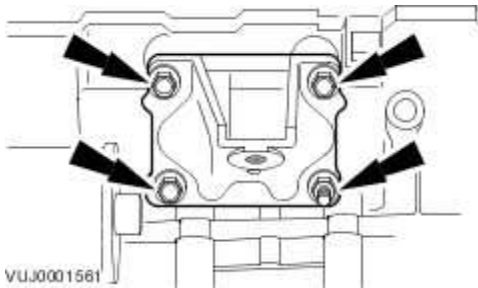
- Remove and discard the gasket.



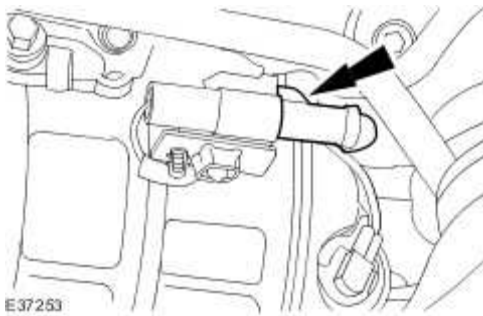
20 . Remove the left-hand engine mount.



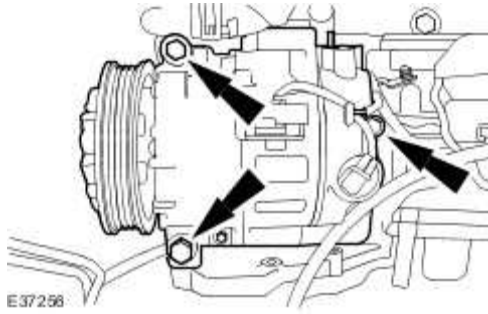
21 . Remove the left-hand engine mounting bracket.



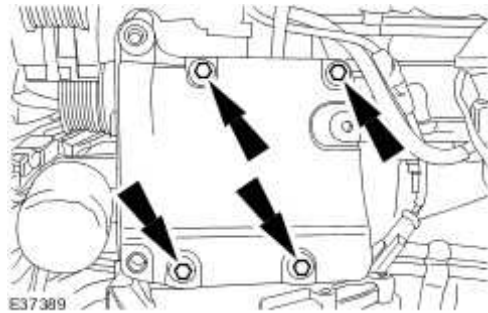
22 . Disconnect the A/C compressor electrical connector.



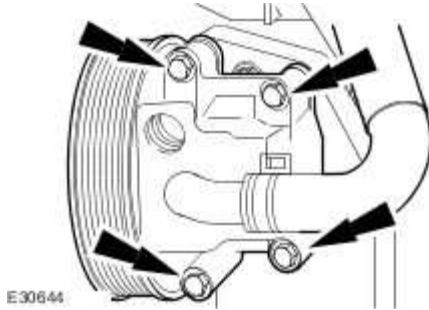
23 . Remove the A/C compressor.



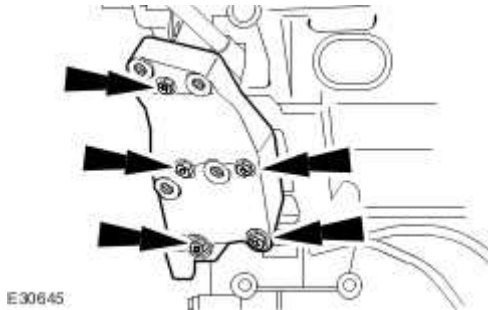
24 . Remove the air conditioning compressor mounting bracket.



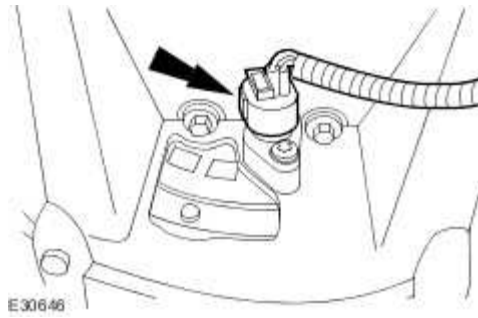
25 . Remove the power steering pump.



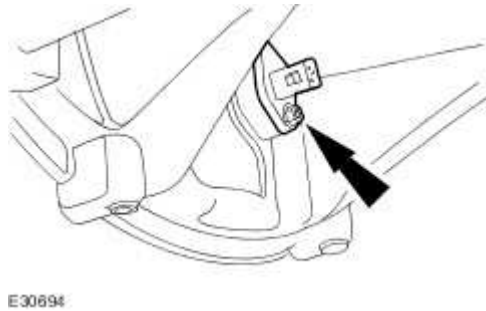
26 . Remove the power steering pump mounting bracket.



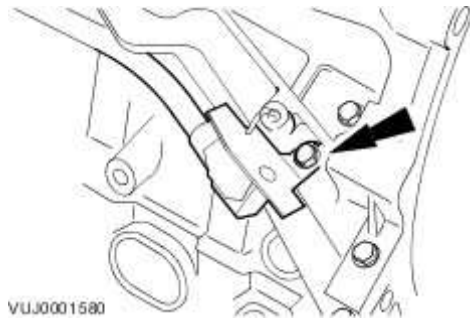
27 . Disconnect the crankshaft position sensor electrical connector.



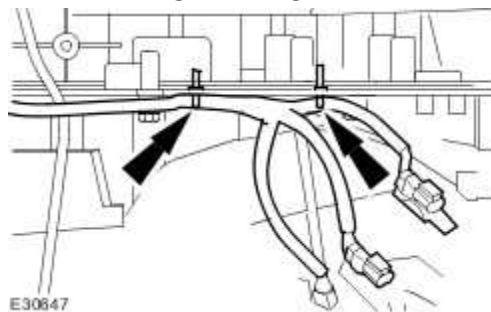
28 . Remove the crankshaft position sensor.



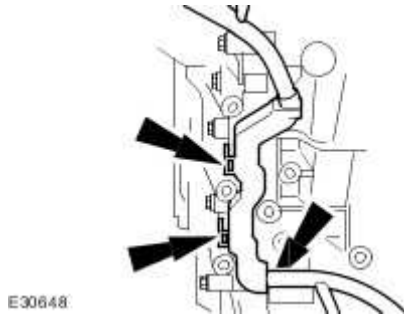
29 . Detach the engine wiring harness.



30 . Detach the engine wiring harness.

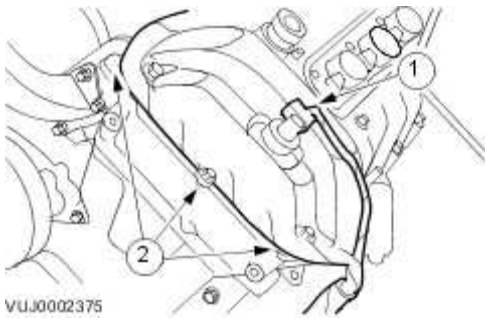


31 . Detach the engine wiring harness.

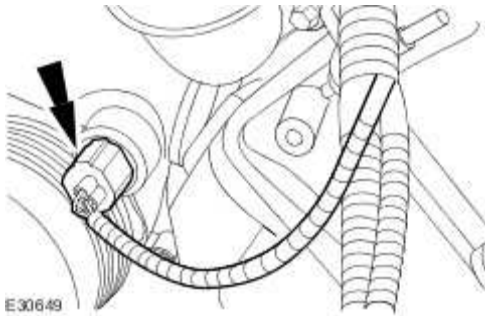


32 . Detach the engine wiring harness.

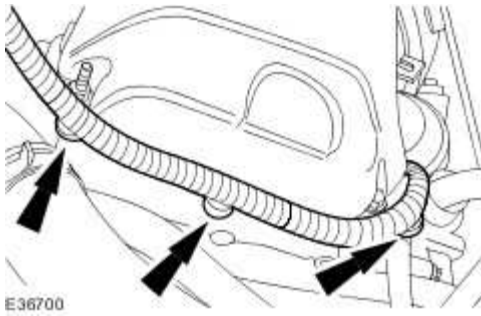
1. Disconnect the variable valve timing (VVT) solenoid electrical connector.
2. Detach the engine wiring harness.



33 . Disconnect the coolant temperature sensor electrical connector.

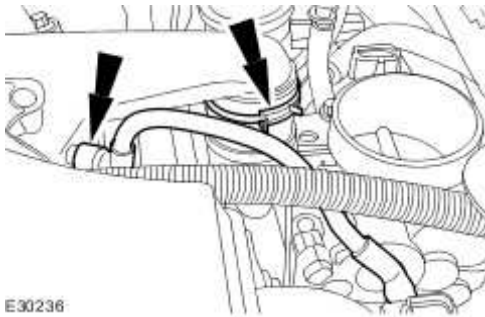


34 . Detach the engine wiring harness.



35 . Detach the hoses.

- Reposition the hose retaining clip.



36 . Detach the supercharger outlet pipe coolant hose.

- Cap the coolant ports.

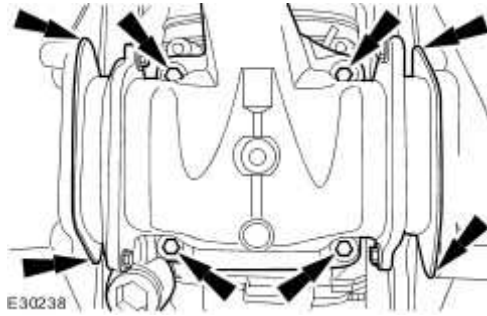


37 .



CAUTION: Make sure no foreign matter enters the supercharger.

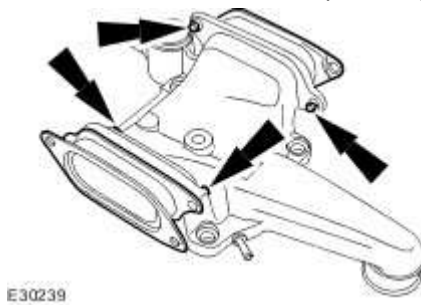
Remove the supercharger outlet pipe



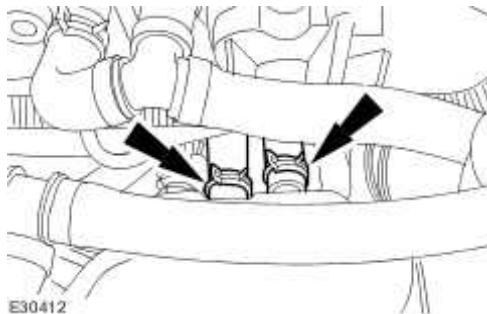
38 . Remove and discard the supercharger outlet pipe gasket.

39 . Remove and discard the supercharger outlet pipe retaining bolt seals.

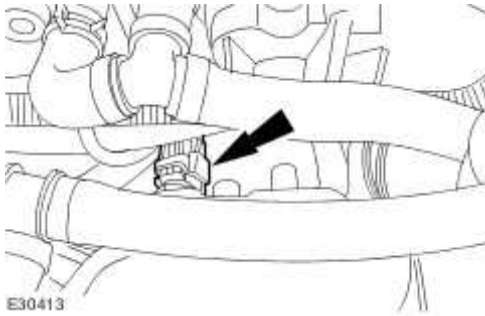
40 . Remove and discard the supercharger outlet pipe to charge air coolers ducts.



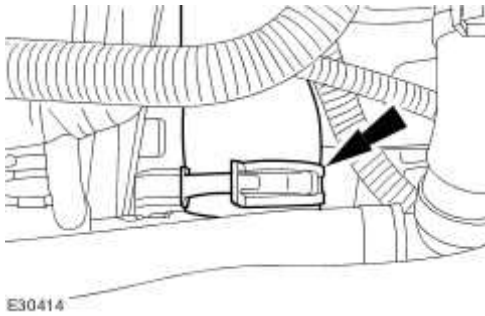
41 . Disconnect the thermostat housing hoses



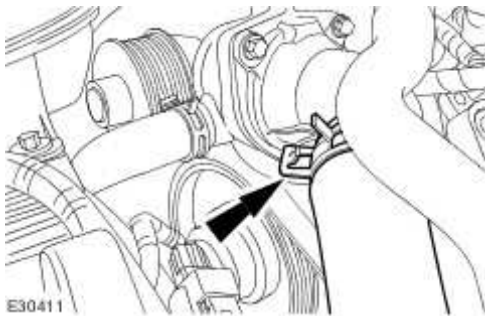
42 . Disconnect the coolant temperature sensor electrical connector.



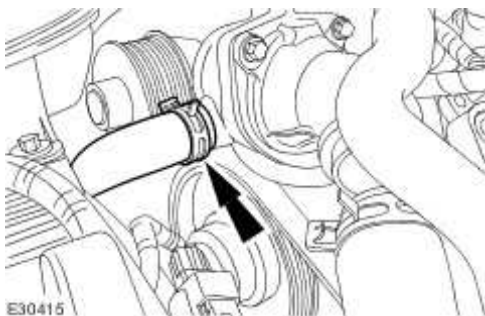
43 . Reposition the thermostat housing hose retaining clip.



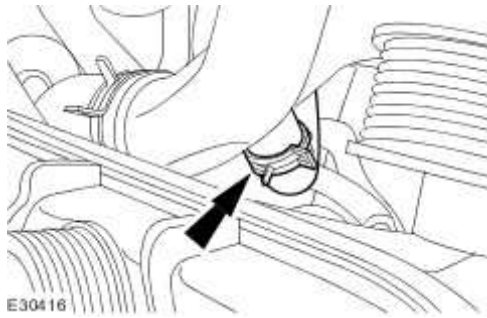
44 . Disconnect the hose.



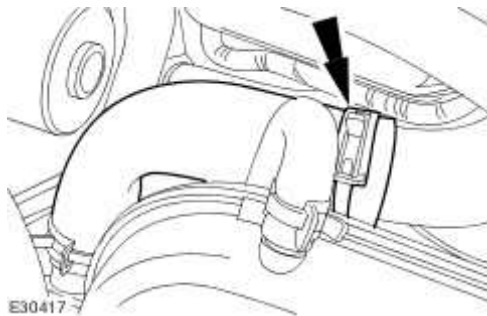
45 . Disconnect the hose.



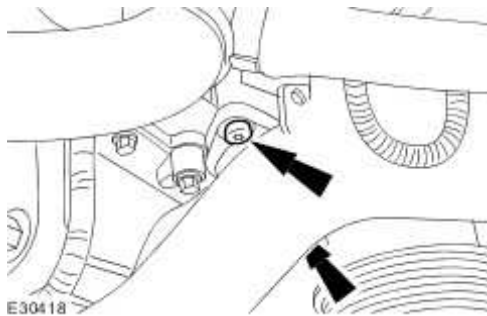
46 . Disconnect the hose.



47 . Disconnect the hose.

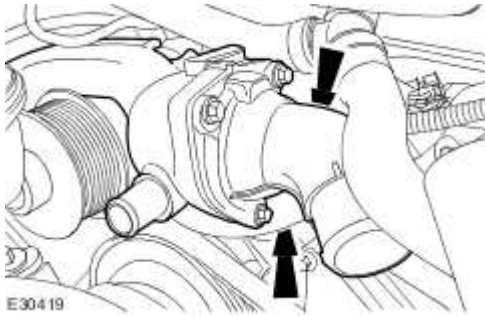


48 . Remove the thermostat housing retaining bolts.

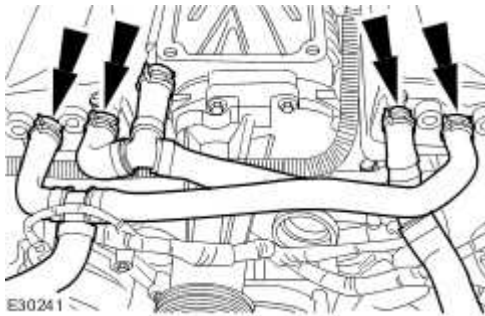


49 . Remove the thermostat housing.

- Remove and discard the thermostat housing O-ring seals.



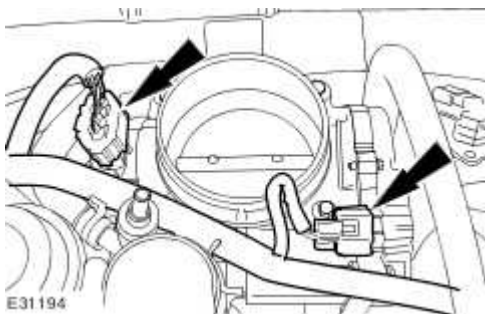
50 . Disconnect the charge air cooler coolant pipes.



51 . Disconnect the intake air temperature (IAT) sensor electrical connector.



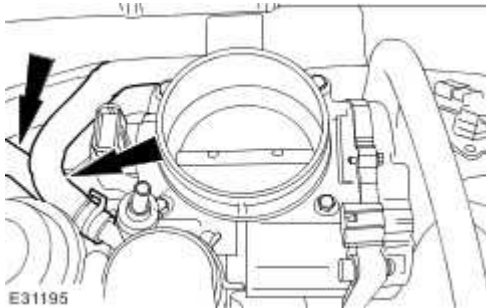
52 . Disconnect the electrical connectors.



53 . **NOTE:**

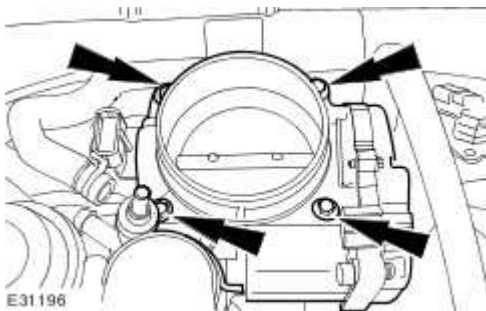
Cap the exposed ports.

Detach the coolant hose from the throttle body.

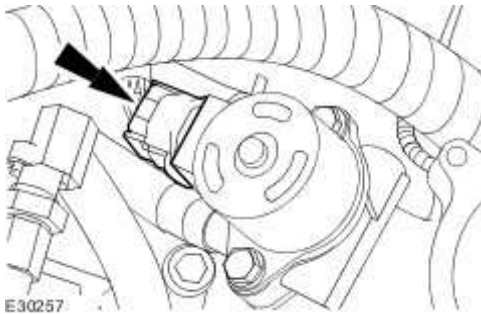


54 . Remove the throttle body.

- Remove and discard the gasket.



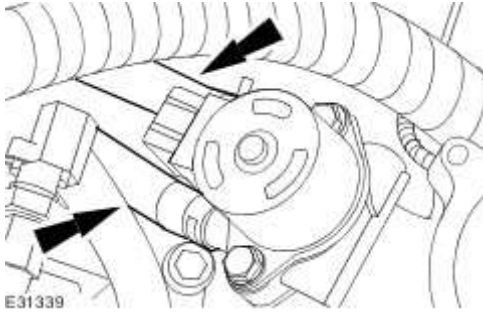
55 . Disconnect the exhaust gas recirculation (EGR) valve electrical connector.



56 . **NOTE:**

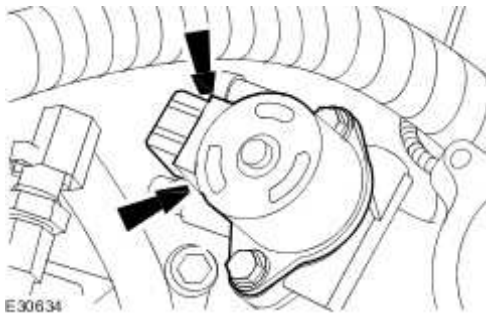
Cap the exposed ports.

Disconnect the coolant hoses.

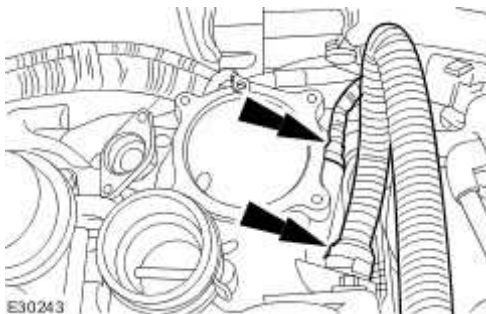


57 . Remove the EGR valve and the exhaust manifold to EGR valve tube.

- Remove the retaining bolts.
- Remove and discard the exhaust manifold to EGR valve tube gasket.
- Remove and discard the EGR valve to air intake elbow gasket.



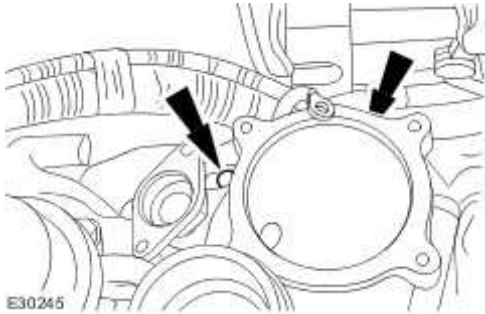
58 . Disconnect the air intake elbow pipes.



59 . **NOTE:**

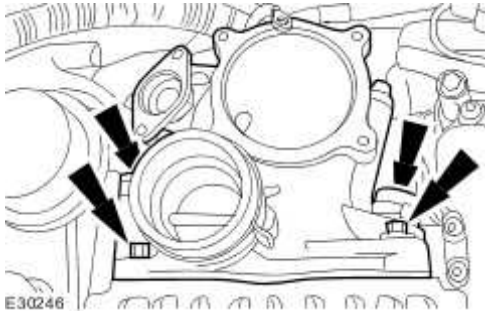
Make sure correct location of the ground strap is noted.

Remove the air intake elbow retaining bracket lower retaining bolts.



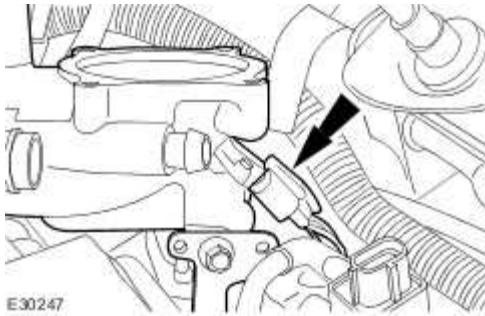
60 . Detach the air intake elbow.

- Remove and discard the gasket.
- Remove and discard the retaining bolt seals.



61 . Remove the air intake elbow.

- Disconnect the manifold absolute pressure (MAP) sensor.



62 . Remove the supercharger.



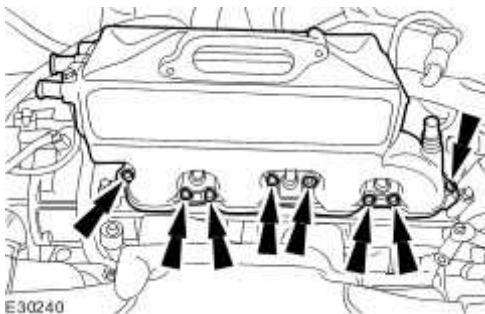
63 .  **CAUTION:** Make sure no foreign matter enters the cylinder head ports.

NOTE:

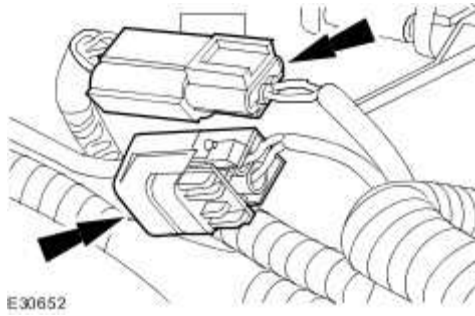
Right-hand shown, left-hand similar.

Remove the charge air coolers.

- Remove and discard the charge air cooler gasket.



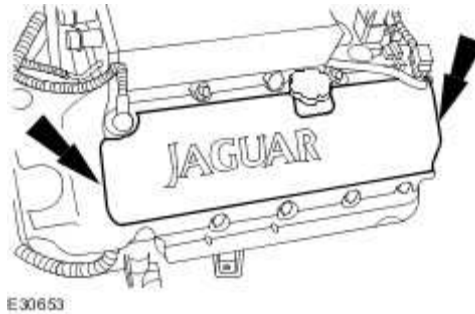
64 . Disconnect the knock sensor electrical connectors.



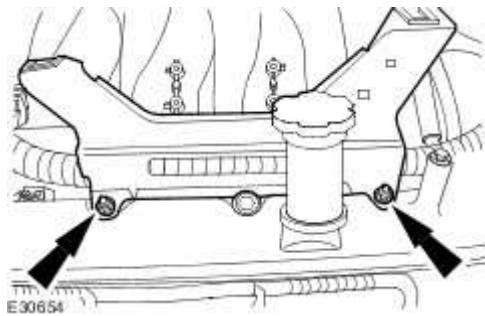
65 . **NOTE:**

Left-hand shown, right-hand similar.

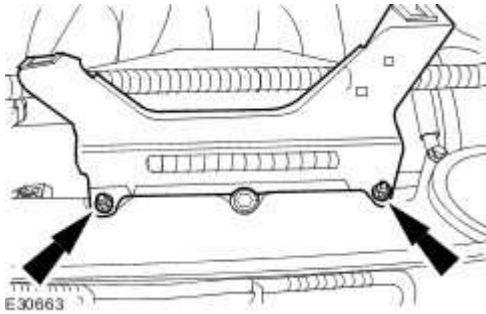
Remove the ignition coil cover.



66 . Remove the engine cover retaining bracket.



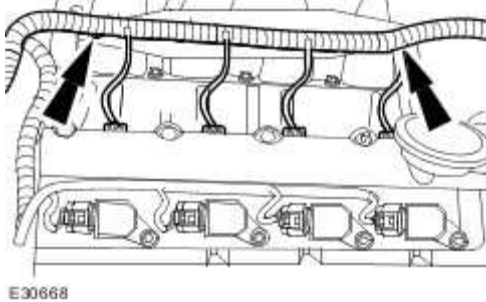
67 . Remove the engine cover retaining bracket.



68 . NOTE:

Right-hand shown, left-hand similar.

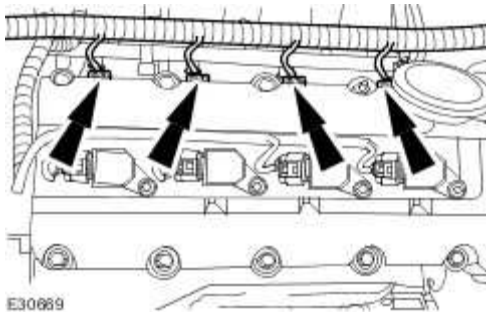
Detach the engine wiring harness.



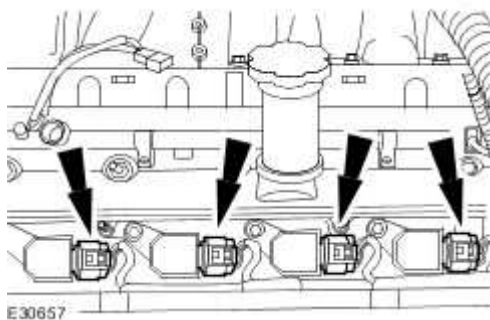
69 . NOTE:

Right-hand shown, left-hand similar.

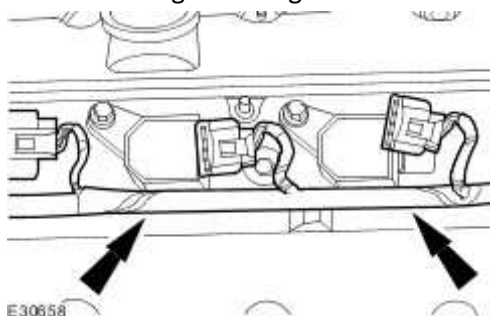
Disconnect the fuel injector electrical connectors.



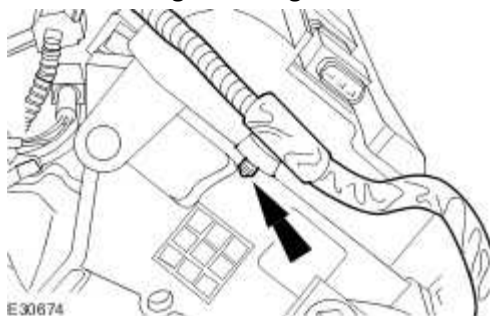
70 . Disconnect the ignition on-plug coil electrical connectors.



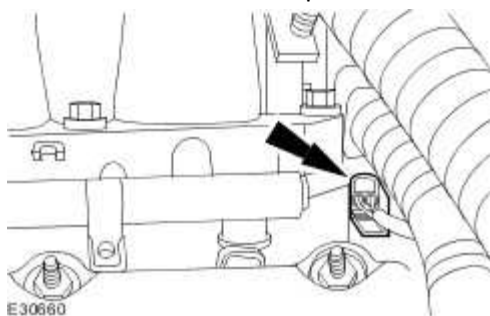
71 . Detach the engine wiring harness.



72 . Detach the engine wiring harness.



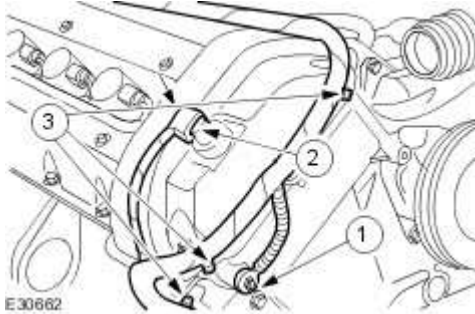
73 . Disconnect the camshaft position sensor electrical connector.



74 . Detach the engine wiring harness.

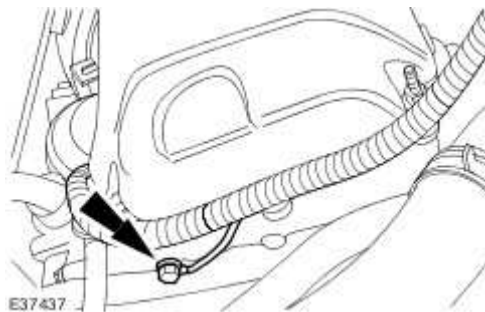
- Detach the ground cable.
- Disconnect the variable valve timing (VVT) solenoid electrical connector.

3. Detach the engine wiring harness.

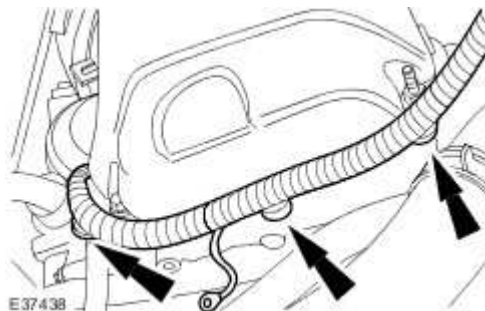


75 . Detach the engine wiring harness.

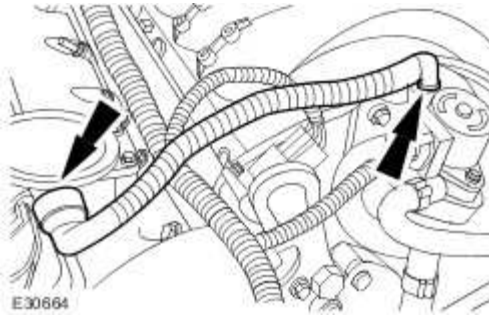
- Remove the retaining bolt.



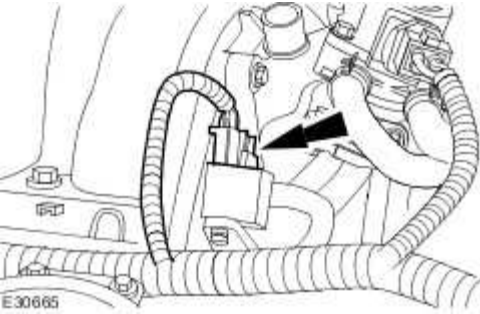
76 . Detach the engine wiring harness.



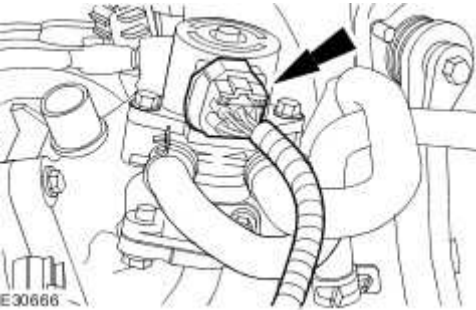
77 . Disconnect the positive crankcase ventilation pipe.



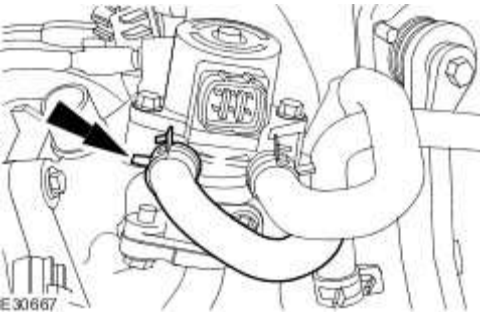
78 . Disconnect the fuel pressure regulator electrical connector.



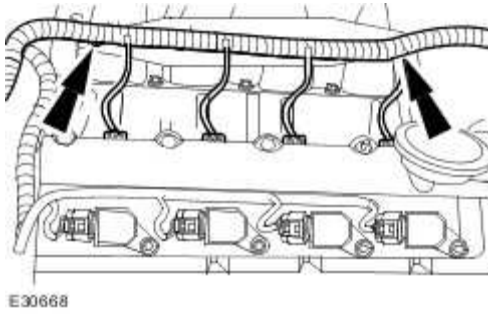
79 . Disconnect the exhaust gas recirculation valve electrical connector.



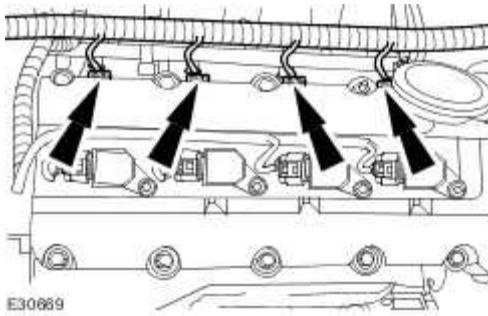
80 . Disconnect the exhaust gas recirculation valve coolant hose.



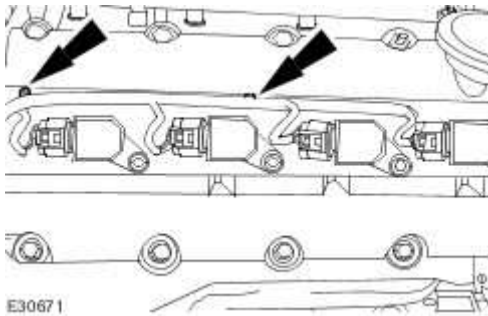
81 . Detach the engine wiring harness.



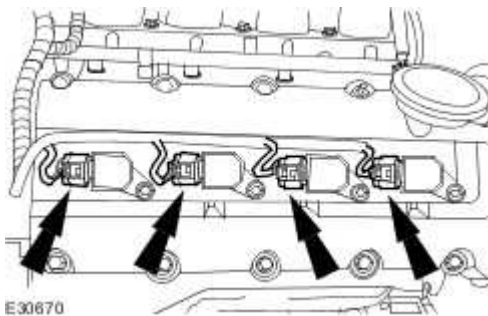
82 . Disconnect the fuel injector electrical connectors.



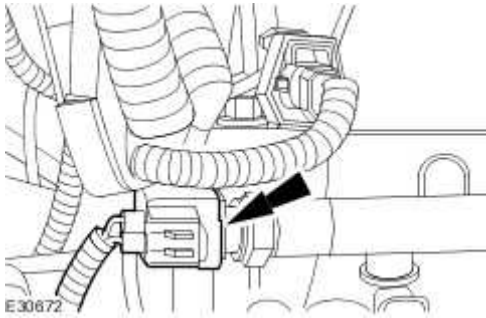
83 . Detach the engine wiring harness.



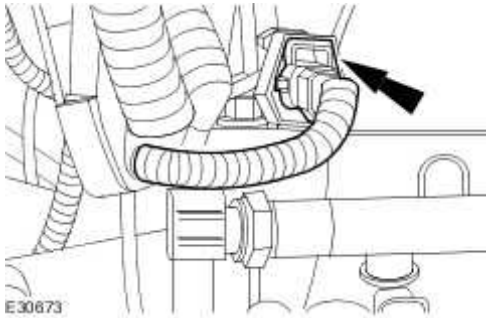
84 . Disconnect the ignition on-plug coil electrical connectors.



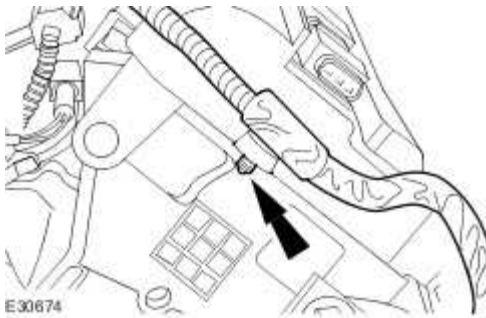
85 . Disconnect the fuel temperature sensor electrical connector.



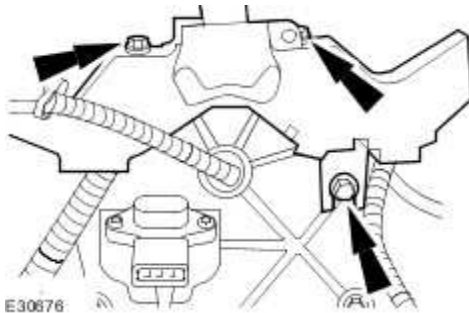
86 . Disconnect the camshaft position sensor electrical connector.



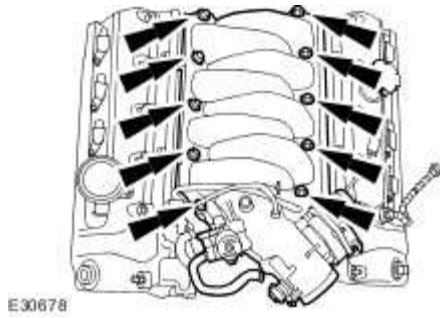
87 . Detach the engine wiring harness



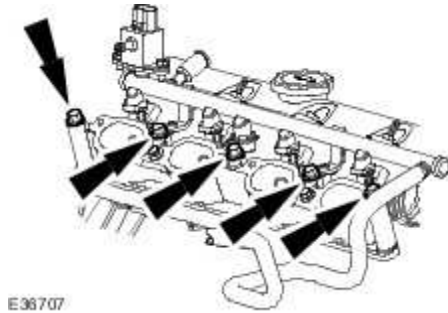
88 . Detach the engine wiring harness.



89 . Remove the intake manifold.



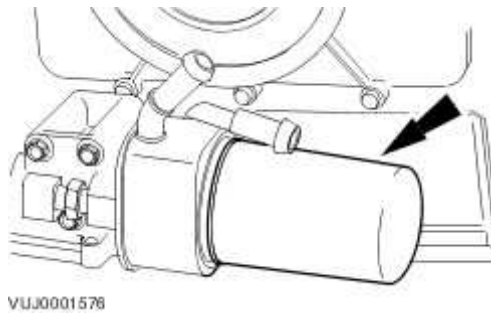
90 . Remove the lower intake manifold.



91 . **NOTE:**

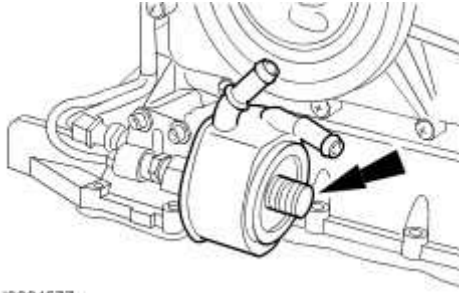
Place a suitable container underneath the filter to prevent oil spillage.

Remove the oil filter element.

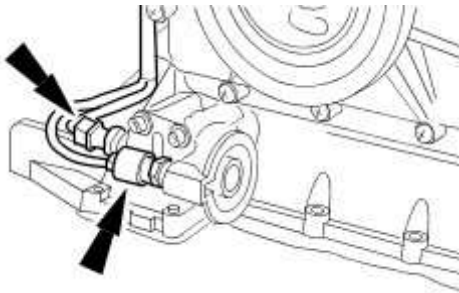


92 . Remove the oil cooler.

- Remove and discard the O-ring seal.

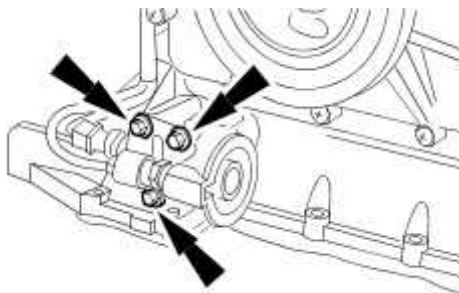


93 . Disconnect the oil pressure switch and oil temperature sensor electrical connectors.

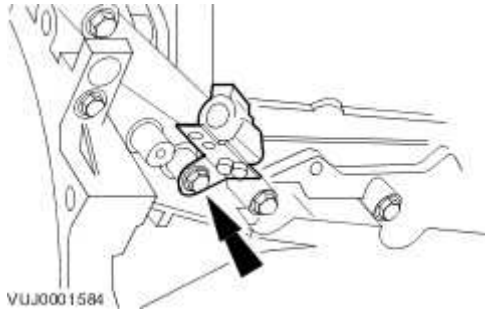


94 . Remove the oil filter housing.

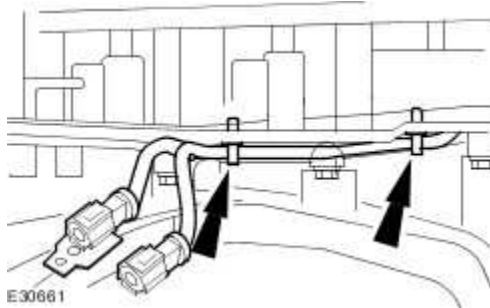
- Remove and discard the O-ring seal.



95 . Detach the right-hand oxygen sensor.

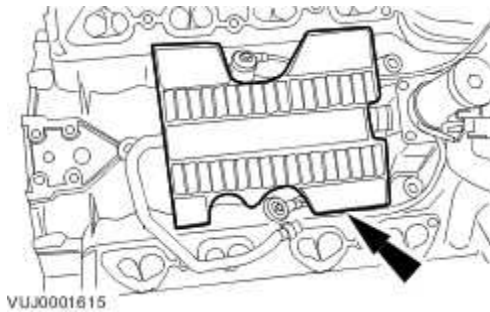


96 . Detach the engine wiring harness retaining clips.



97 . Remove the engine wiring harness

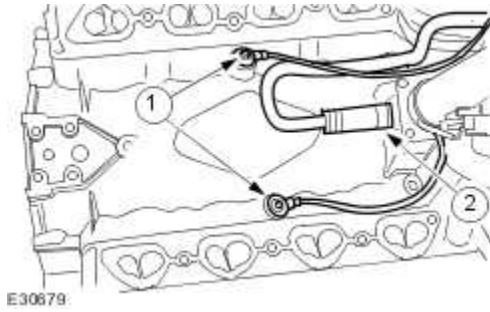
98 . Remove the noise and vibration insulating pad.



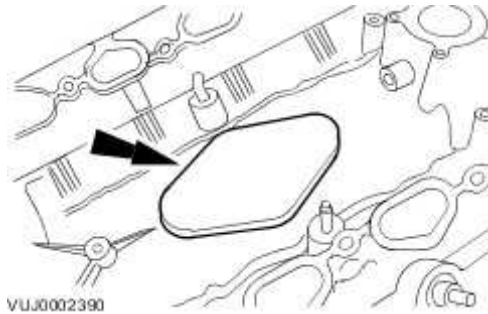
99 . Remove the intake manifold heater coolant hose.

4. Remove the knock sensors.

5. Remove the intake manifold heater coolant hose.

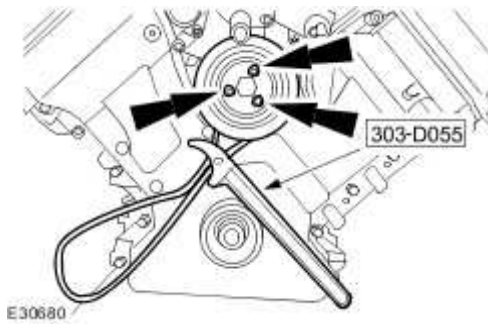


100 . Remove the engine block insulation grommet.



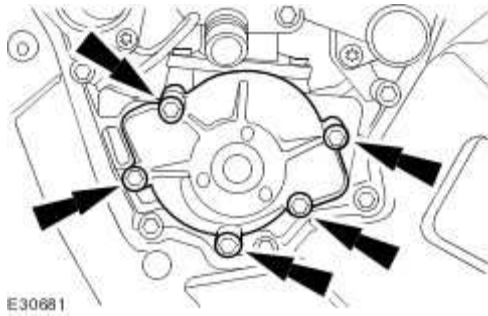
101 . Remove the water pump pulley.

- Using the special tool, retain the water pump pulley.



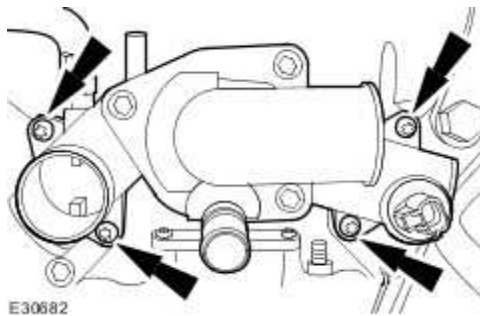
102 . Remove the water pump.

- Remove and discard the gasket.
- Remove and discard the O-ring seal.



103 . Remove the thermostat housing.

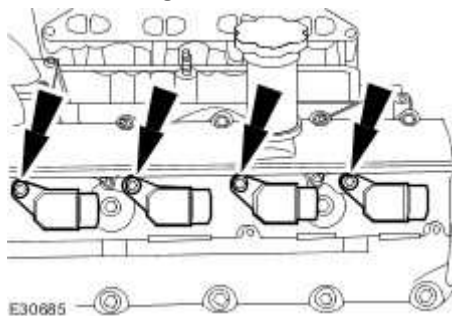
- Remove and discard the O-ring seals.



104 . **NOTE:**

Left-hand shown, right-hand similar

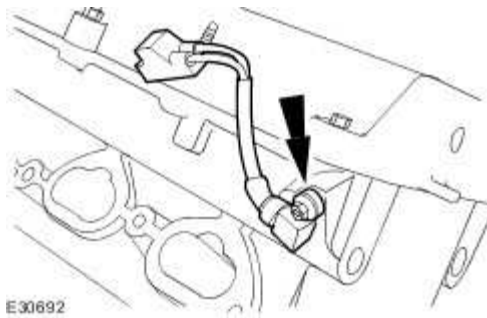
Remove the ignition coils.



105 . Remove the spark plugs.

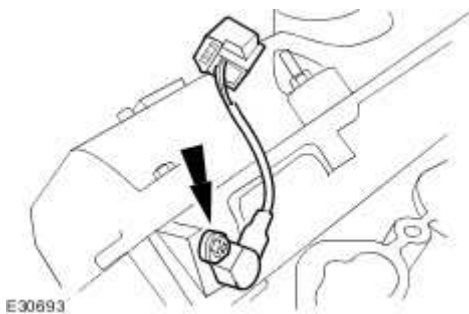
106 . Remove the right-hand camshaft position (CMP) sensor.

- Remove and discard the O-ring seal.



107 . Remove the left-hand camshaft position (CMP) sensor.

- Remove and discard the O-ring seal.



108



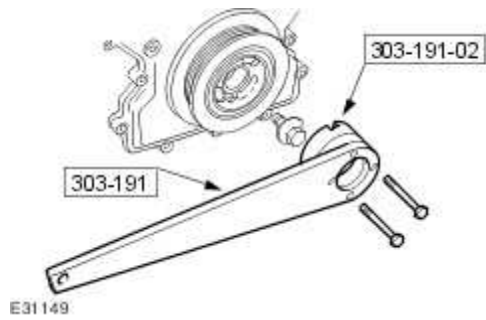
CAUTION: Under no circumstances should the crankshaft setting peg 303-645 be used in the following operations to lock the crankshaft.

NOTE:

The crankshaft retaining bolt will be very tight.

Using special tools, retain the crankshaft pulley.

- Remove and discard the crankshaft pulley bolt.



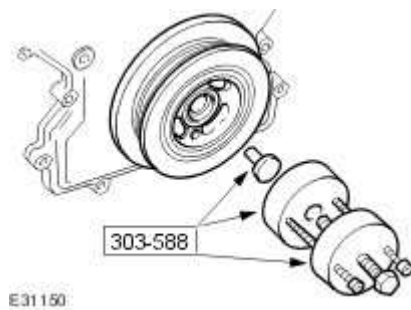
109 . Remove the special tools.

110 . **NOTE:**

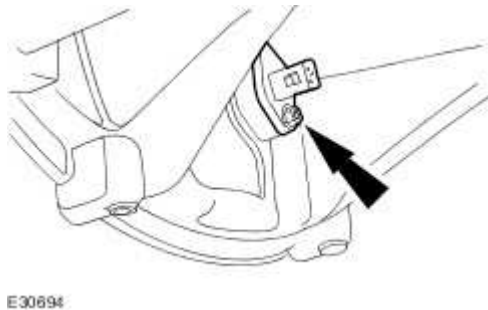
The crankshaft pulley will be very tight.

Using special tools, remove the crankshaft pulley.

- Collect the locking ring.
- Remove and discard the O-ring seal.



111 . Remove the crankshaft position (CKP) sensor.



112



CAUTION: Make sure the spark plugs are removed to enable the engine to rotate freely.

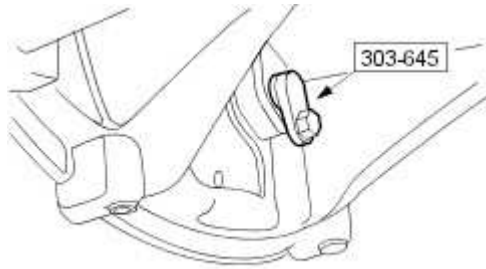


CAUTION: Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.



CAUTION: Rotate the crankshaft clockwise to position the engine to top dead center (TDC) No. 1 cylinder.

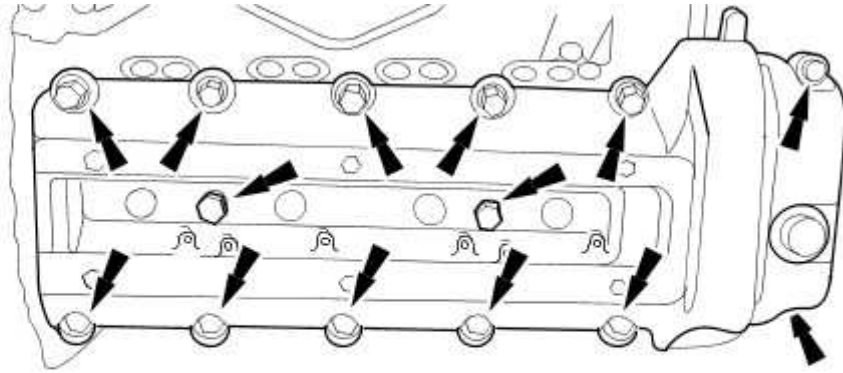
Install the special tool 303-645.



VUJ0002400

113 . Remove the right-hand valve cover.

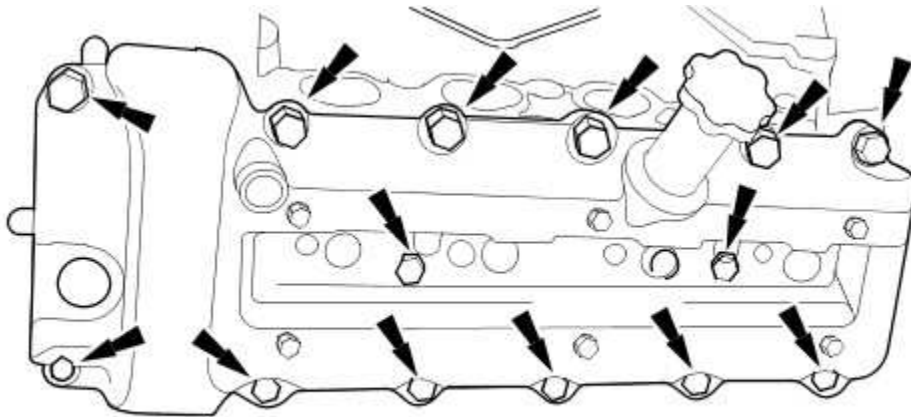
- Discard the valve cover gaskets.



E30696

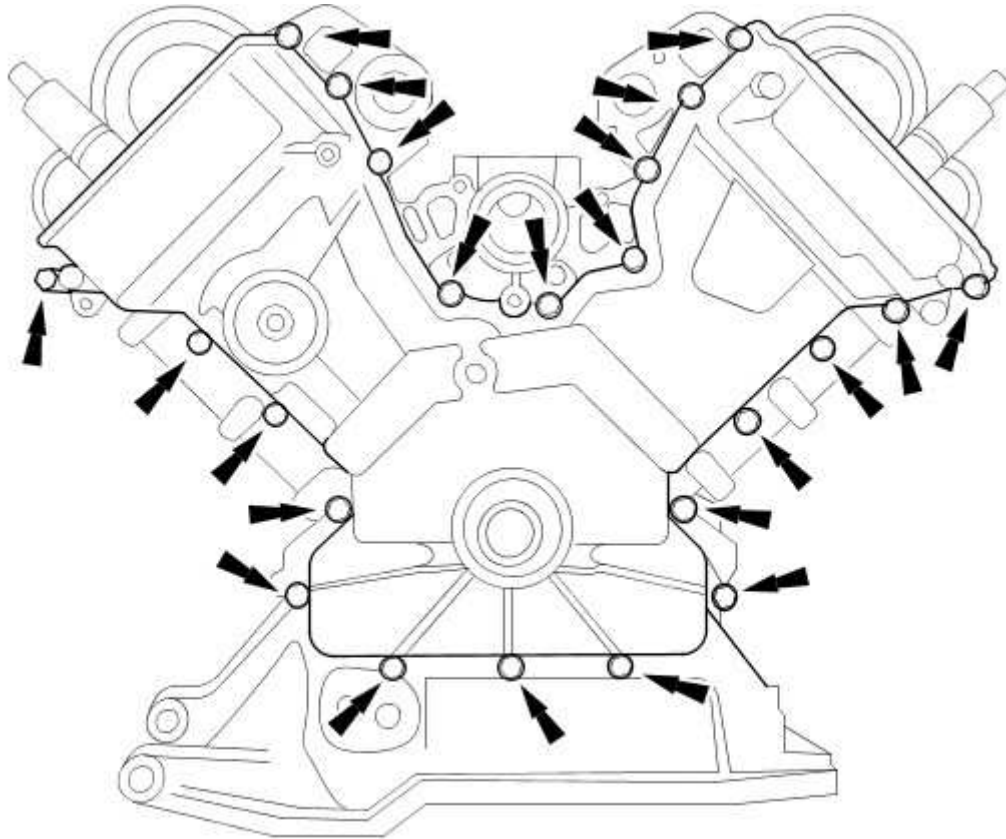
114 . Remove the left-hand valve cover.

- Discard the valve cover gaskets.



E30697

115 . Remove the engine front cover.



VUJ0002398

116 . Remove the right-hand variable camshaft timing oil control unit housing.

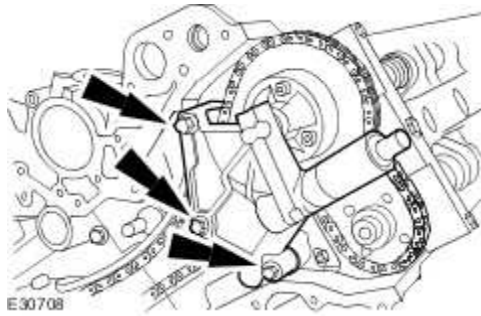
- Remove and discard the O-ring seals.



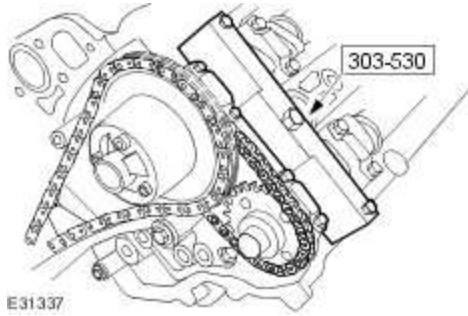
E30699

117 . Remove the left-hand variable camshaft timing oil control unit housing.

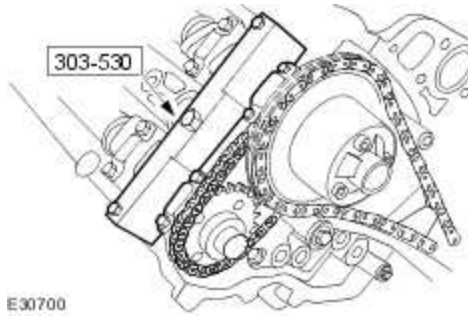
- Remove and discard the O-ring seals.



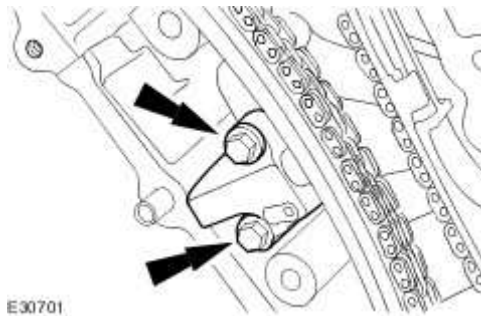
118 . Install the special tool to the left-hand cylinder head.



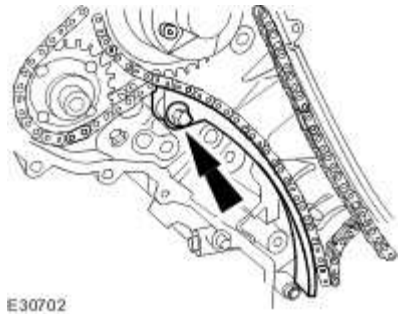
119 . Install the special tool to the right-hand cylinder head.



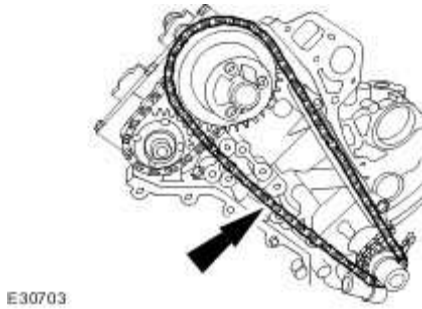
120 . Remove the primary timing chain tensioner assembly.



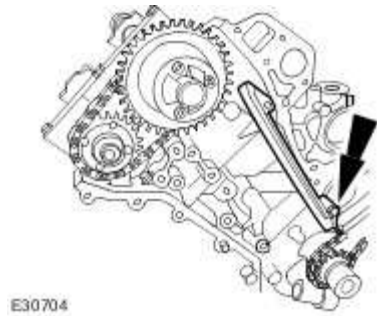
121 . Remove the primary timing chain tensioner guide.



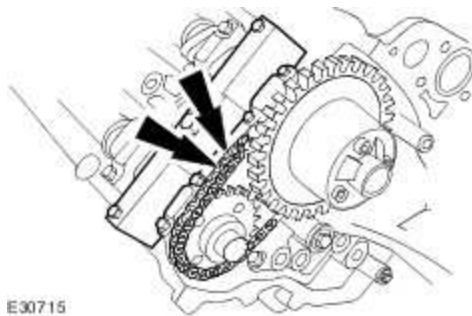
122 . Remove the primary timing chain.



123 . Remove the primary timing chain guide.

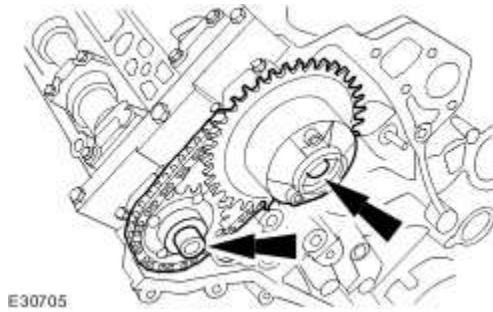


124 . Remove the secondary timing chain tensioner retaining bolts.

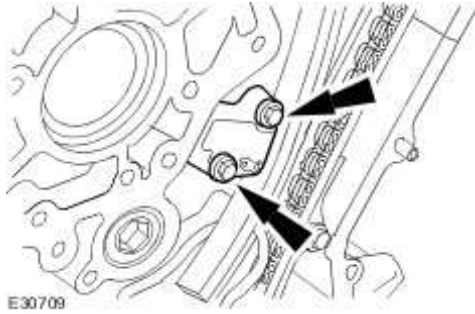


125 Remove the camshaft sprockets.

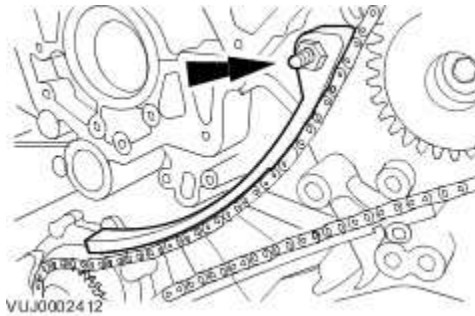
- Remove the secondary timing chain tensioner and secondary timing chain from the camshaft sprockets.



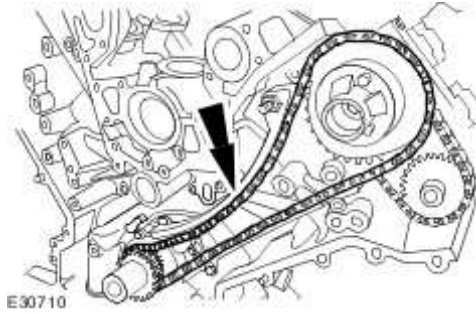
126 . Remove the primary timing chain tensioner assembly.



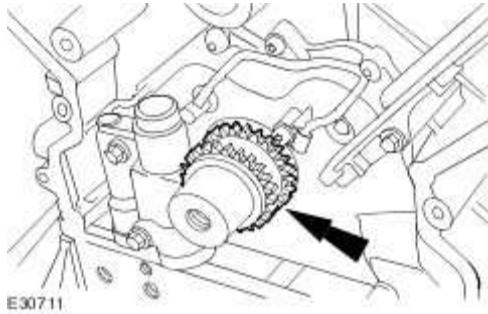
127 . Remove the primary timing chain tensioner guide.



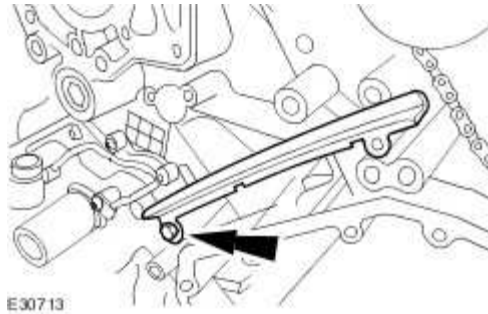
128 . Remove the primary timing chain.



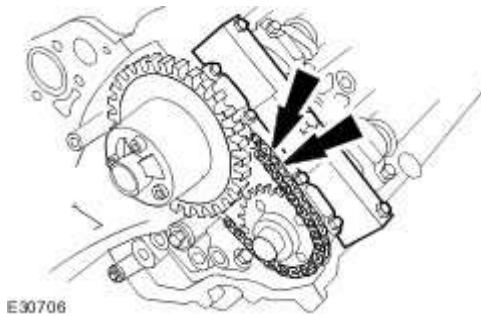
129 . Remove the crankshaft sprocket.



130 . Remove the primary timing chain tensioner guide.

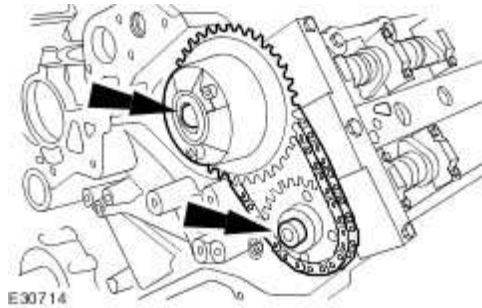


131 . Remove the secondary timing chain tensioner retaining bolts.

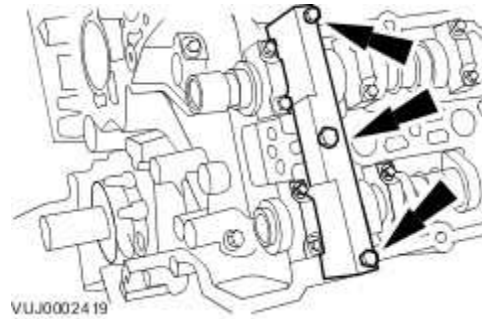


132 Remove the camshaft sprockets.

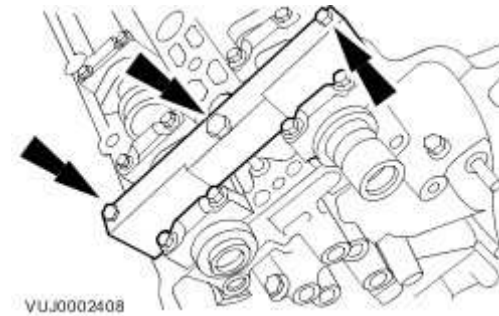
- Remove the secondary timing chain tensioner and secondary timing chain from the camshaft sprockets.



133 . Remove the camshaft setting tool.



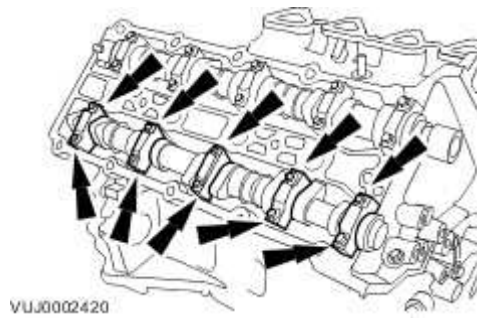
134 . Remove the camshaft setting tool.



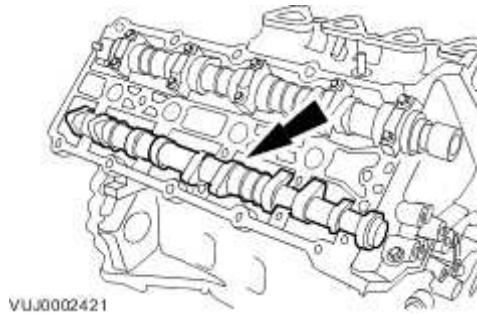
135 Remove the camshaft bearing caps.

- Remove the camshaft bearing cap retaining bolts evenly and in stages.
- Remove the camshaft bearing caps. Note their orientation and markings, each is

marked with its position (a number) and orientation (an arrow).

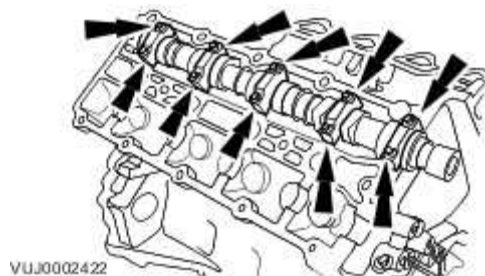


136 . Remove the right-hand exhaust camshaft.

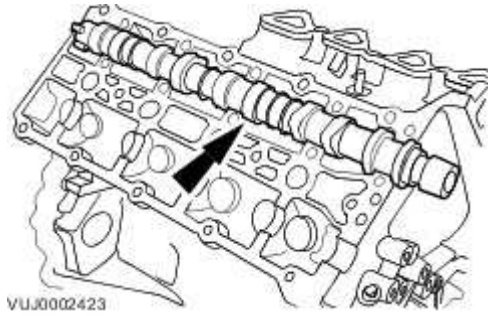


137 Remove the camshaft bearing caps.

- Remove the camshaft bearing cap retaining bolts evenly and in stages.
- Remove the camshaft bearing caps. Note their orientation and markings, each is marked with its position (a number) and orientation (an arrow).

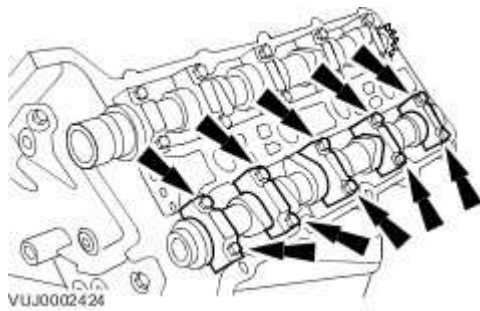


138 . Remove the right-hand intake camshaft.

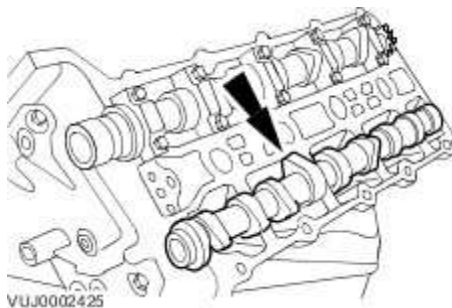


139 Remove the camshaft bearing caps.

- Remove the camshaft bearing cap retaining bolts evenly and in stages.
- Remove the camshaft bearing caps. Note their orientation and markings, each is marked with its position (a number) and orientation (an arrow).



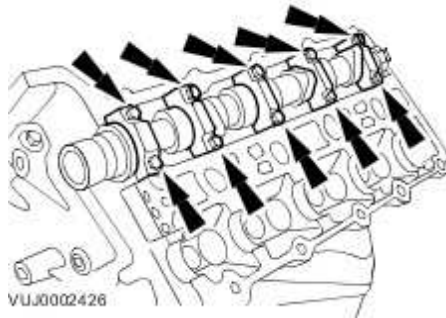
140 . Remove the left-hand exhaust camshaft.



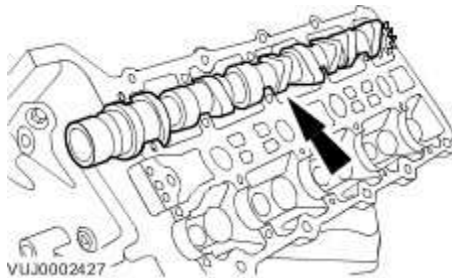
141 Remove the camshaft bearing caps.

- Remove the camshaft bearing cap retaining bolts evenly and in stages.

- Remove the camshaft bearing caps. Note their orientation and markings, each is marked with its position (a number) and orientation (an arrow).



142 . Remove the left-hand inlet camshaft.



143



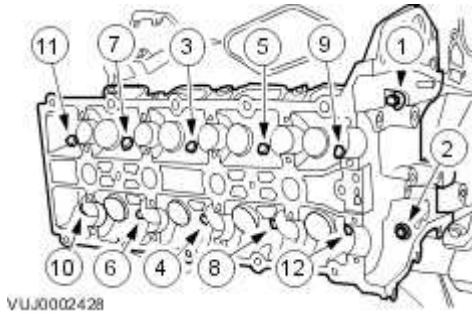
CAUTION: The bolts can only be used twice, mark the bolts with a center punch. If two punch marks are visible, discard the bolts.



CAUTION: Vehicles fitted with Polydrive cylinder head bolts, the cylinder head bolts must be removed using a 10 mm Polydrive socket or a 10 mm Allen key. Failure to follow this instruction may result in damage to the component.

Remove the right-hand cylinder head.

- Remove the bolts in the indicated sequence.
- Remove and discard the gasket.



144



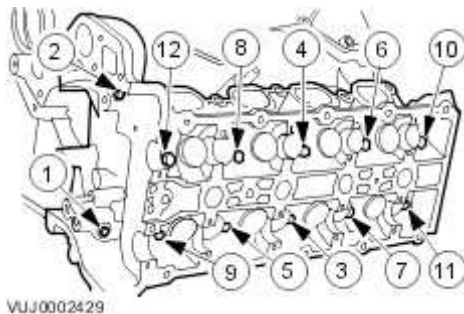
CAUTION: The bolts can only be used twice, mark the bolts with a center punch. If two punch marks are visible, discard the bolts.



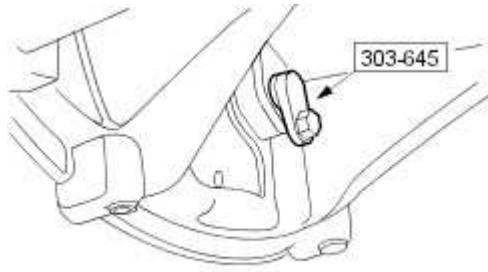
CAUTION: Vehicles fitted with Polydrive cylinder head bolts, the cylinder head bolts must be removed using a 10 mm Polydrive socket or a 10 mm Allen key. Failure to follow this instruction may result in damage to the component.

Remove the left-hand cylinder head.

- Remove the bolts in the indicated sequence.
- Remove and discard the gasket.



145 . Remove the crankshaft setting peg 303-645 from the crankshaft position sensor location.

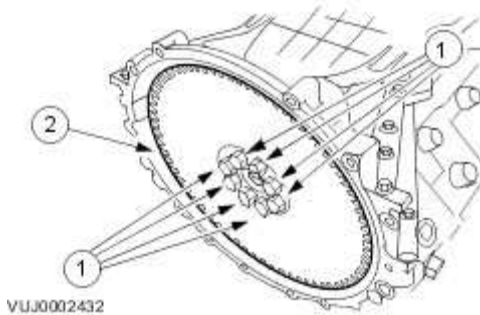


VUJ0002400

146 . Remove the flexplate.

6. Remove the flexplate retaining bolts.

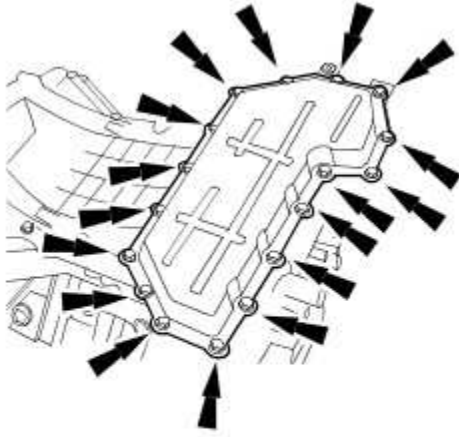
7. Remove the flexplate.



VUJ0002432

147 . Remove the lower oil pan.

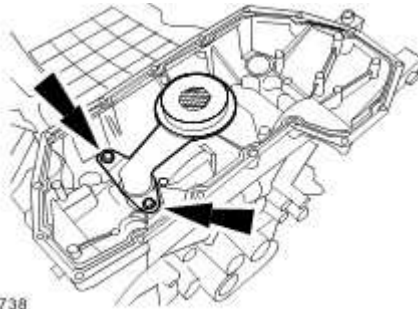
- Remove and discard the gasket.



VUJ0002433

148 . Remove the oil strainer.

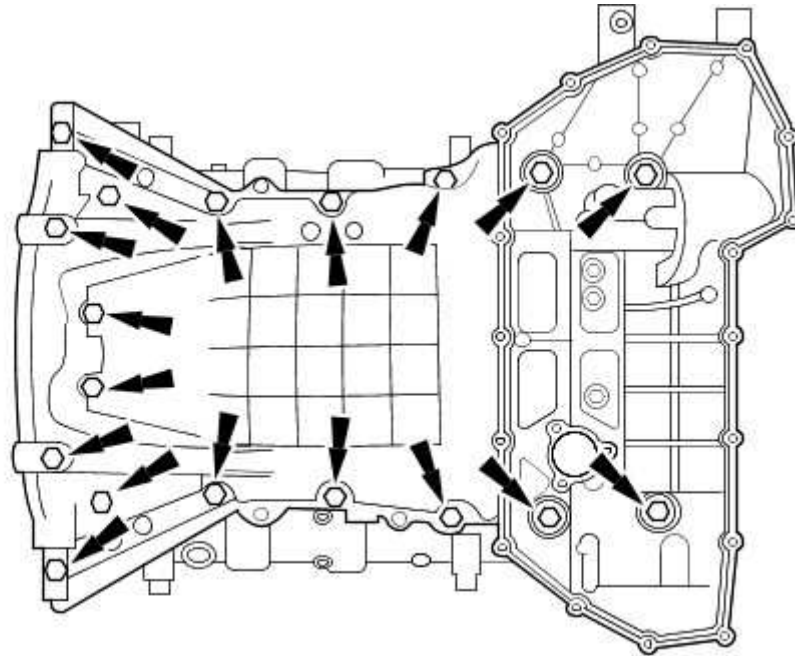
- Remove and discard the O-ring seal.



E30738

149 . Remove the upper oil pan.

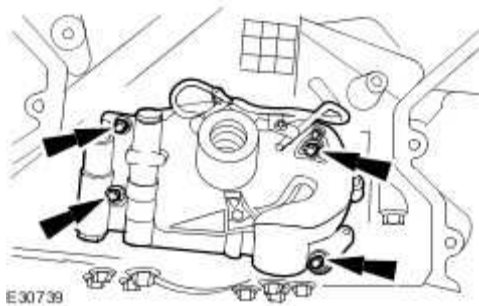
- Remove and discard the gasket.



VUJ0002435

150 . Remove the oil pump.

- Remove and discard the gasket.



E30739

151 Inspect the tops of the cylinder bores. As necessary remove ridge and carbon build up from each cylinder.

152 . Remove the piston cooling jets.

153



CAUTION: Pistons, connecting rods and connecting rod bearings should be

numbered to make sure they are reassembled in the same position.

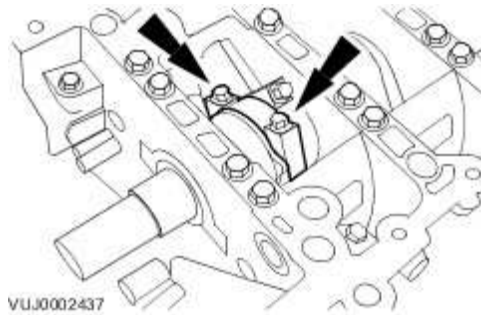
NOTE:

Mark the position of the connecting rod caps to the connecting rods to make sure of correct installation.

NOTE:

Discard the connecting rod bolts after removal.

Remove the connecting rod bolts, the connecting rod caps and the lower connecting rod bearings.

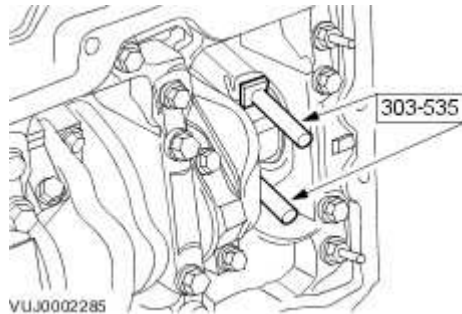


154



CAUTION: Use appropriate protection to prevent damage to the crankshaft bearing journals and cylinder bore surfaces.

Install special tools to the connecting rods.



155



CAUTION: Care should be taken not to damage the connecting rod and cap joint

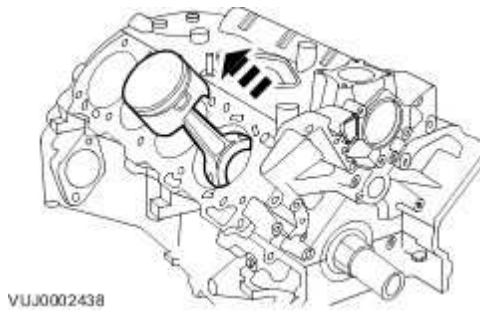
face surfaces or possible engine damage may occur. Avoid contaminating the fractured joint surfaces with dirt or grease.

NOTE:

Attach the connecting rods and caps after removal to avoid mismatch.

Remove the pistons.

- Rotate the crankshaft to locate pistons at the bottom of travel.
- Push the piston, connecting rod and upper bearing through the top of the cylinder.



156 . **NOTE:**

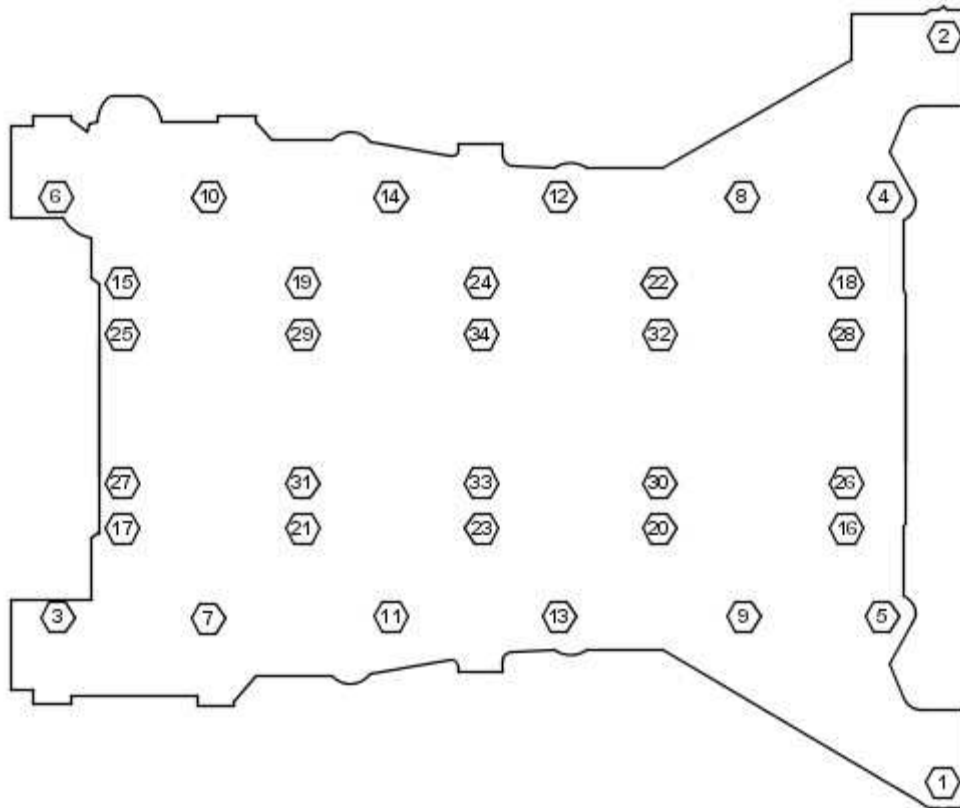
Remove the lower cylinder block bolts in the indicated sequence.

NOTE:

Mark the position of the upper and lower crankshaft main bearings for reassembly.

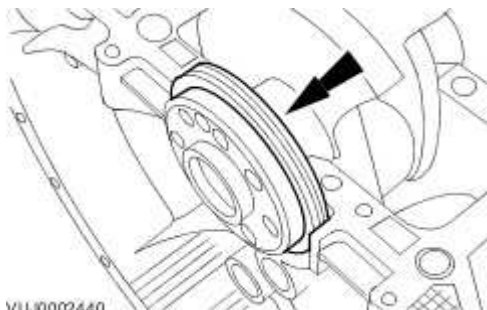
Remove the lower cylinder block.

- Remove the lower cylinder block retaining bolts in the indicated sequence.



VUJ0002439

157 . Discard the crankshaft rear main oil seal.



VUJ0002440

158

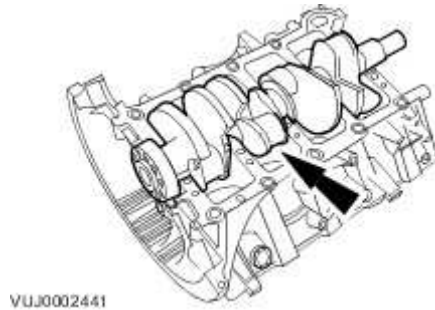


CAUTION: Avoid damage to any crankshaft bearing surfaces.

NOTE:

Never remove any pipe, plugs or dowels unless they are to be newly installed or the cylinder block is to be washed.

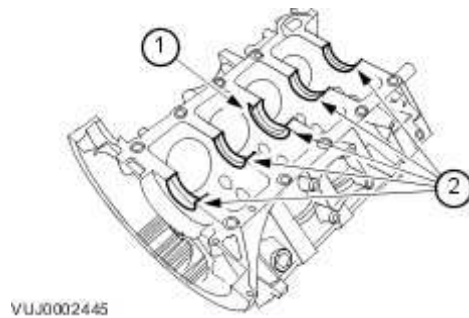
Remove the crankshaft.



159 . Remove the upper crankshaft main bearings.

8. Remove the upper crankshaft thrust washers.

9. Remove the upper crankshaft main bearings.



160 Clean the cylinder block with a soap and water solution. Dry the cylinder block completely with compressed air.

Cylinder Head (12.29.22)

Special Service Tools



Valve Spring Compressor
303-252

Disassembly

1

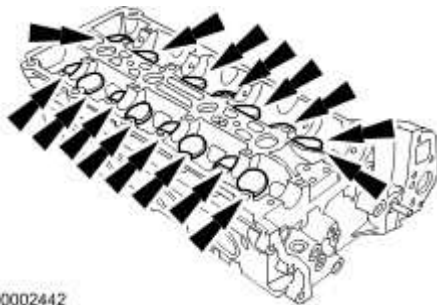


- CAUTION: Do not use a magnet to remove shims. Failure to follow these instructions may result in damage to the vehicle.



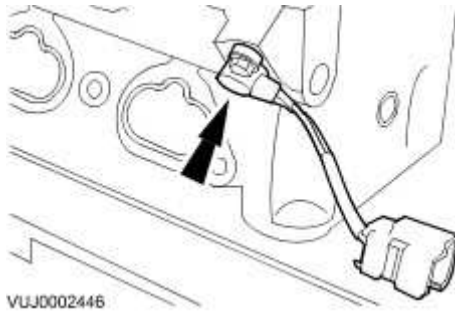
CAUTION: If the cylinder head valve components are to be reused, mark the position of the valve components to make sure they are reassembled in the same position.

Remove the bucket tappet and shim assemblies.



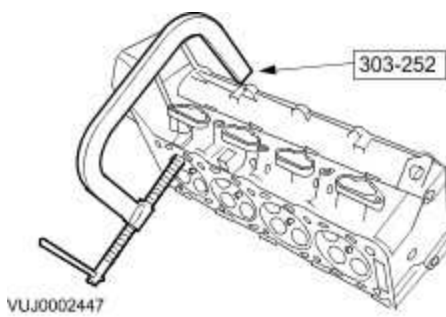
2 . Remove the camshaft position (CMP) sensor.

- Remove and discard the 'O' ring seal.



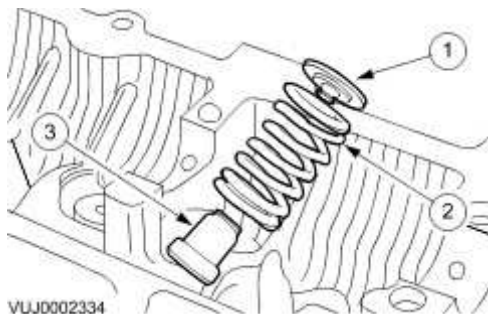
3 . Using the special tool, compress the valve springs.

- Remove the valve collets.



4 . Remove the valve spring retainers and valve springs.

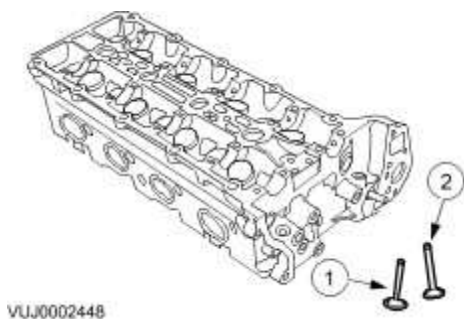
1. Remove the valve spring retainers.
2. Remove the valve springs.
3. Remove the valve stem oil seals.



5 . Remove the valves from the cylinder head.

4. Remove the intake valves.

5. Remove the exhaust valves.



6 Inspect the cylinder heads and related components. For additional information, refer to
 . <<303-00>>

7 . Remove the pipe plugs and alignment dowels as necessary to clean the cylinder heads.

Assembly

1



· **WARNING:** Eye protection is required during use of compressed air. Failure to follow

these instructions may result in personal injury.



CAUTION: The cylinder head surface finish is measured in microns. For correct head gasket sealing, avoid any contact of finish with metallic objects.

Clean gasket material, dirt and foreign material from cylinder heads. Wash with a suitable soap and water solution and dry the cylinder head completely using compressed air if pipe plugs have been removed.

2 . Install the pipe plugs and alignment dowels to cylinder heads.

- Apply pipe sealant to plugs prior to installation.

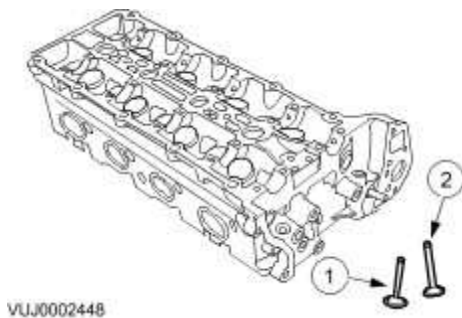
3 . **NOTE:**

Lubricate the valve stems before assembly.

Install the valves into the cylinder heads.

6. Install the intake valves.

7. Install the exhaust valves.

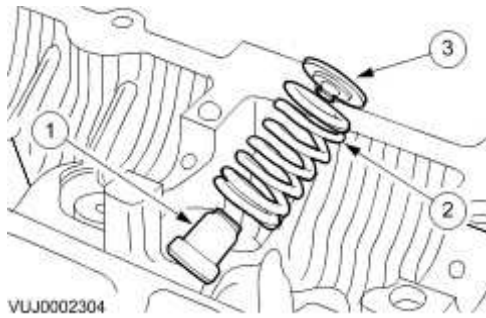


4 . Install the valve spring retainers and valve springs.

8. Install the valve stem oil seals.

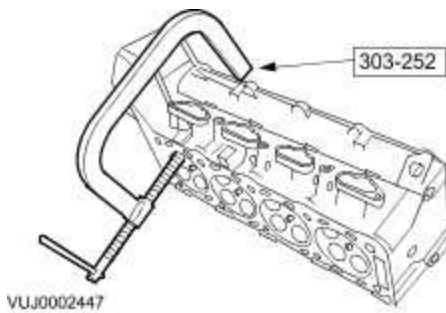
9. Install the valve springs.

10. Install the valve spring retainers.



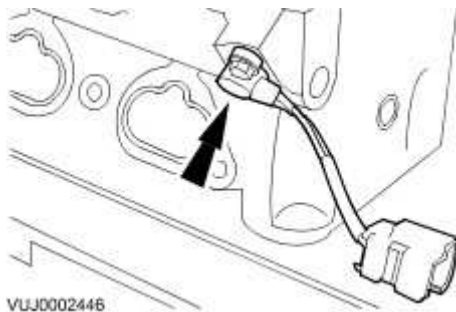
5 . Using the special tool, compress the valve springs.

- Install the valve collets.



6 . Install the camshaft position (CMP) sensor.

- Install a new 'O' ring seal.
- Tighten to 7 Nm.

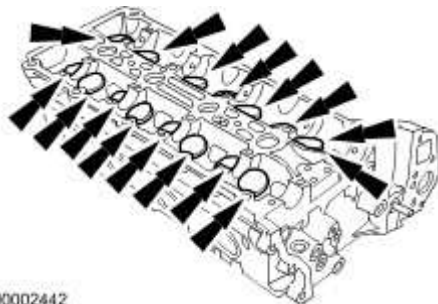


7



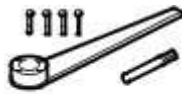
CAUTION: Do not use a magnet to install shims. Failure to follow these instructions may result in damage to the vehicle.

Install the bucket tappet and shim assemblies.



Engine

Special Service Tools



303-191

Crankshaft locking, main tool

303-191



303-191-02

Adapter

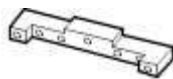
303-191-02



303-645

Crankshaft setting, main tool

303-645



303-530

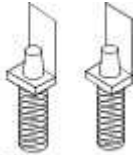
Camshaft setting

303-530



303-532

Timing chain tensioning tool
303-532



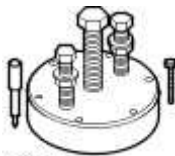
303-535

Cylinder Bore Protectors
303-535



303-372

Piston Ring Compressor
303-372



303-538

Crankshaft rear oil seal remover/replacer
303-538



303-750

Crankshaft front seal installer
303-538



303D055

Crankshaft damper holding tool
303-D055

Assembly

1



- **CAUTION: Use only a plastic scraper when removing old gasket material.**

Clean all the mating faces and reusable parts thoroughly and check for damage.

- If gasket material remains on the cylinder head after cleaning, use a plastic tipped scraper to remove remaining material.

2 . **NOTE:**

Never remove pipe plugs or alignment dowels unless they are to be serviced.

Reseal oil passage blanking plugs, as necessary.

3 . **NOTE:**

The main bearings are precision selective fit.

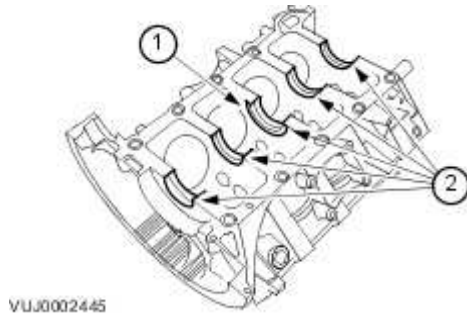
NOTE:

Lubricate the upper crankshaft main bearings and thrust washers.

Install the upper crankshaft main bearings.

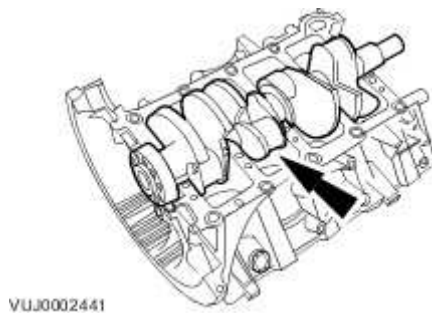
For additional information, refer to Camshaft Bearing Journal Clearance

1. Install the upper crankshaft thrust washers.
2. Install the upper crankshaft main bearings.



4.  **CAUTION:** Avoid damage to any crankshaft bearing surfaces.

Install the crankshaft.



5 **NOTE:**

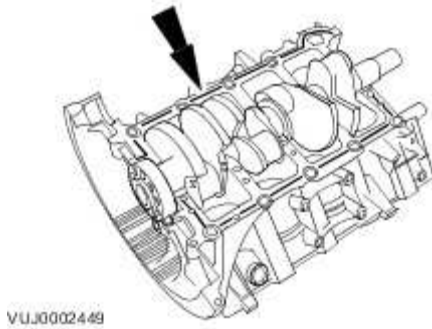
The main bearings are precision selective fit.

NOTE:

Install lower cylinder block and tighten bolts to specification within twenty minutes of applying sealer.

Apply a bead of sealant to the cylinder block housing.

- Use WSS-M4G320-A3-RTV sealant.



6



CAUTION: Make sure all dowels are fully seated into lower cylinder block prior to tightening the bolts.



CAUTION: Do not lubricate the lower cylinder block bolts.



CAUTION: Do not rotate crankshaft until all bolts are tightened to specification.



CAUTION: Bolts must be tightened within twenty minutes of applying sealer.

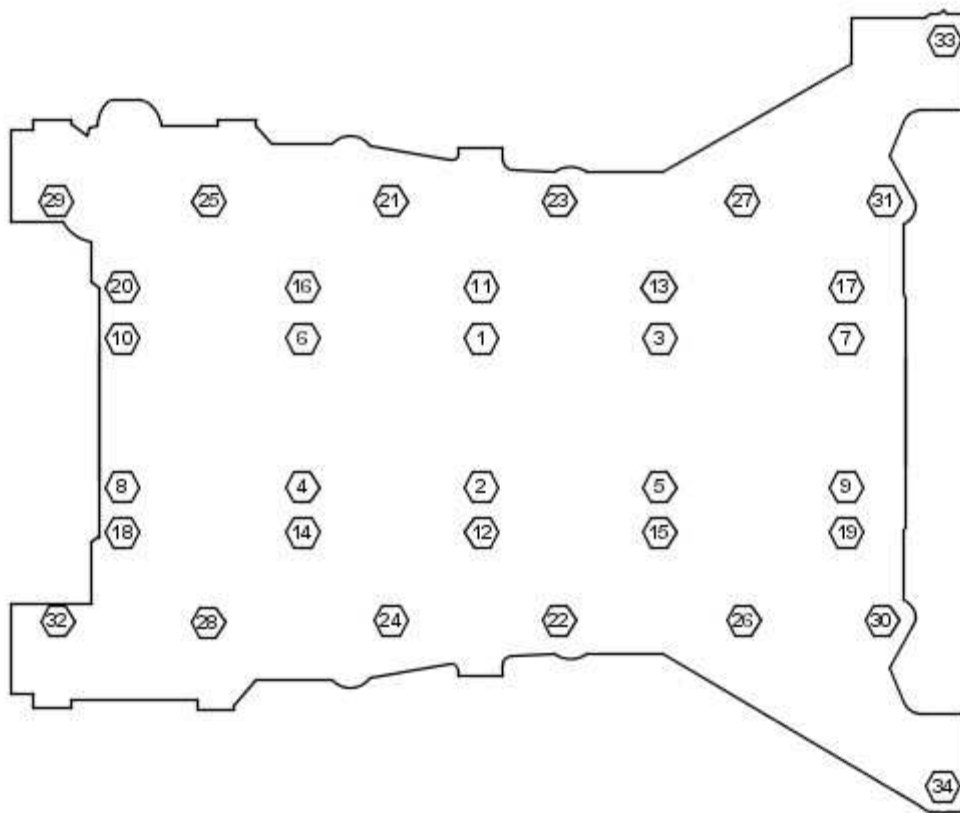


CAUTION: Tighten the bolts in the sequence shown.

Install the lower cylinder block to the upper cylinder block.

3. Tighten bolts 21 to 32 to 15 Nm
4. Tighten bolts 33 to 34 to 15 Nm
5. Tighten bolts 1 to 10 to 25 Nm

6. Tighten bolts 11 to 20 to 15 Nm
7. Tighten bolts 1 to 10 to 35 Nm +135°
8. Tighten bolts 11 to 20 to 20 Nm +150°
9. Tighten bolts 21 to 32 to 20 Nm +90°
10. Tighten bolts 33 to 34 to 20 Nm +150°



VUJ0002450

- 7 . Rotate the crankshaft to check correct operation.
- 8 . Remove excess sealant which may squeeze out at the front cover sealing surfaces.

9 .



CAUTION: Do not use any lubricant on the seal, the transit sleeve or the crankshaft.

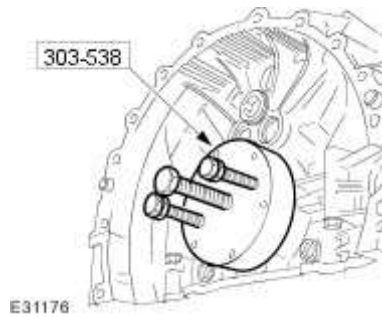


CAUTION: Make sure all components are clean and dry.

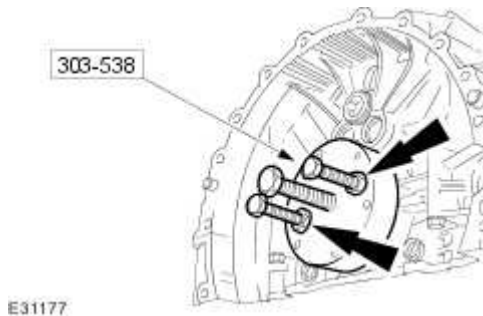
Make sure the transit sleeve is correctly in place and install the new seal over the crankshaft.

10 . Carefully remove the transit sleeve, leaving the seal in place.

11 . Install the special tool to the crankshaft.



12 Reposition the nuts to hold the special tool against the crankshaft rear seal. Check that the crankshaft rear seal and the special tool are parallel to the rear of the engine.

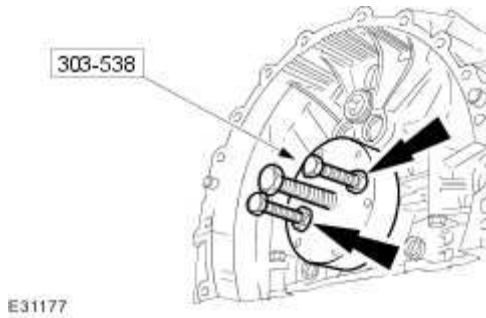


13 .



CAUTION: Alternate nut tightening to correctly seat the crankshaft rear seal.

Using the special tool, install the crankshaft rear seal.



14 . Remove the special tool from the crankshaft.

- Check that the seal is located correctly.

15



CAUTION: Use appropriate protection to prevent damage to the crankshaft bearing journals and cylinder bore surfaces.

Install special tools to the connecting rods.

- Position the crankshaft journal at the bottom of the stroke.

16



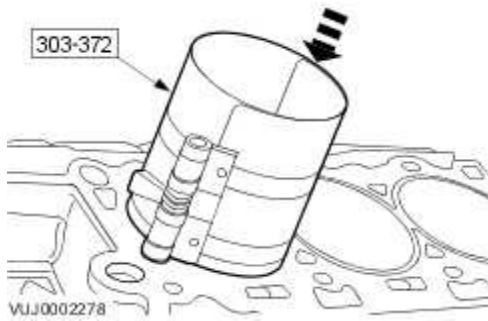
CAUTION: Make sure the piston rings are positioned at different positions opposite the thrust side of the piston before installation.



CAUTION: Install pistons with arrow to front of engine.

Using the special tool compress the rings and install the piston and connecting rod.

- Lubricate all piston components.



17



CAUTION: When assembling the connecting rods and connecting rod caps it is imperative that bearing slots and tangs be located on the same side of the connecting rods.



CAUTION: Connecting rod bolts are torqued to yield and must be replaced.



CAUTION: Bolts must be tightened equally.

NOTE:

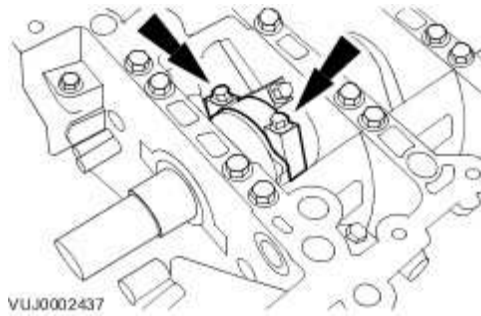
Remove the special tools from the connecting rods.

Position the connecting rod cap on the appropriate connecting rod.

11. Tighten to 10 Nm

12. Tighten to 30 Nm

13. Tighten to 90°



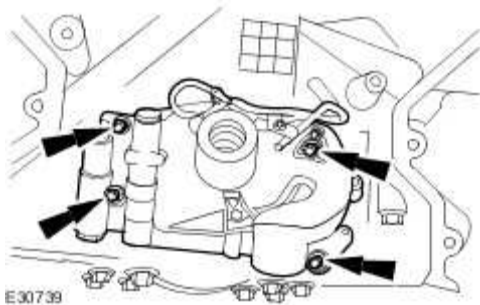
18 . Rotate the crankshaft to check correct operation.

19 . Install the piston cooling jets.

- Tighten to 9 Nm

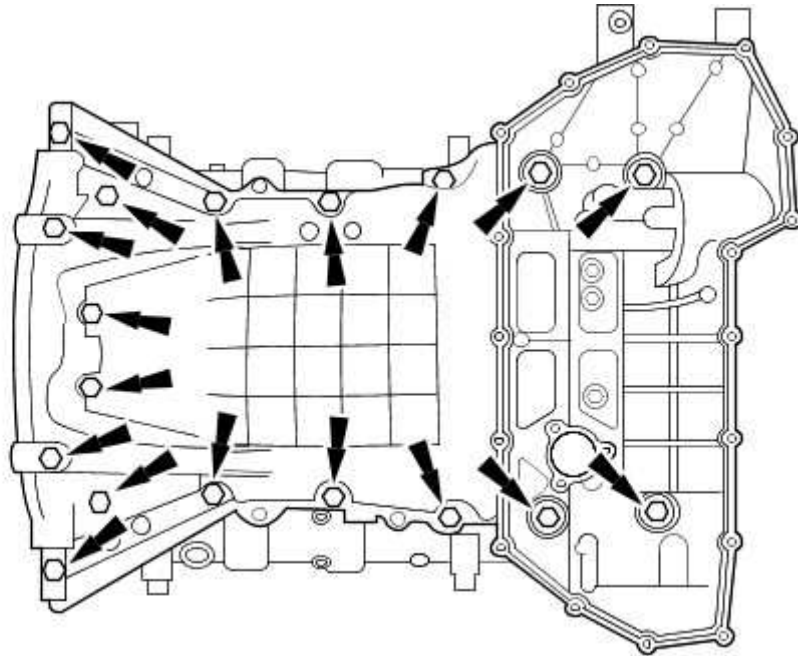
20 . Install the oil pump.

- Install a new gasket.
- Tighten to 12 Nm.



21 . Install the upper oil pan.

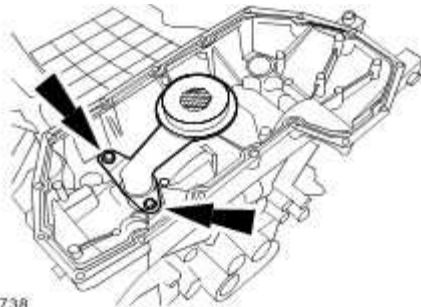
- Install a new gasket.
- Tighten to 21 Nm.



VUJ0002435

22 . Install the oil strainer.

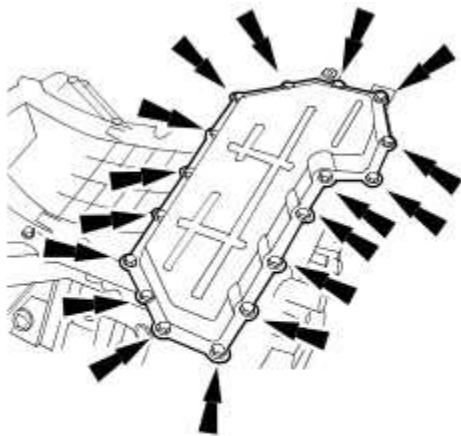
- Install a new O-ring seal.
- Tighten to 12 Nm.



E30738

23 . Install the oil pan.

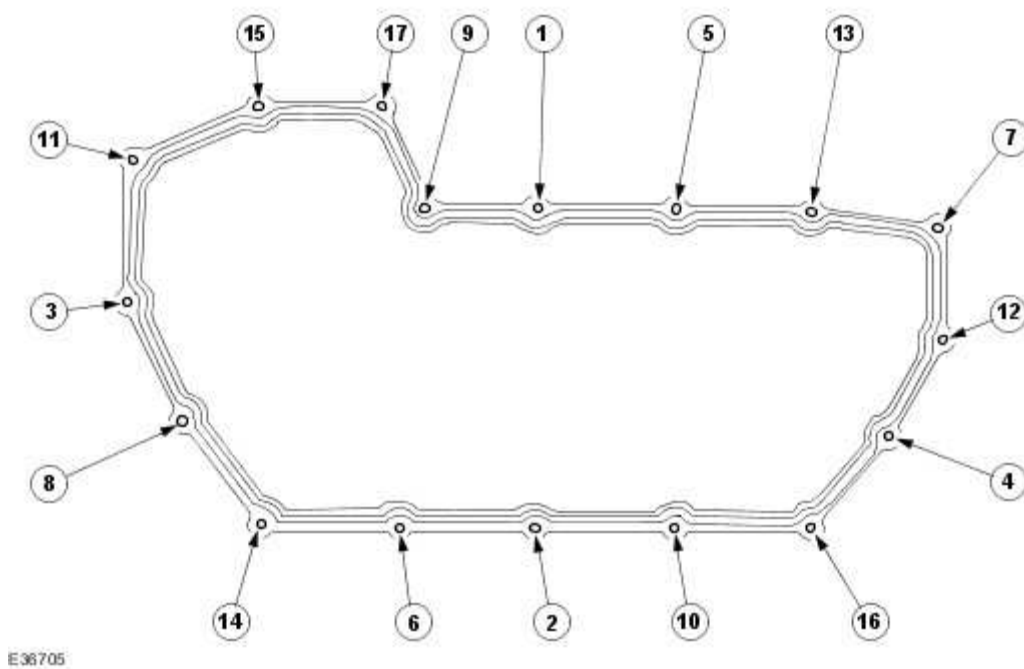
- Install a new gasket.
- Install, but do not fully tighten the retaining bolts.



VUJ0002433

24 Tighten to 12 Nm.

- Tighten in the sequence shown.
- A new oil pan is supplied with the drain plug installed. Check that the drain plug is tightened to 25 Nm.



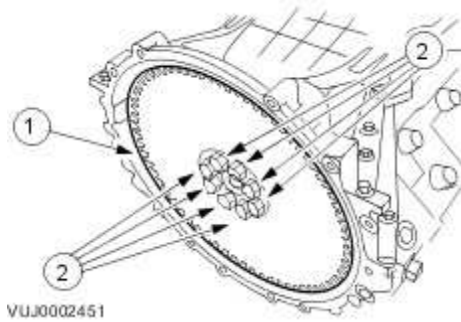
E36705

25 . Install the flexplate.

14. Install the flexplate.

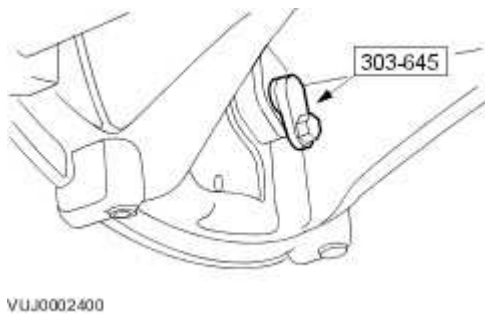
15. Install the flexplate retaining bolts.

- Tighten to 15 Nm.
- Tighten to 110 Nm.



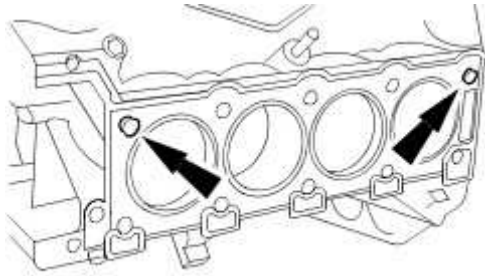
26 . Reposition the crankshaft.

- Install the crankshaft setting peg 303-645 to the crankshaft position sensor location.



27 . Install a new left-hand cylinder head gasket.

- Make sure the cylinder head dowels are correctly located.



E31267

28



CAUTION: Vehicles fitted with Polydrive cylinder head bolts, the cylinder head bolts must be installed using a 10 mm Polydrive socket or a 10 mm Allen key. Failure to follow this instruction may result in damage to the component.



CAUTION: Tighten the bolts 1 to 10 in the sequence shown.

Install the left-hand cylinder head.

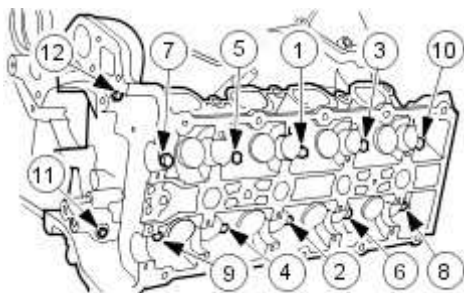
16. Tighten bolts 1 to 10 to 20 Nm.

17. Tighten bolts 1 to 10 to 35 Nm.

18. Tighten bolts 1 to 10 to 90°.

19. Tighten bolts 1 to 10 to 90°.

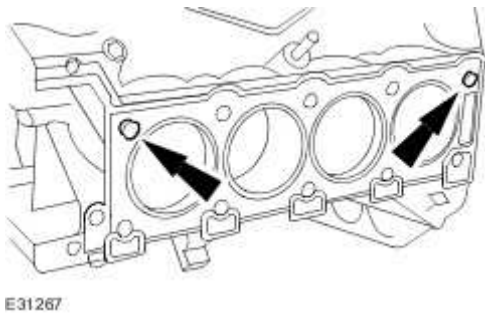
20. Tighten bolts 11 to 12 to 25 Nm.



VUJ0002452

29 . Install a new right-hand cylinder head gasket.

- Make sure the cylinder head dowels are correctly located.



30



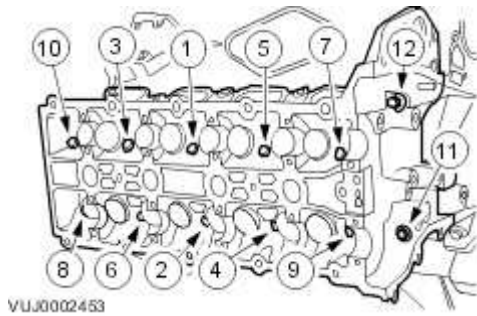
CAUTION: Vehicles fitted with Polydrive cylinder head bolts, the cylinder head bolts must be installed using a 10 mm Polydrive socket or a 10 mm Allen key. Failure to follow this instruction may result in damage to the component.



CAUTION: Tighten the bolts 1 to 10 in the sequence shown.

Install the right-hand cylinder head.

21. Tighten bolts 1 to 10 to 20 Nm.
22. Tighten bolts 1 to 10 to 35 Nm.
23. Tighten bolts 1 to 10 to 90°.
24. Tighten bolts 1 to 10 to 90°.
25. Tighten bolts 11 to 12 to 25 Nm.

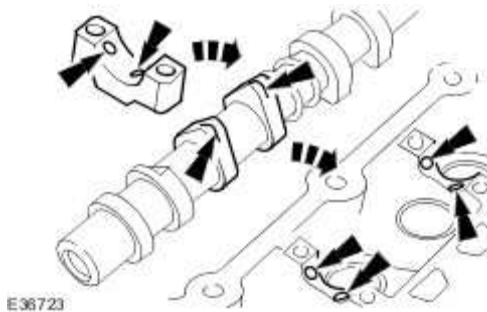


31 . NOTE:

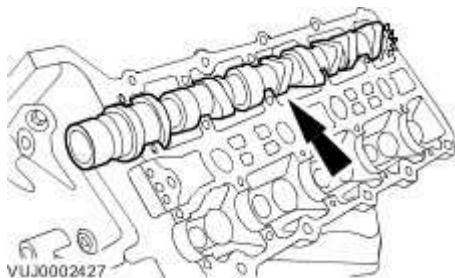
Make sure all components are clean.

Apply oil (EP-90) to the camshaft and bearing surfaces, as follows:

- To the upper face of each bearing surface in the cylinder head.
- To the upper face of each bearing surface in each bearing cap.
- On the cam lobes ONLY, not on the base circle area.



32 . Install the left-hand inlet camshaft.



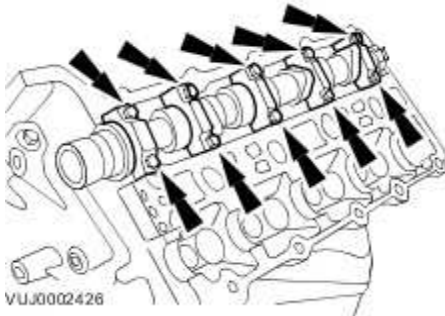
33 .



CAUTION: Alternate bolt tightening to correctly seat the camshaft bearing caps.

Install the camshaft bearing cap bolts evenly.

- Tighten to 10 Nm.

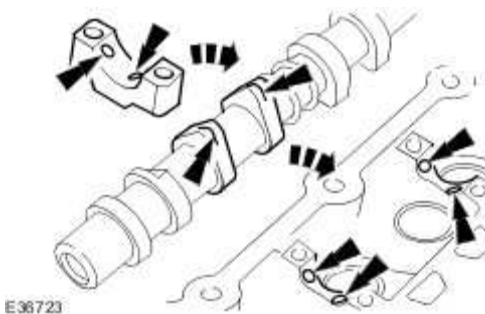


34 . **NOTE:**

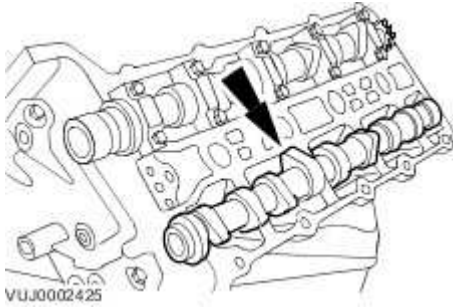
Make sure all components are clean.


Apply oil (EP-90) to the camshaft and bearing surfaces, as follows:

- To the upper face of each bearing surface in the cylinder head.
- To the upper face of each bearing surface in each bearing cap.
- On the cam lobes ONLY, not on the base circle area.



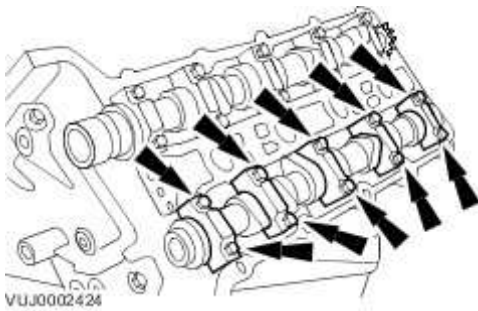
35 . Install the left-hand exhaust camshaft.



- 36 .  **CAUTION:** Alternate bolt tightening to correctly seat the camshaft bearing caps.

Install the camshaft bearing cap bolts evenly.

- Tighten to 10 Nm.

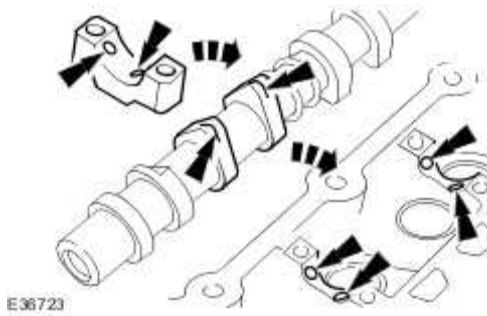


37 . **NOTE:**

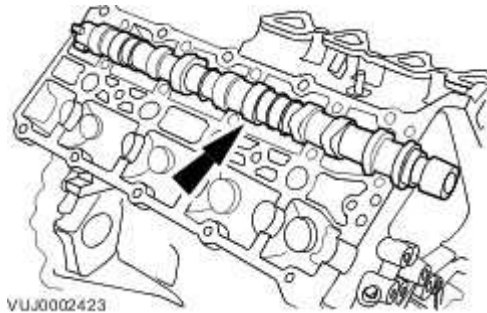
Make sure all components are clean.


Apply oil (EP-90) to the camshaft and bearing surfaces, as follows:

- To the upper face of each bearing surface in the cylinder head.
- To the upper face of each bearing surface in each bearing cap.
- On the cam lobes **ONLY**, not on the base circle area.



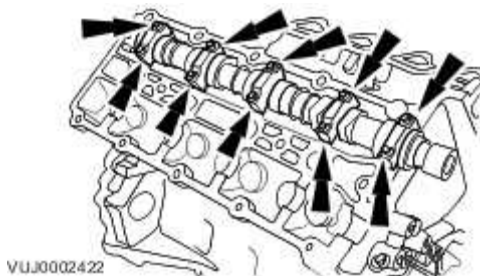
38 . Install the right-hand inlet camshaft.



39 .  **CAUTION:** Alternate bolt tightening to correctly seat the camshaft bearing caps.

Install the camshaft bearing cap bolts evenly.

- Tighten to 10 Nm.

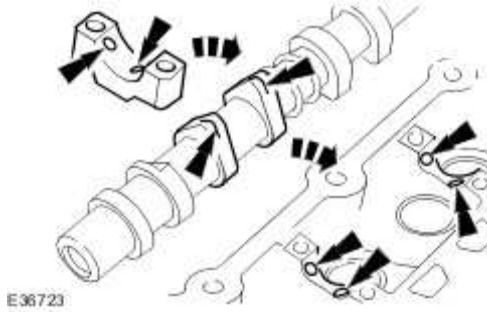


40 . **NOTE:**

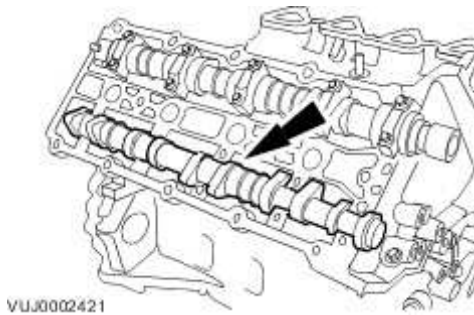
Make sure all components are clean.


Apply oil (EP-90) to the camshaft and bearing surfaces, as follows:

- To the upper face of each bearing surface in the cylinder head.
- To the upper face of each bearing surface in each bearing cap.
- On the cam lobes ONLY, not on the base circle area.



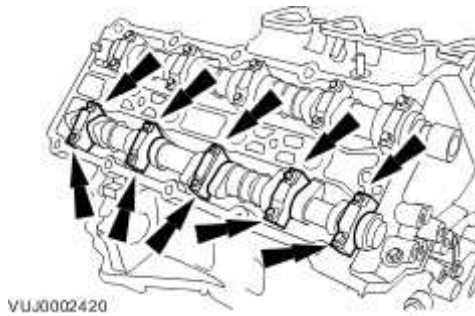
41 . Install the right-hand exhaust camshaft.



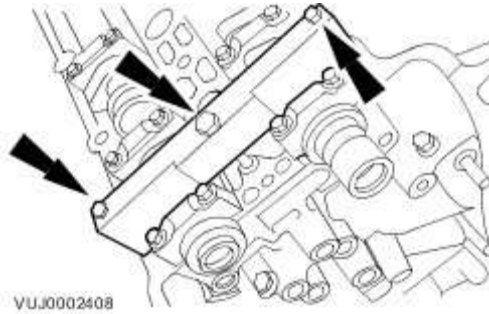
42 .  **CAUTION: Alternate bolt tightening to correctly seat the camshaft bearing caps.**

Install the camshaft bearing cap bolts evenly.

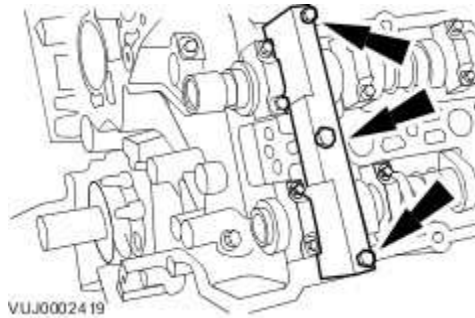
- Tighten to 10 Nm.



43 . Install the camshaft setting tool.



44 . Install the camshaft setting tool.



45



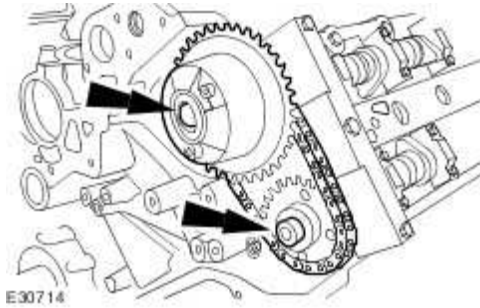
CAUTION: Do not tighten the camshaft sprocket retaining bolts.



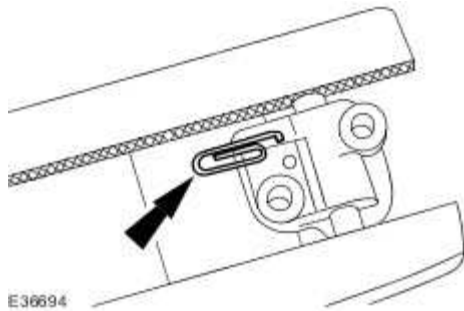
CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

Install the camshaft sprockets.

- Install the secondary timing chain tensioner and secondary timing chain to the camshaft sprockets.



- 46 . Using a suitable tool, retain the left-hand timing chain tensioner piston.

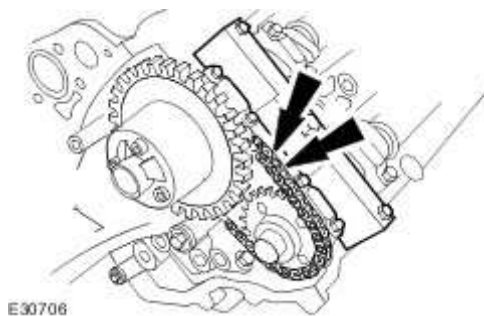


- 47 . Release the tension in the left-hand timing chain tensioner.

- Remove the retaining tool.

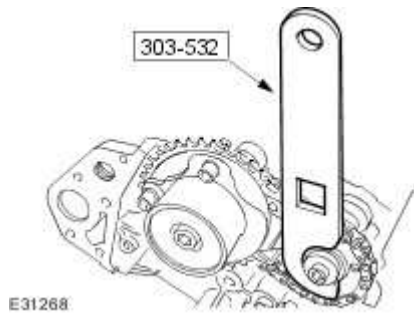
- 48 . Install the secondary timing chain tensioner.

- Tighten to 12 Nm.



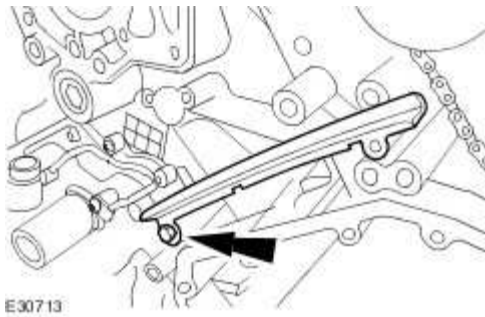
49 Install the timing chain tensioning tool 303-532 to the exhaust camshaft sprocket.

- Reposition the camshaft sprockets for the most advantageous position for use of the tool.

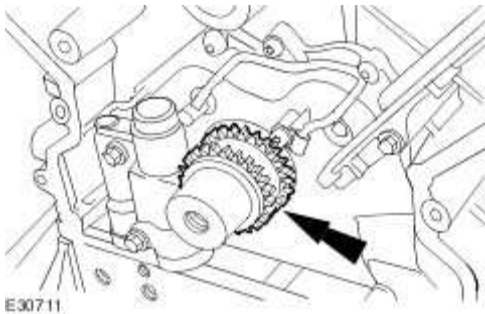


50 . Install the primary timing chain tensioner guide.

- Tighten to 12 Nm.



51 . Install the crankshaft sprocket.



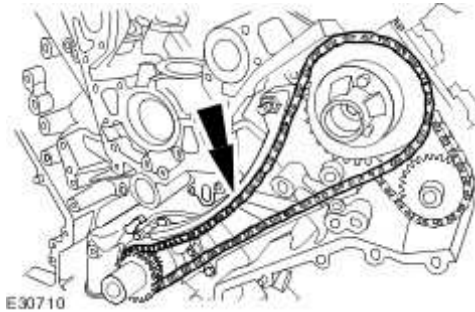
52



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

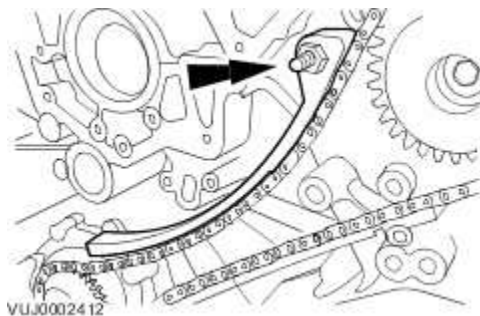
Install the primary timing chain.

- Install the primary chain over the crankshaft sprocket and the intake sprocket.



53 . Install the primary timing chain tensioner guide.

- Tighten to 12 Nm.

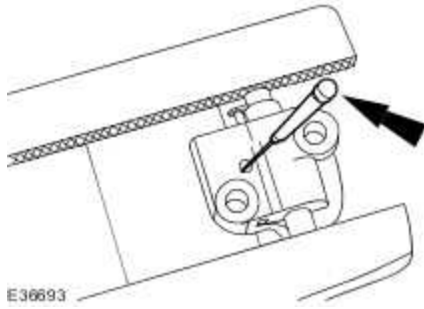


54



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the left-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



55 **NOTE:**

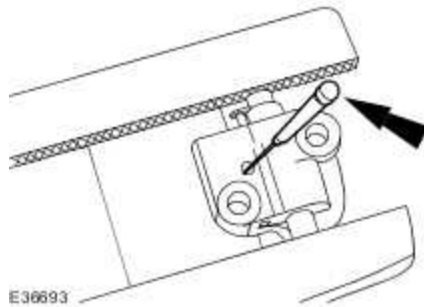
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the left-hand timing chain tensioner.

56 **NOTE:**

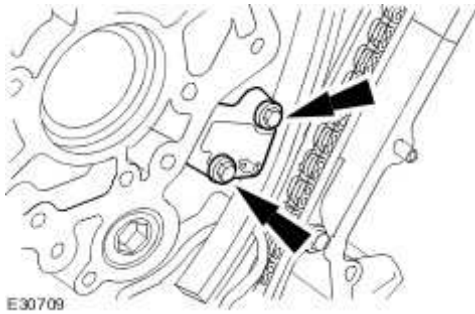
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the left-hand timing chain tensioner piston.



57 . Install the primary timing chain tensioner assembly.

- Tighten to 12 Nm.



58 . Release the tension in the left-hand timing chain tensioner.

- Remove the retaining tool.

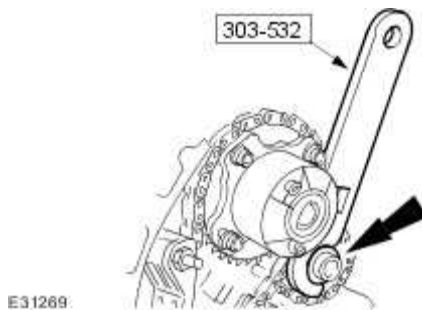
59



CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

Using the special tool apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

- Tighten to 20 Nm + 90 deg.



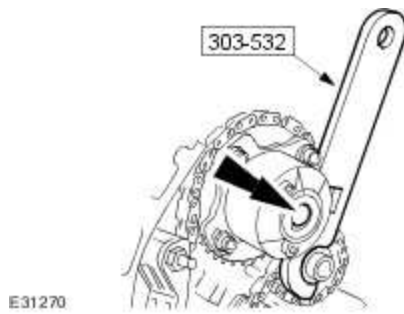
60



CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

Using the special tool apply force to the tool in an anti-clockwise direction.

- Tighten to 20 Nm + 90 deg.



61



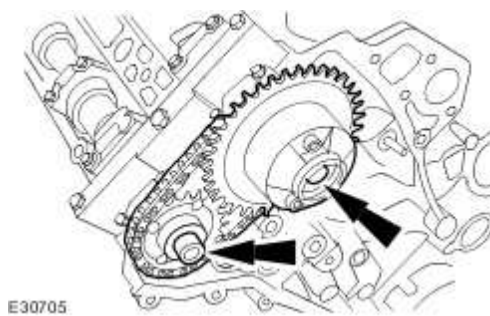
CAUTION: Do not tighten the camshaft sprocket retaining bolts.



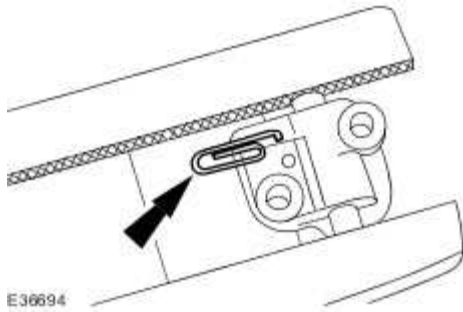
CAUTION: Make sure the secondary timing chain and camshaft sprockets are free to rotate.

Install the camshaft sprockets.

- Install the secondary timing chain tensioner and secondary timing chain to the camshaft sprockets.

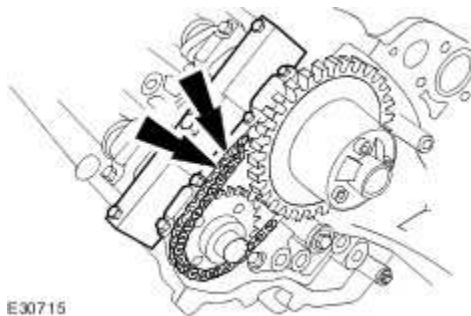


62 . Using a suitable tool, retain the right-hand timing chain tensioner piston.



63 . Install the secondary timing chain tensioner retaining bolts.

- Tighten to 12 Nm.

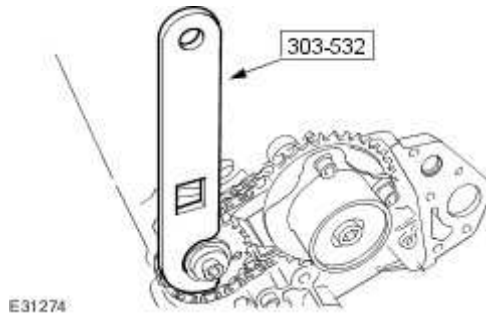


64 . Release the tension in the right-hand timing chain tensioner.

- Remove the retaining tool.

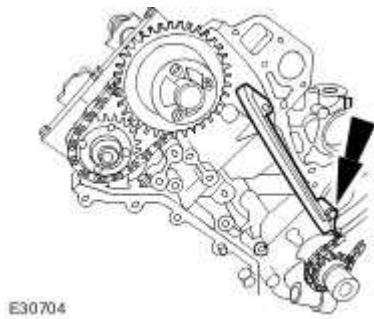
65 Install the timing chain tensioning tool 303-532 to the exhaust camshaft sprocket.

- Reposition the camshaft sprockets for the most advantageous position for use of the tool.



66 . Install the primary timing chain guide.

- Tighten to 12 Nm.



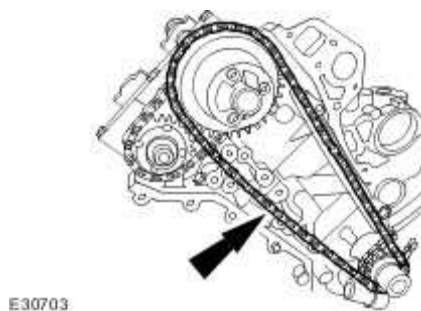
67



CAUTION: Make sure the timing chain slack is on the tensioned side of the timing chain.

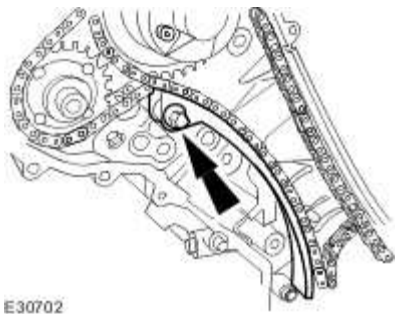
Install the primary timing chain.

- Install the primary chain over the crankshaft sprocket and the intake sprocket.



68 . Install the primary timing chain tensioner guide.

- Tighten to 12 Nm.

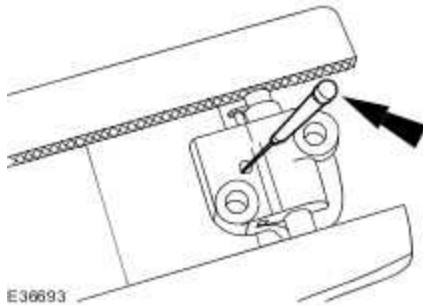


69



CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the right-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



70 **NOTE:**

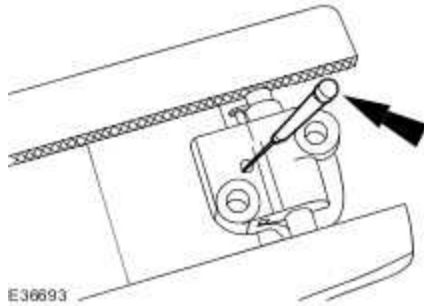
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the right-hand timing chain tensioner.

71 **NOTE:**

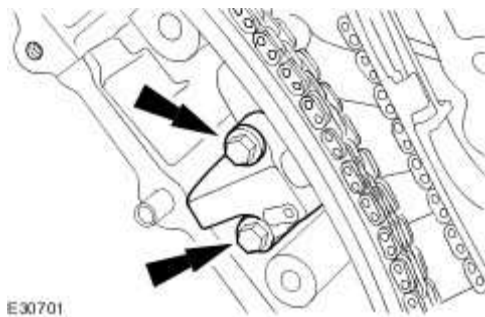
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the right-hand timing chain tensioner piston.



72 . Install the primary timing chain tensioner assembly.

- Tighten to 12 Nm.



73 . Release the tension in the right-hand timing chain tensioner.

- Remove the retaining tool.

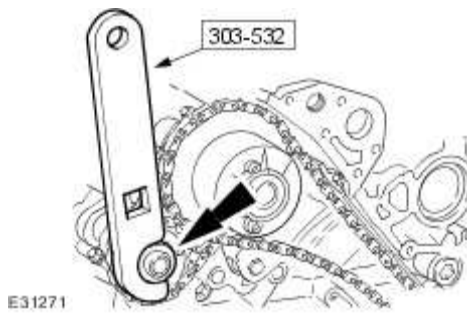
74



- **CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.**

Using the special tool apply force to the tool in an anti-clockwise direction to tension the primary timing chain on its drive side.

- Tighten to 20 Nm + 90 deg.



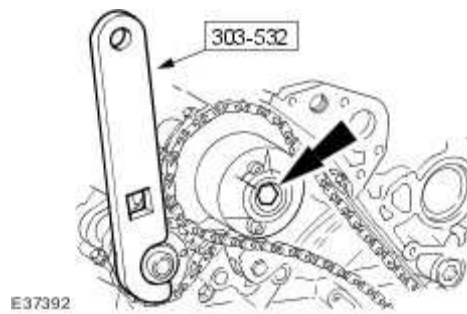
75



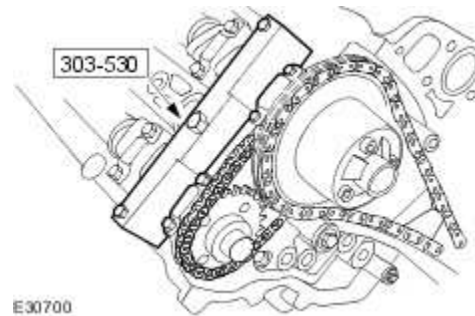
CAUTION: While applying the opposing force to sprocket and chain, tighten the sprocket bolt.

Using the special tool apply force to the tool in an anti-clockwise direction.

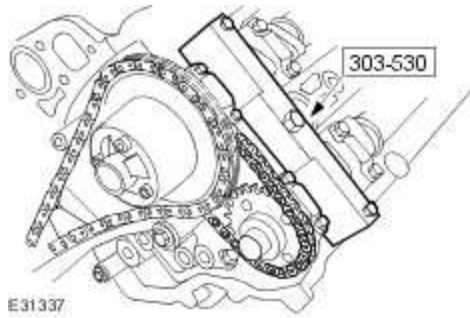
- Tighten to 20 Nm + 90 deg.



76 . Remove the special tool from the right-hand cylinder head.

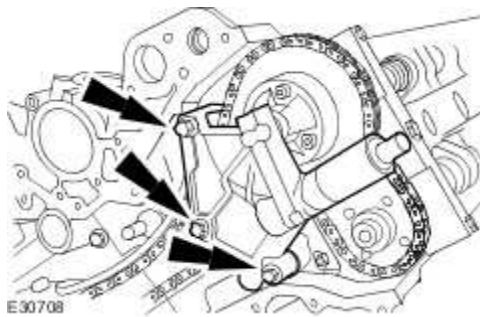


77 . Remove the special tool from the left-hand cylinder head.



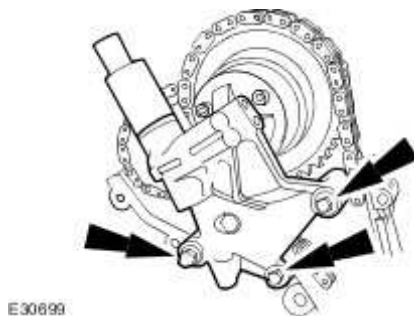
78 . Install the left-hand variable camshaft timing oil control unit housing.

- Install new O-ring seals.
- Tighten to 22 Nm.

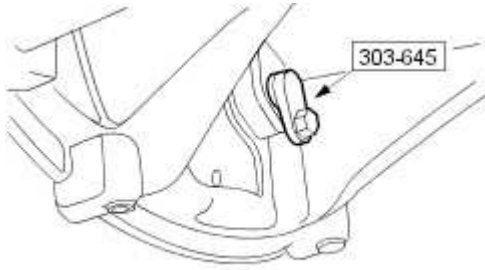


79 . Install the right-hand variable camshaft timing oil control unit housing.

- Install new O-ring seals.
- Tighten to 22 Nm.



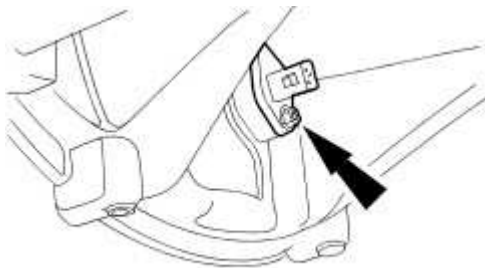
80 . Remove the special tool.



VUJ0002400

81 . Install the crankshaft position sensor.

- Tighten to 10 Nm.

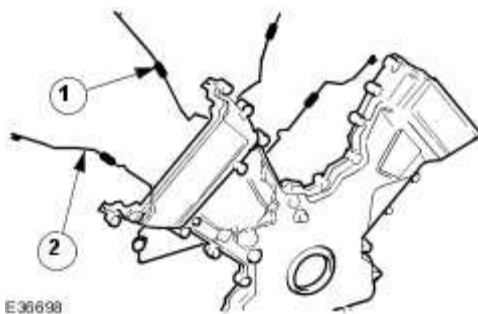


E30694

82 . Install new seals to the timing cover.

26. Install the new seal to the inner groove on the face of the timing cover.

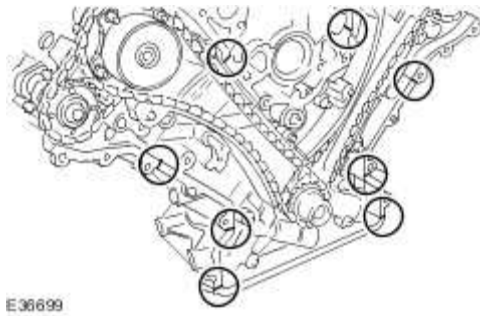
27. Install the new seal to the outer groove on the face of the timing cover.



E30698

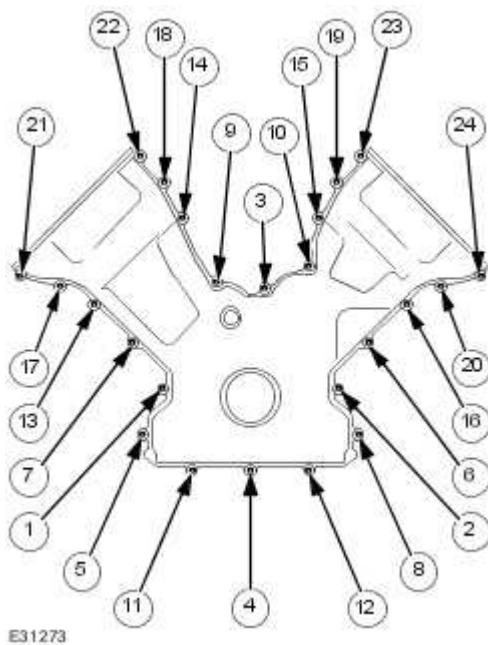
83 Apply sealant to the eight joints on the engine face.

- Sealant beads to be 3mm diameter and 12mm long. Cut the nozzle of the sealant tube to produce a 3 mm bead. (Install and tighten the securing bolts within twenty minutes of sealant application).



84 . Install the timing cover.

- Tighten in the sequence shown.
- Tighten to 13 Nm.



85 .

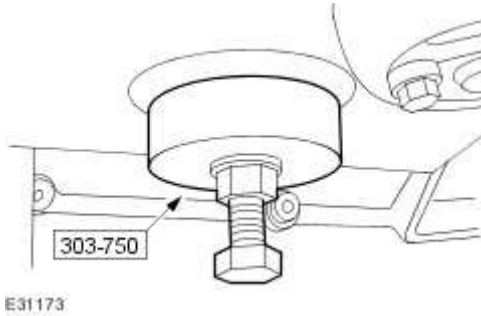


CAUTION: Make sure the crankshaft front seal mating faces are clean and dry.

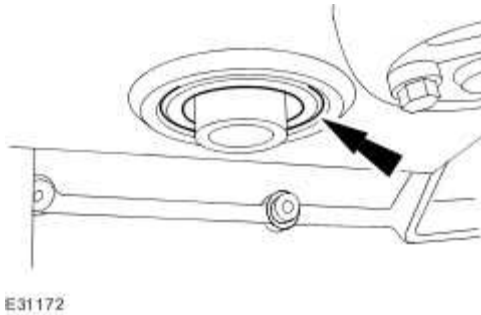


CAUTION: Do not remove the crankshaft front seal protector.

Using the special tool, install a new crankshaft front seal.



86 . Remove the crankshaft seal protector.



87 . Install a new O-ring seal to the crankshaft pulley.

- Lubricate the new O-ring.

88



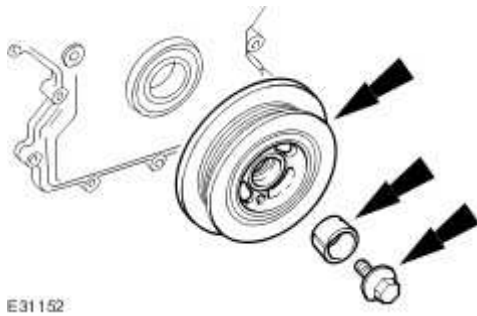
CAUTION: The screw thread in the crankshaft must be cleaned out before a new crankshaft pulley bolt is installed.



CAUTION: A new crankshaft pulley bolt must be used.

Install, but do not tighten, a new crankshaft pulley retaining bolt.

- Install the crankshaft pulley and locking ring to the crankshaft.



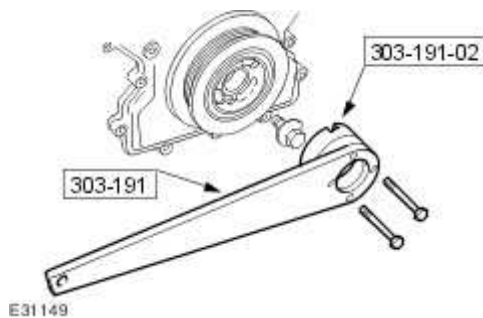
89



CAUTION: Under no circumstances should the crankshaft setting peg 303-645 be used in the following operations to lock the crankshaft.

Using special tools, retain the crankshaft pulley.

- Tighten the crankshaft pulley retaining bolt to 375 Nm.



90 . Remove the special tools.

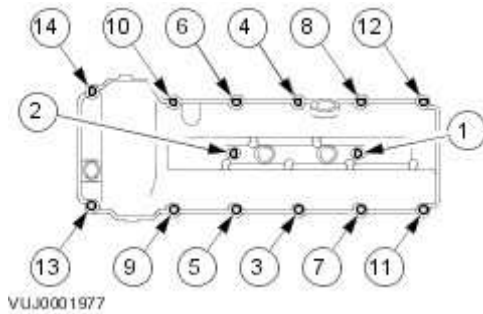
91 . Carry out a valve clearance check.
For additional information, refer to

92 **NOTE:**

Apply an 8mm diameter bead of silicone gasket sealant on the two places where the cylinder head and front cover join.

Install the left-hand valve cover.

- Install new valve cover gaskets.
- Tighten in the sequence shown.
- Tighten to 10 Nm.

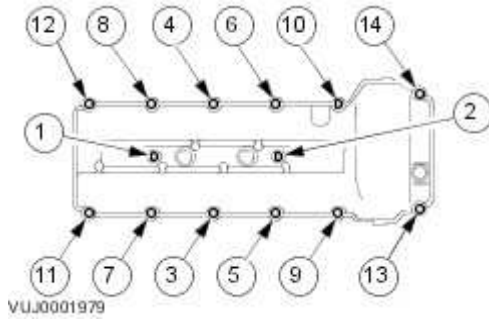


93 **NOTE:**

Apply an 8mm diameter bead of silicone gasket sealant on the two places where the cylinder head and front cover join.

Install the right-hand valve cover.

- Install new valve cover gaskets.
- Tighten in the sequence shown.
- Tighten to 10 Nm.

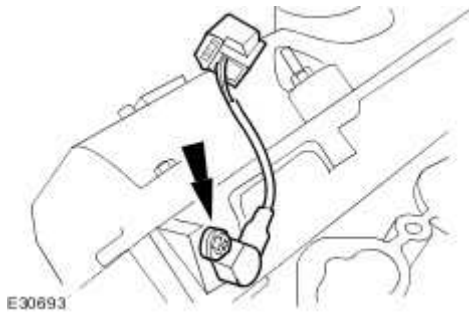


94 . Install the spark plugs.

- Tighten to 27 Nm.

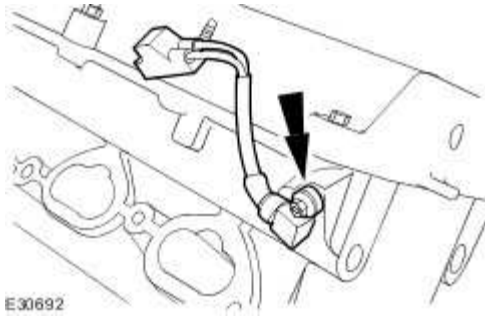
95 . Install the left-hand camshaft position (CMP) sensor.

- Install a new O-ring seal.
- Tighten to 7 Nm.



96 . Install the right-hand camshaft position (CMP) sensor.

- Install a new O-ring seal.
- Tighten to 7 Nm.

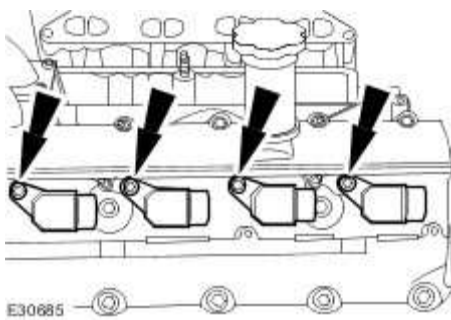


97 . **NOTE:**

Left-hand shown, right-hand similar

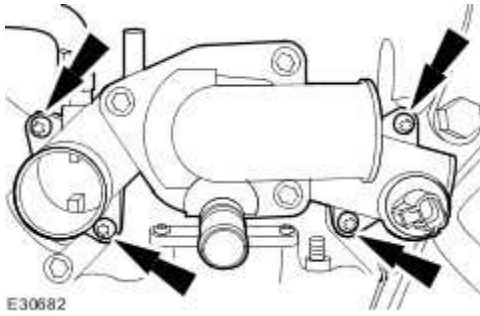
Install the ignition coils.

- Tighten to 5 Nm.



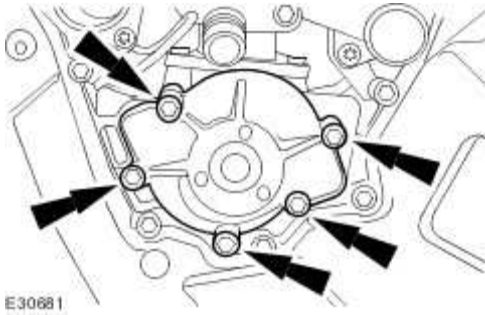
98 . Install the thermostat housing.

- Install new O-ring seals.
- Tighten to 10 Nm.



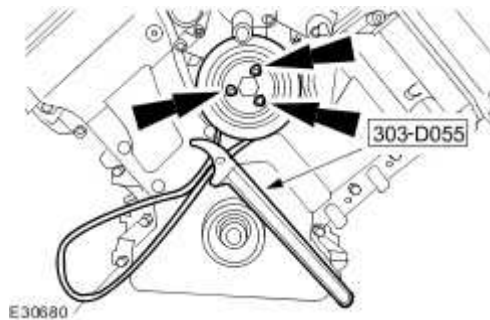
99 . Install the water pump.

- Install new O-ring seals and gaskets.
- Tighten to 12 Nm.

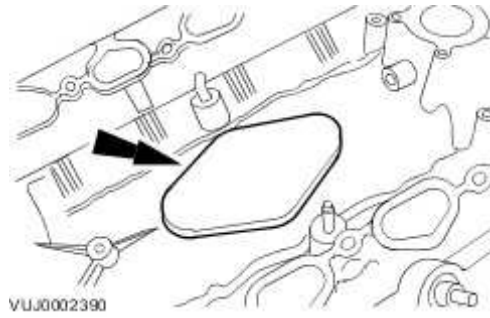


100 . Install the water pump pulley.

- Using special tool, retain the water pump pulley.
- Tighten to 10 Nm + 45°.



101 . Install the engine block insulation grommet.

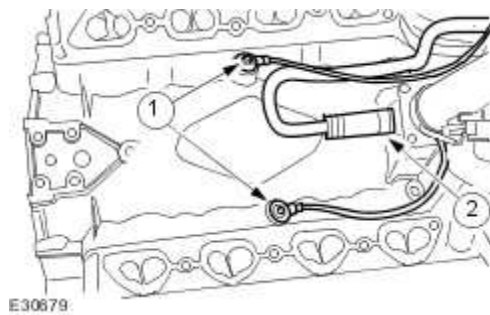


102 . Install the intake manifold heater coolant hose.

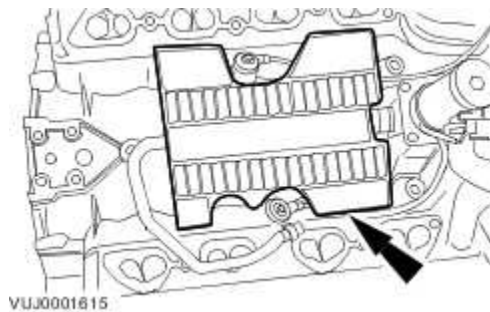
28. Install the knock sensors.

- Tighten to 20 Nm.

29. Install the intake manifold heater coolant hose.

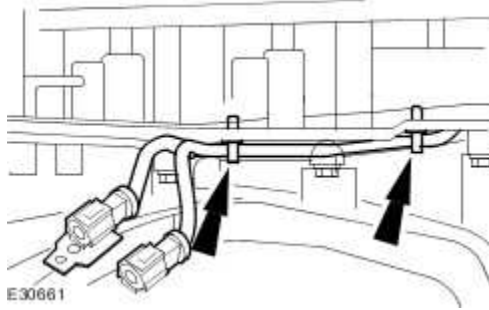


103 . Install the noise and vibration insulating pad.



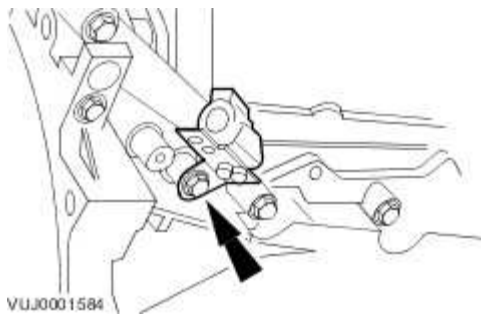
104 . Install the engine wiring harness.

105 . Attach the engine wiring harness retaining clips.



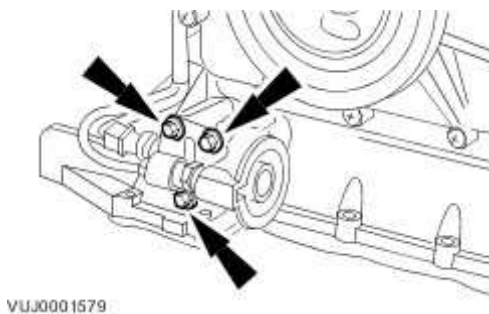
106 . Attach the right-hand oxygen sensor.

- Tighten to 10 Nm.

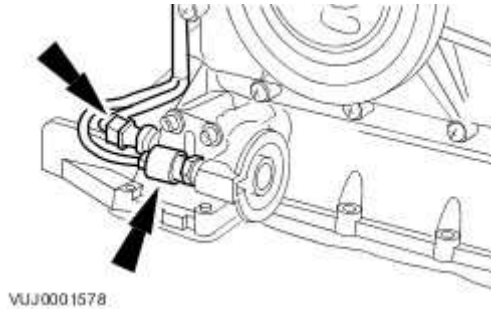


107 . Install the oil filter housing.

- Install a new O-ring seal.
- Tighten to 21 Nm.

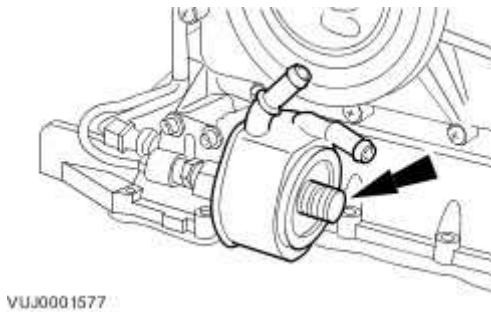


108 . Connect the oil pressure switch and oil temperature sensor electrical connectors.



109 . Install the oil cooler.

- Install a new O-ring seal.
- Tighten to 55 Nm.

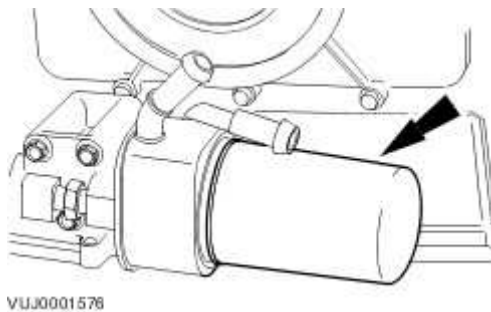


110 . **NOTE:**

Apply a suitable amount of clean engine oil to lubricate the oil filter O-ring seal.

Install a new oil filter.

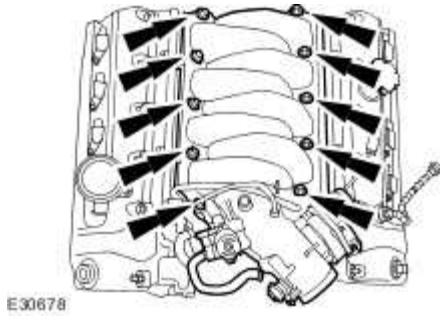
- Tighten to 18 Nm.



111 .

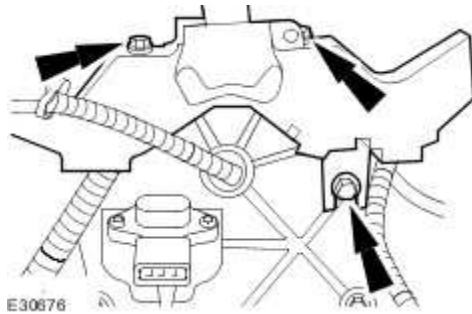
112 . Install the intake manifold.

- Tighten to 22 Nm.



113 . Attach the engine wiring harness.

- Tighten to 10 Nm.

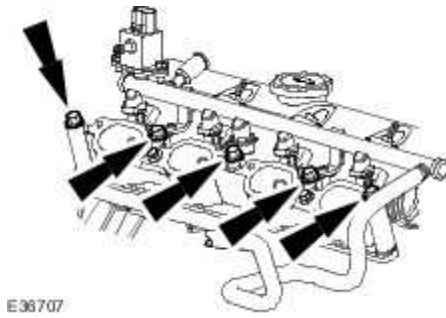


114 . **NOTE:**

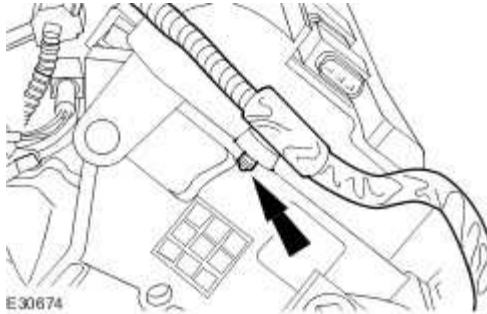
Left-hand shown, right-hand similar.

Install the lower intake manifold.

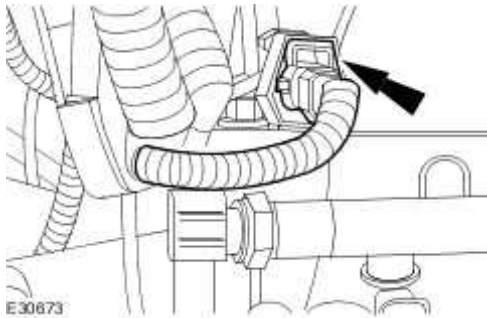
- Tighten to 22 Nm.



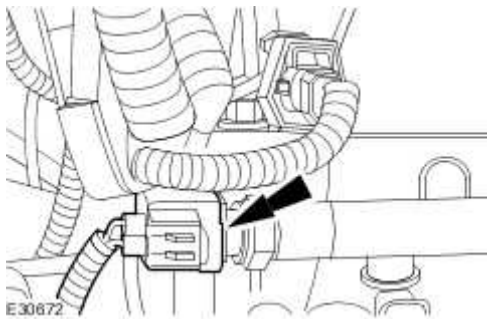
115 . Attach the engine wiring harness.



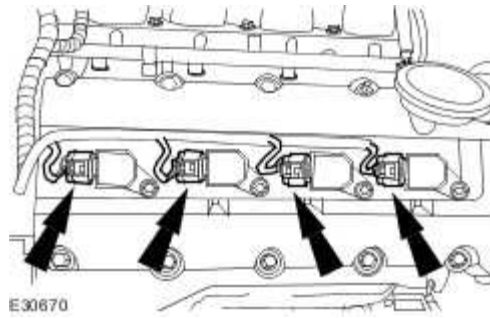
116 . Connect the camshaft position sensor electrical connector.



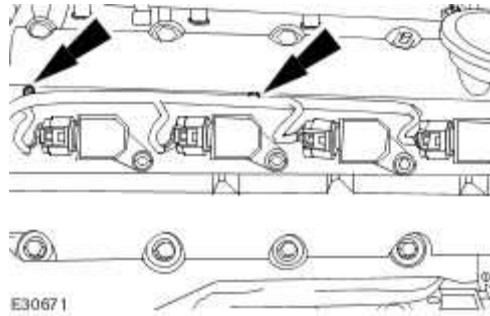
117 . Connect the fuel temperature sensor electrical connector.



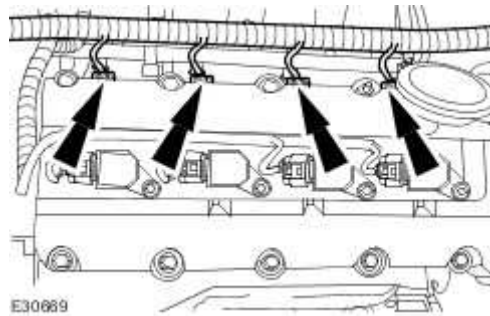
118 . Connect the ignition on-plug coil electrical connectors.



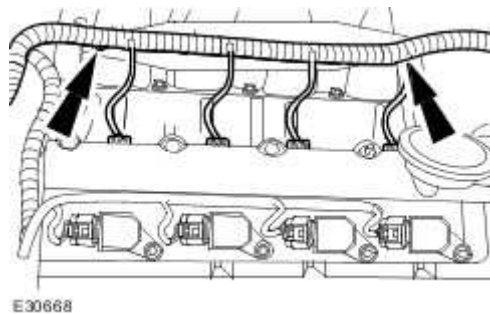
119 . Attach the engine wiring harness.



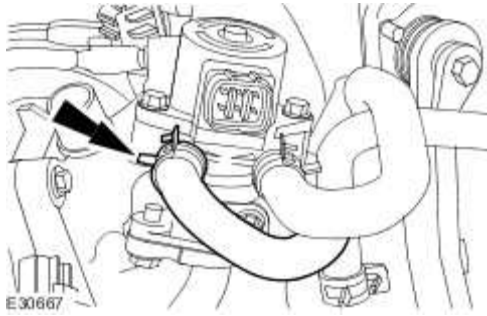
120 . Connect the fuel injector electrical connectors.



121 . Attach the engine wiring harness.



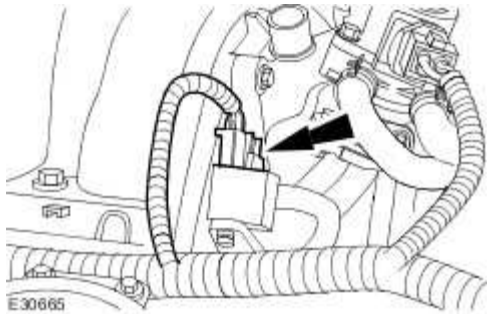
122 . Connect the exhaust gas recirculation valve coolant hose.



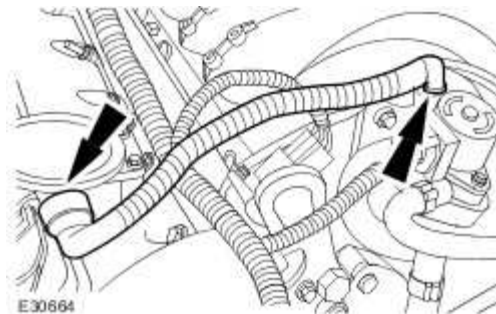
123 . Connect the exhaust gas recirculation valve electrical connector.



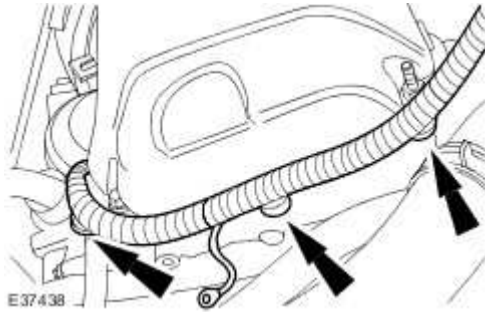
124 . Connect the fuel pressure regulator electrical connector.



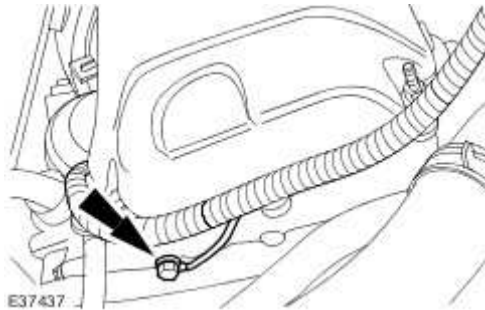
125 . Connect the positive crankcase ventilation pipe.



126 . Attach the engine wiring harness.



127 . Attach the engine wiring harness.

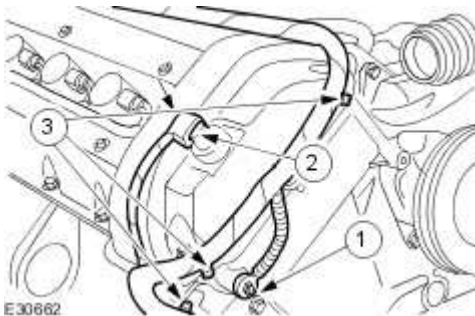


128 . Attach the engine harness.

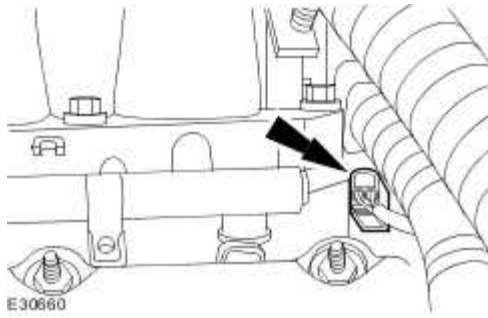
30. Connect the earth wire.

31. Connect the variable valve timing (VVT) solenoid electrical connector.

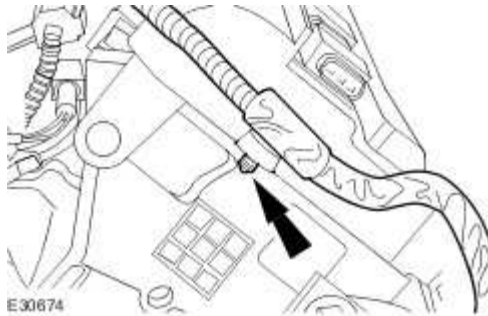
- Attach the engine harness.



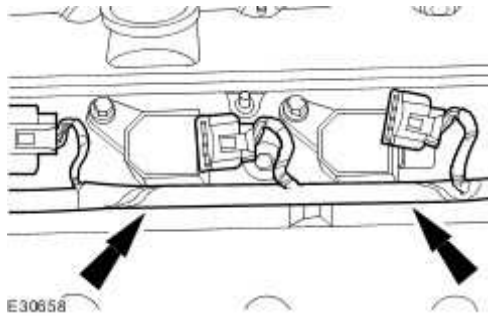
129 . Connect the camshaft position sensor electrical connector.



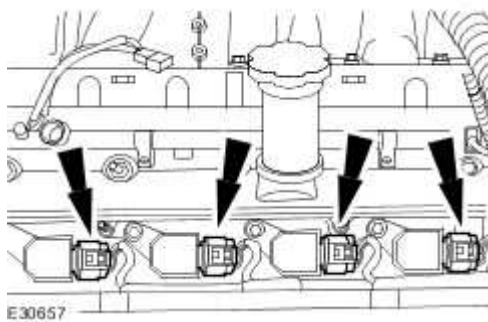
130 . Attach the engine wiring harness.



131 . Attach the engine wiring harness.



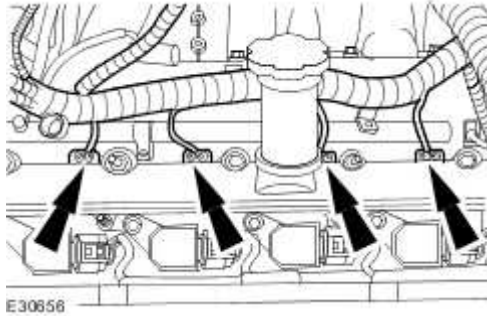
132 . Connect the ignition on-plug coil electrical connectors.



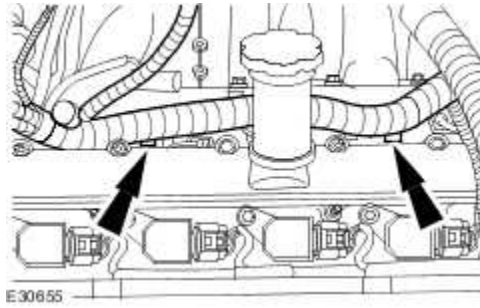
133 . **NOTE:**

Left-hand shown, right hand similar.

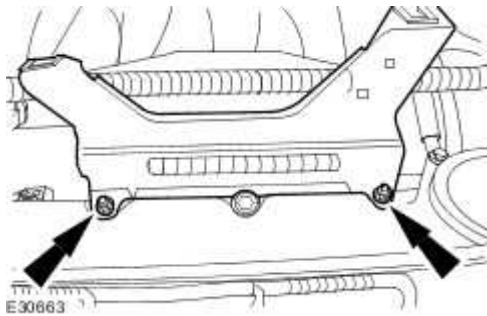
Connect the fuel injector electrical connectors.



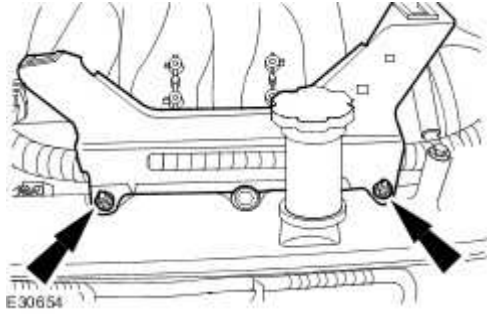
134 . Attach the engine wiring harness.



135 . Install the engine cover retaining bracket.



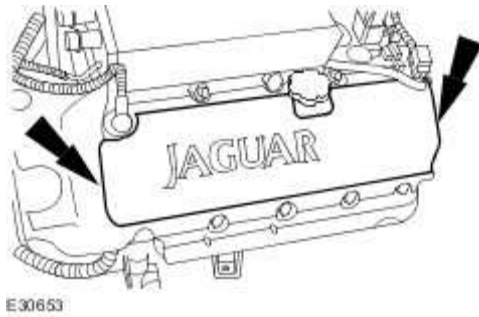
136 . Install the engine cover retaining bracket.



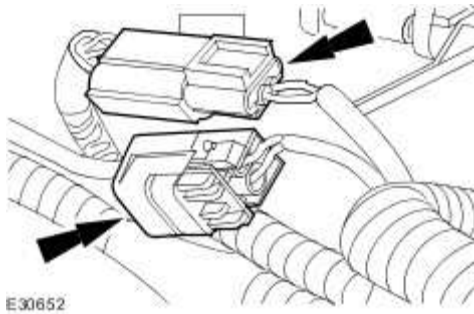
137 . **NOTE:**

Left-hand shown, right-hand similar.

Install the ignition coil cover.



138 . Connect the knock sensor electrical connectors.

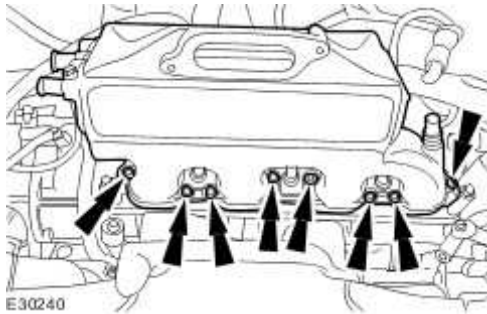


139 . **NOTE:**

Right-hand shown, left-hand similar.

Install the charge air coolers.

- Install a new charge air cooler gasket.
- Tighten to 13 Nm.

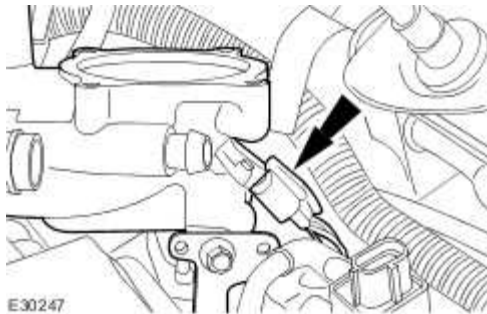


140 . Install the supercharger.

- Tighten to 24 Nm.

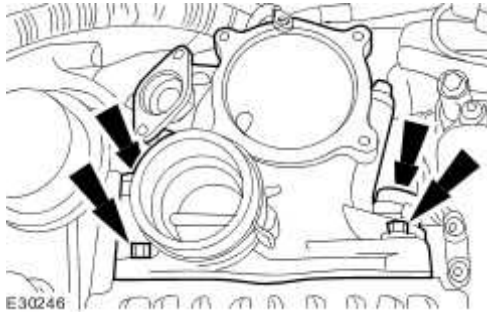


141 . Connect the manifold absolute pressure (MAP) sensor.



142 . Install the air intake elbow.

- Install a new gasket.
- Install new retaining bolt seals.
- Tighten to 24 Nm.

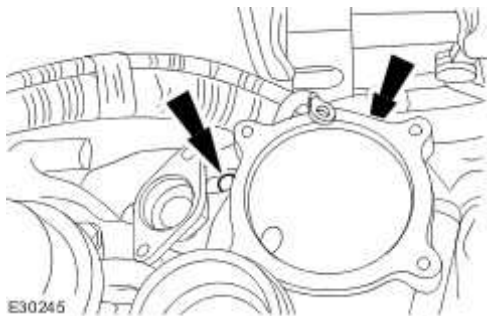


143 . **NOTE:**

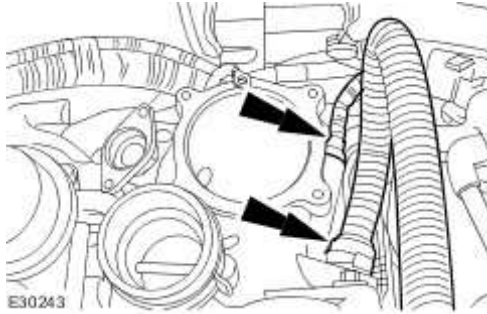
Make sure ground strap is correctly installed to the location noted.

Install the air intake elbow retaining bracket lower retaining bolts.

- Tighten to 20 Nm.



144 . Connect the air intake elbow pipes.



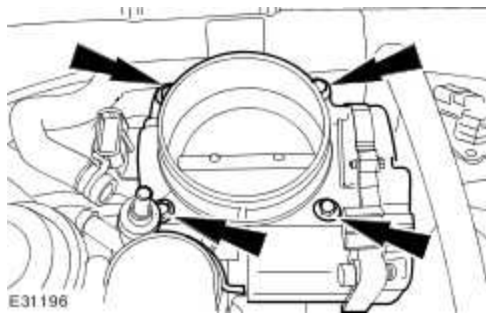
145



CAUTION: Do not attempt to clean the throttle body. The bore and the throttle plate has a special coating applied during manufacture which should not be removed.

Install the throttle body.

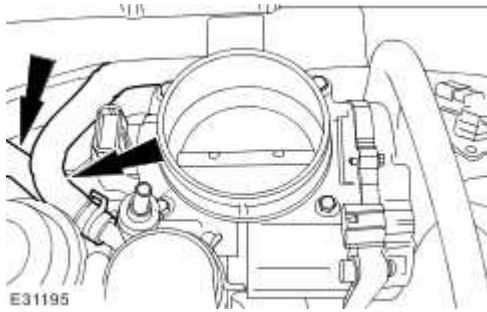
- Install a new throttle body gasket.
- Tighten to 10 Nm.



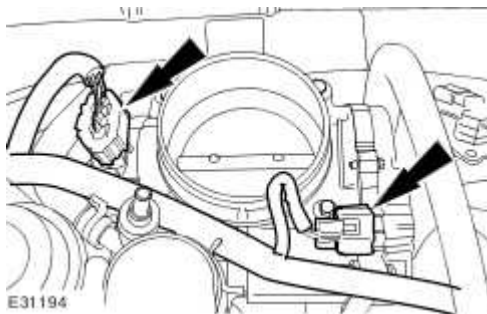
146 . **NOTE:**

Un-cap the coolant hose.

Attach the coolant hose to the throttle body.

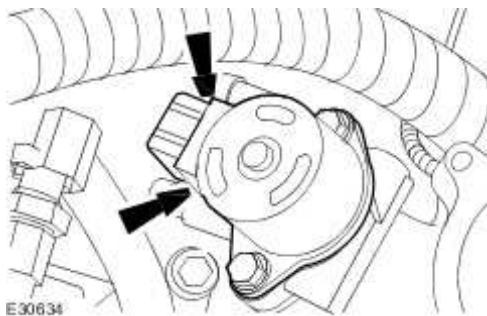


147 . Connect the electrical connectors.

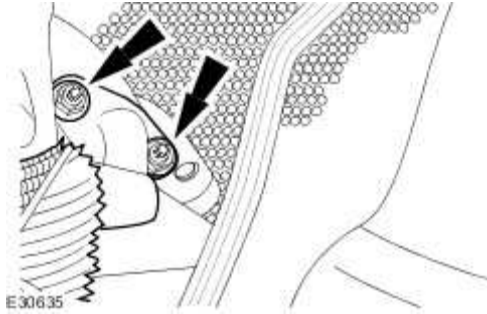


148 . Install the EGR valve and the exhaust manifold to EGR valve tube.

- Install a new exhaust manifold to EGR valve tube gasket.
- Install a new EGR valve to air intake elbow gasket.
- Tighten to 10 Nm.



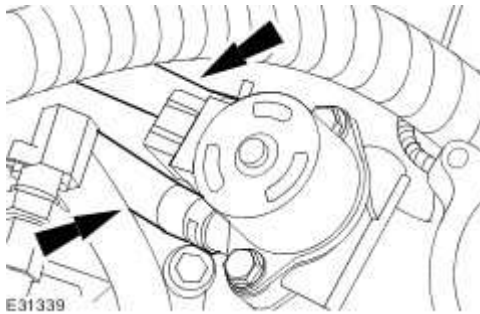
149 . Tighten to 21 Nm.



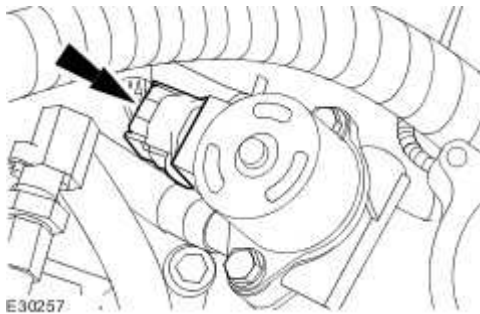
150 . **NOTE:**

Un-cap the exposed ports.

Connect the coolant hoses.



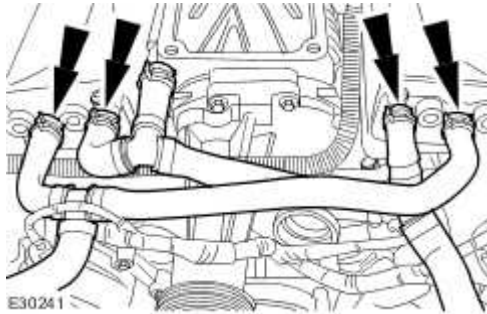
151 . Connect the exhaust gas recirculation (EGR) valve electrical connector.



152 . Connect the IAT sensor electrical connector.



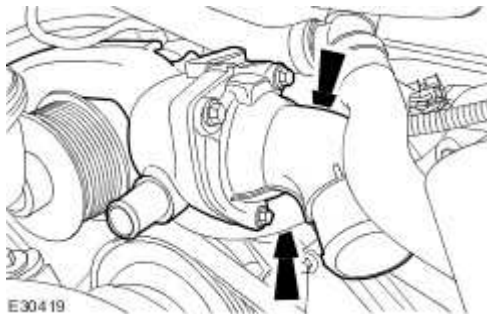
153 . Connect the charge air cooler coolant pipes.



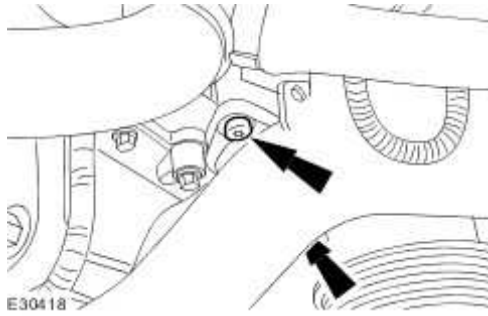
154 . Install new O-ring seals to the thermostat housing.

155 . Install thermostat housing.

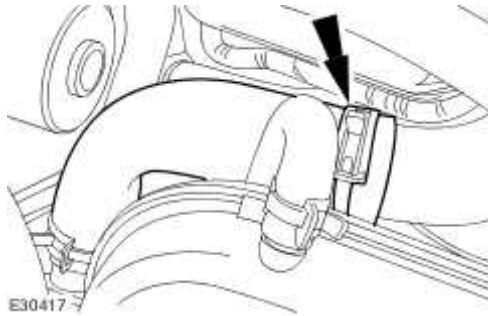
156 . Tighten to 10 Nm.



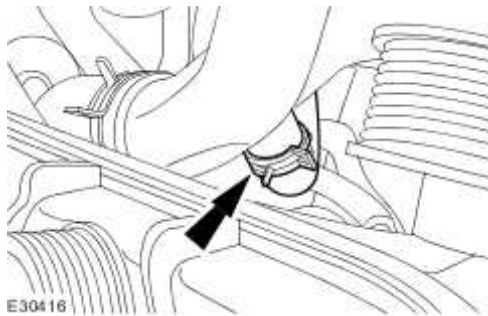
157 . Tighten to 10 Nm.



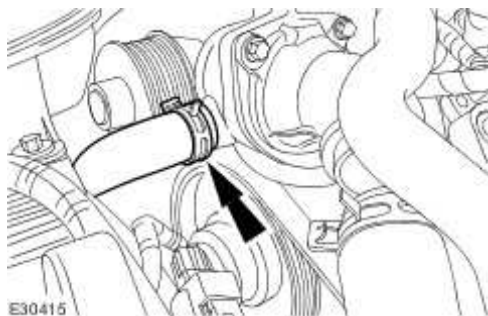
158 . Connect the hose.



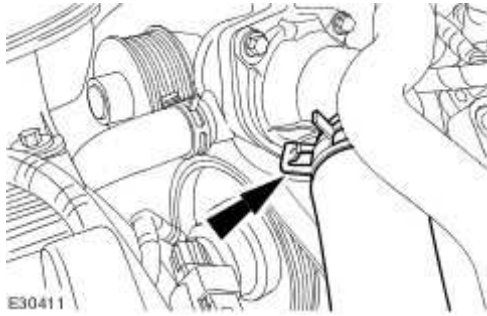
159 . Connect the hose.



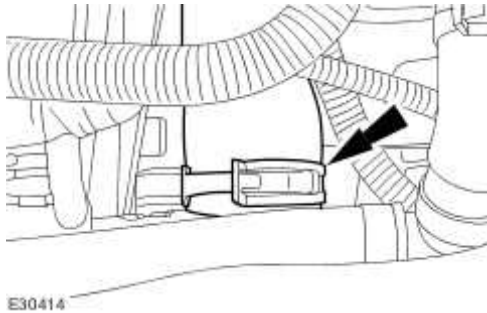
160 . Connect the hose.



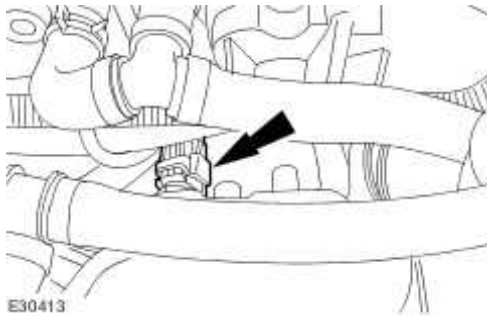
161 . Connect the hose.



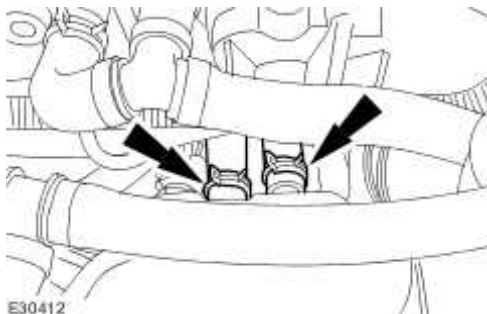
162 . Reposition the thermostat housing hose retaining clip.



163 . Connect the coolant temperature sensor electrical connector.

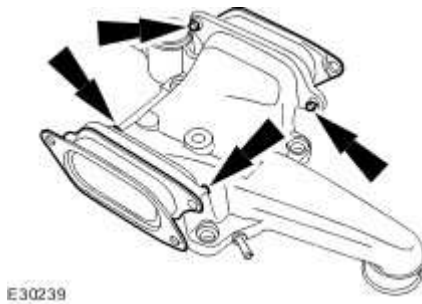


164 . Connect the thermostat housing hoses



165 . Install new supercharger outlet pipe to charge air coolers ducts.

- Tighten to 8 Nm.

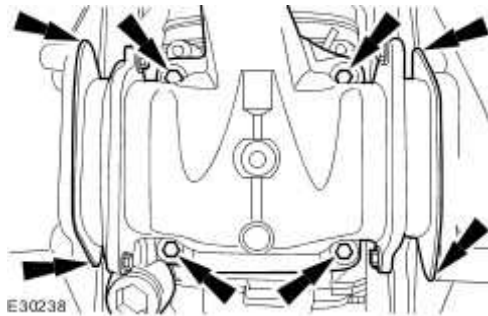


166 . Install a new supercharger outlet pipe gasket.

167 . Install new seals to the supercharger outlet pipe retaining bolts

168 .  **CAUTION: Make sure no foreign matter enters the supercharger.**

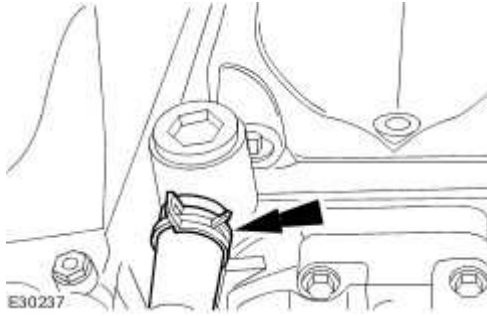
Install the supercharger outlet pipe



169 . **NOTE:**

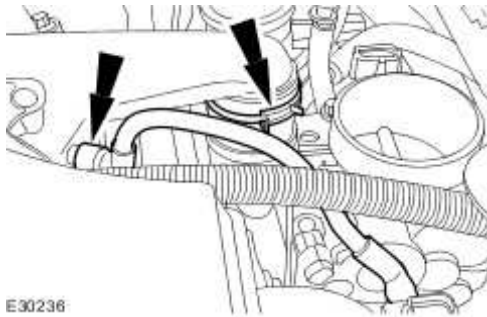
Un-cap the coolant ports.

Attach the supercharger outlet pipe coolant hose.

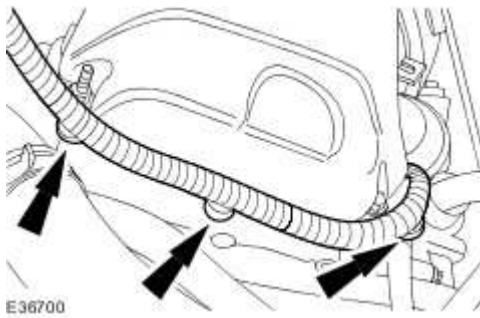


170 . Attach the hoses.

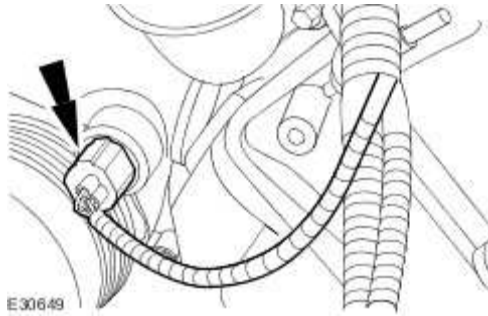
- Reposition the hose retaining clip.



171 . Attach the engine wiring harness.



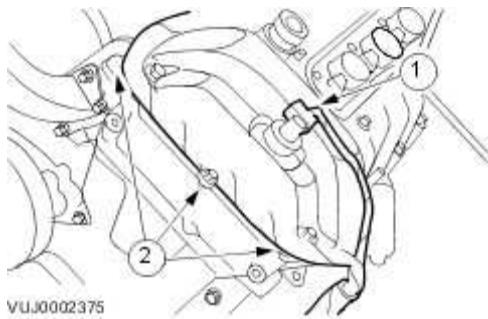
172 . Connect the coolant temperature sensor electrical connector.



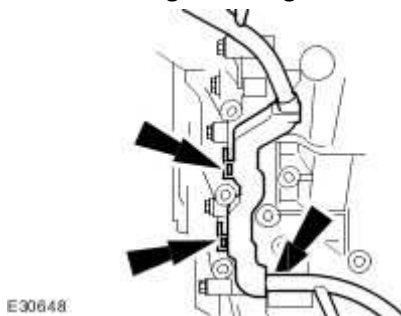
173 . Attach the engine wiring harness.

32. Connect the variable valve timing (VVT) solenoid electrical connector.

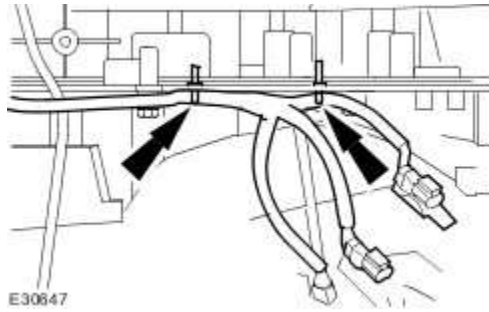
33. Attach the engine wiring harness.



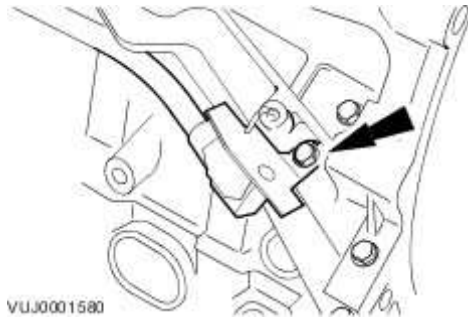
174 . Attach the engine wiring harness.



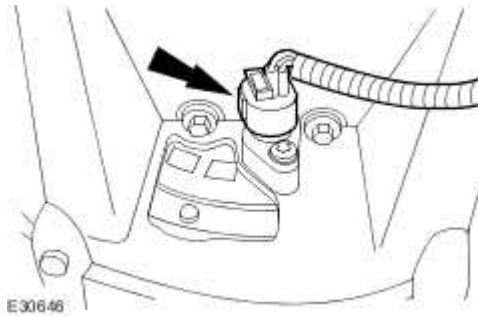
175 . Attach the engine wiring harness.



176 . Attach the engine wiring harness.

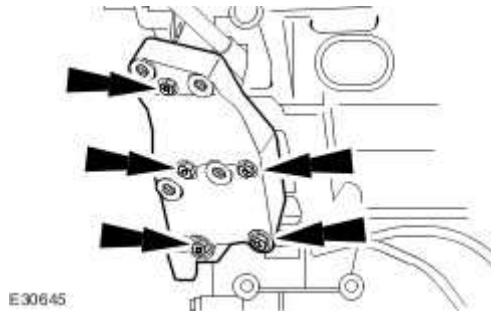


177 . Connect the crankshaft position sensor electrical connector.



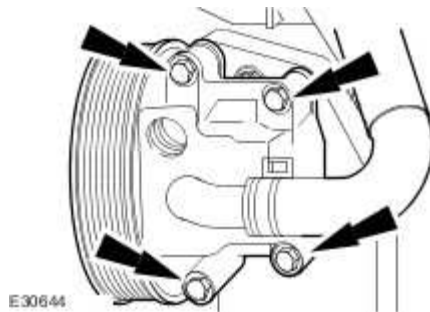
178 . Install the power steering pump mounting bracket.

- Tighten to 25 Nm.



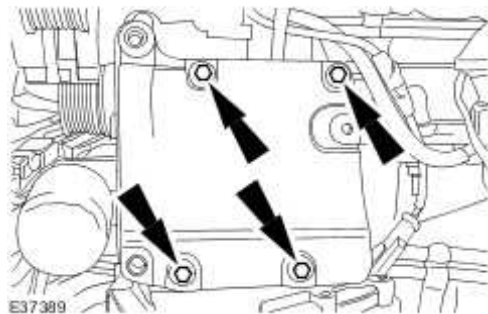
179 . Install the power steering pump.

- Tighten to 25 Nm.



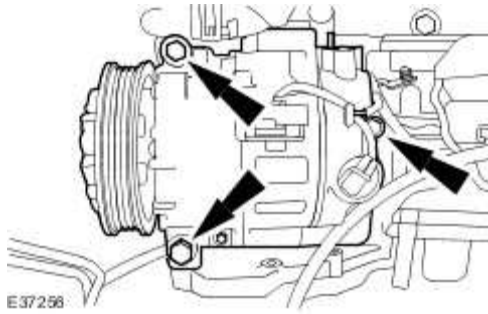
180 . Install the air conditioning compressor mounting bracket.

- Tighten to 25 Nm.

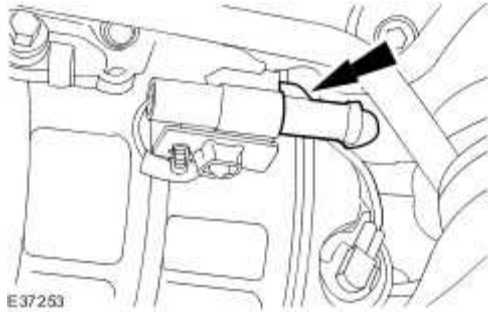


181 . Install the A/C compressor.

- Tighten to 25 Nm.

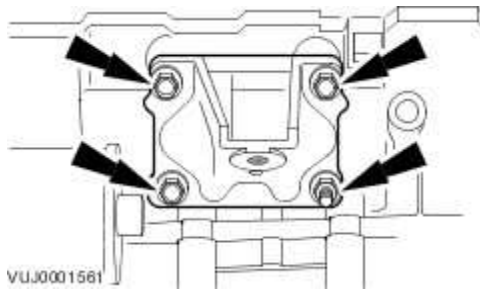


182 . Connect the air conditioning compressor electrical connector.



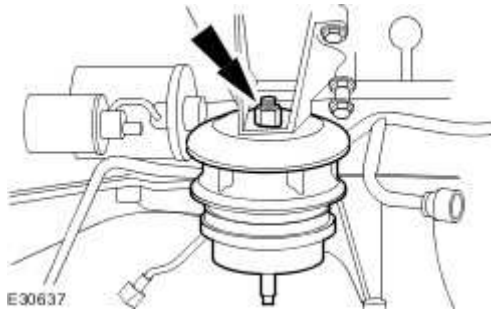
183 . Install the left-hand engine mounting bracket.

- Tighten to 25 Nm.



184 . Install the left-hand engine mount.

- Tighten to 43 Nm.



185



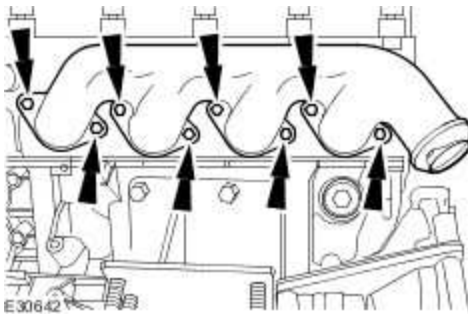
CAUTION: Make sure the exhaust manifold and gasket are correctly aligned to the cylinder head.



CAUTION: Make sure the exhaust manifold torque is checked after initial tighten.

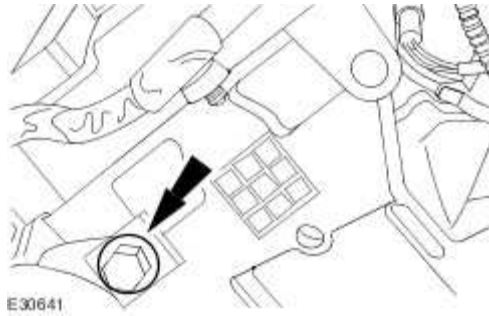
Install the left-hand exhaust manifold.

- Install a new gasket.
- Tighten to 20 Nm.



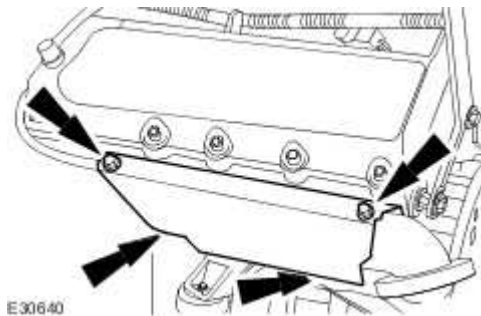
186 . Install the heat shield retaining bolt.

- Tighten to 50 Nm.



187 . Install the heat shield.

- Tighten to 3 Nm.



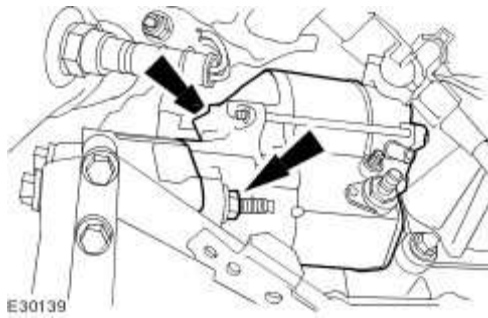
188 . Install the oil level indicator and tube.

- Install a new O-ring seal.
- Tighten to 6 Nm.

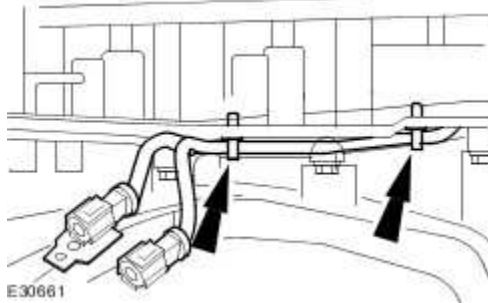


189 . Install the starter motor.

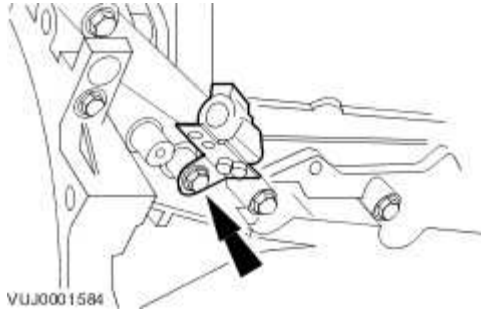
- Tighten to 45 Nm.



190 . Attach the engine wiring harness.

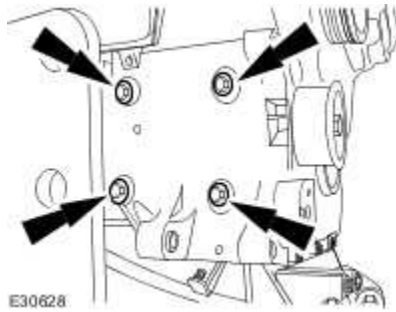


191 . Attach the right hand oxygen sensor retaining bracket.

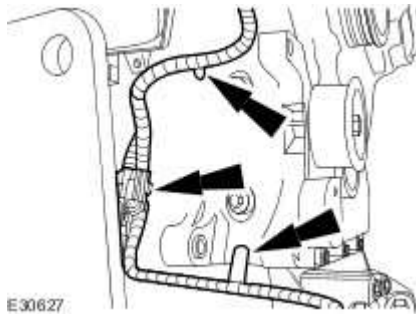


192 . Install the generator mounting bracket.

- Tighten to 45 Nm.

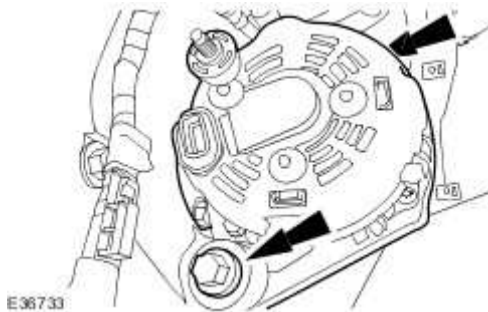


193 . Attach the engine wiring harness.

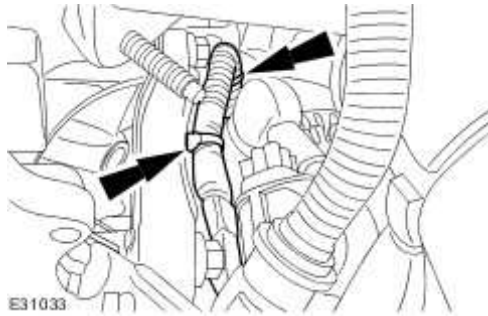


194 . Install the generator.

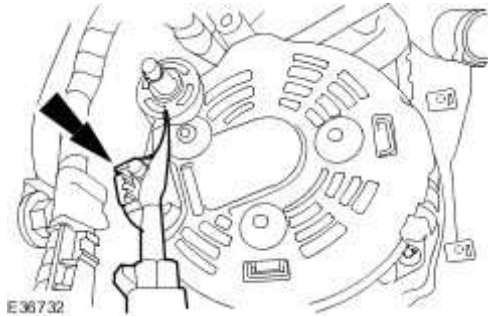
- Tighten the generator upper retaining bolt to 21 Nm.
- Tighten the generator lower retaining bolt to 40 Nm.



195 . Attach the wiring harness.

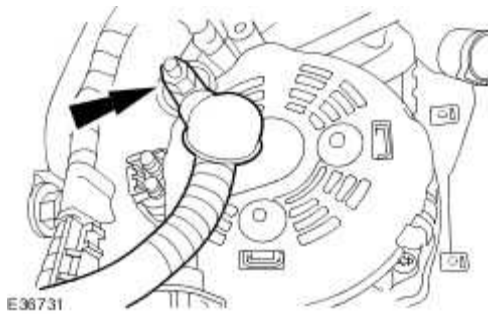


196 . Connect the generator electrical connector.

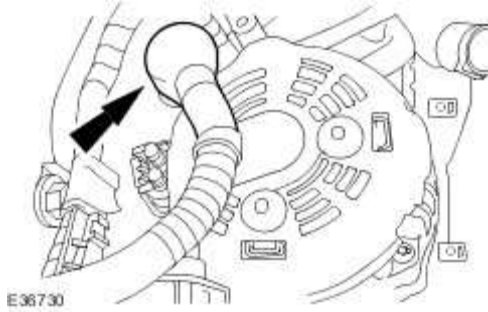


197 . Attach the generator battery positive cable.

- Tighten to 12 Nm

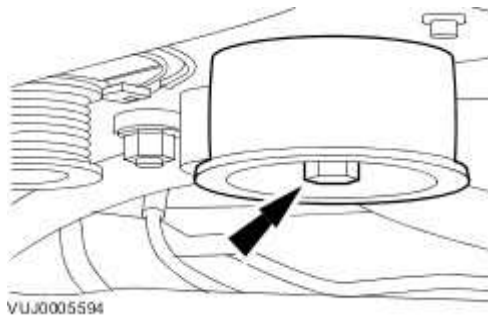


198 . Attach the generator battery positive cable protective cover.



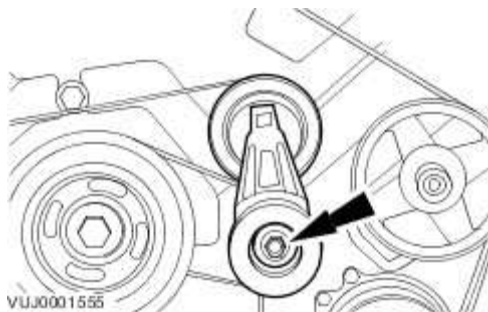
199 . Install the accessory drive belt idler pulley.

- Tighten to 25 Nm.



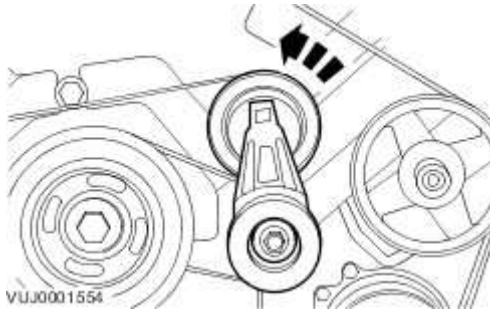
200 . Install the accessory drive belt tensioner.

- Install the accessory drive belt.
- Tighten to 45 Nm.



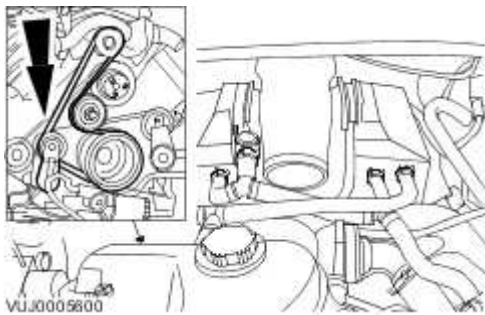
201 . Attach the accessory drive belt.

- Use a 3/8 inch square drive bar to rotate the drive belt tensioner.
- Attach the accessory drive belt.



202 . Install the supercharger belt.

- Use a 1/2 inch square drive bar to rotate the supercharger belt tensioner.



203 . Connect the oil cooler hoses.



303-01C : Engine – 2.7L Diesel

Specifications

Specifications

Lubricants, Fluids, Sealers and Adhesives

Description	Specification
Engine oil, SAE 5W-30	WSS-M2C-913B A1
Sealant	WSE M4G323-A4 (Loctite 5910)
Sealant (camshaft caps)	ESK M4G269-A (Loctite 518)
Hose assembly surfactant	WSE N99C45-A2

General Specifications

Maximum permissible cylinder head warp	
Total flame face	0.1 mm
150 mm x 150 mm square on flame face	0.05 mm
25 mm x 25 mm square on flame face	0.025 mm

Capacities

Description	Liters
Engine oil, initial fill	7.7
Engine oil, service fill with oil filter change	6.6

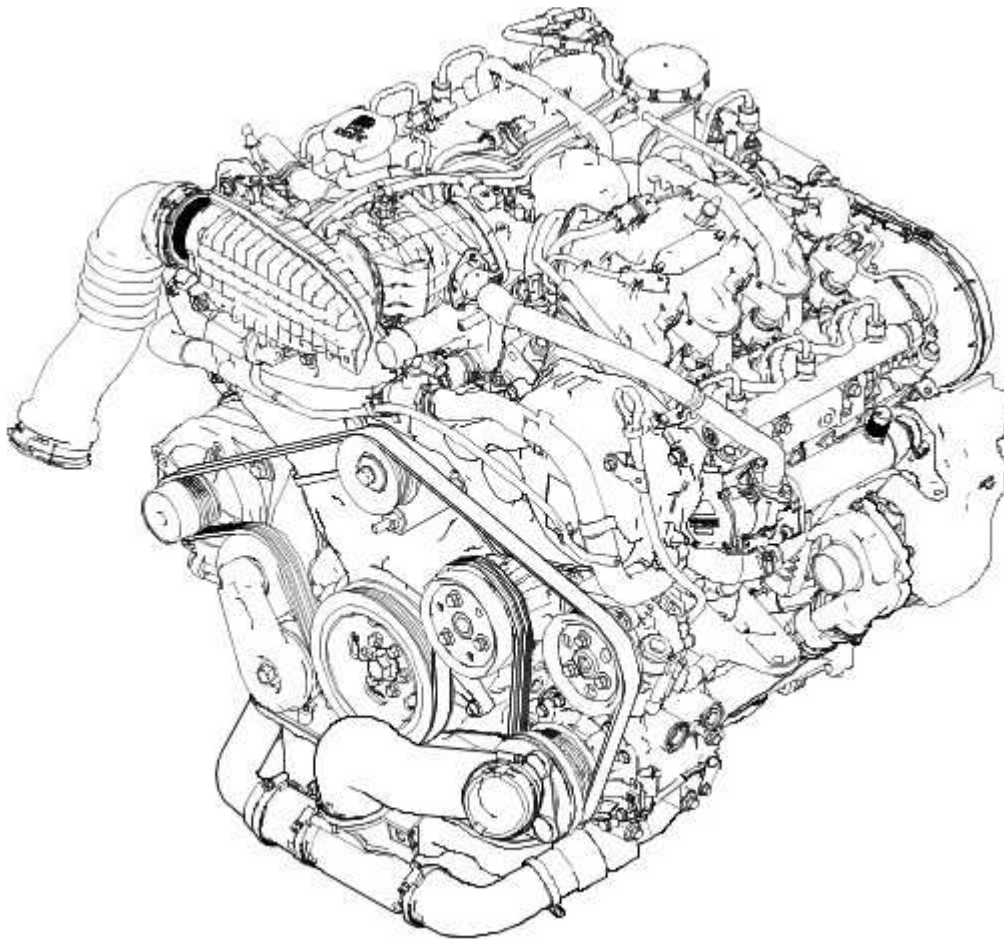
Torque Specifications

Description	Nm	lb-ft	lb-in
Accessory drive belt idler pulley retaining bolt	47	35	—
Accessory drive belt idler pulley mount bracket retaining bolts	80	59	—
Accessory drivebelt tensioner retaining bolt	47	35	—
Air conditioning compressor retaining bolts	25	18	—
Air conditioning compressor mounting bracket retaining bolts	25	18	—
A/C manifold retaining bolt	20	15	—

Camshaft bearing caps retaining bolts	A	–	–
Camshaft position sensor retaining bolt	10	–	89
Camshaft hub retaining bolts	A	–	–
Camshaft pulley retaining bolts	23	17	–
Crankshaft pulley retaining bolt	A	–	–
Crankshaft position sensor retaining bolt	5	–	44
Coolant inlet housing	10	–	89
Cylinder head retaining bolts	A	–	–
Engine mount retaining nuts to crossmember	63	46	–
Engine mount bracket to engine mount retaining nut	48	35	–
Engine mount bracket to engine block retaining bolts	90	66	–
Engine wiring harness retaining bracket	4	–	35
Exhaust manifold heat shield retaining bolts	10	–	89
Exhaust manifold retaining bolts	23	17	–
Flexplate retaining bolts	A	–	–
Fuel injection pump	23	17	–
Fuel injection pump pulley retaining nut	50	37	–
Fuel injector retaining bolts	10	–	89
Generator retaining bolts	47	35	–
Generator mount bracket retaining bolts	23	17	–
Glow plugs	10	–	89
Knock sensor retaining nuts	20	15	–
Oil cooler to cylinder block retaining bolt	10	–	89
Oil level indicator tube retaining bolt	10	–	89
Oil pan retaining bolts	10	–	89
Oil pump to engine block retaining bolts	10	–	89
Oil pan drain plug	25	18	–
Oil separator pipe retaining bolts	10	–	89
Oil filter	25	18	–
Piston cooling jet retaining bolt	10	–	89
Power steering bracket retaining bolts	23	17	–
Power steering pump retaining bolts	22	16	–
Primary timing chain tensioner retaining bolts	12	9	–
Starter motor retaining bolts	48	35	–
Timing belt tensioner retaining bolt	24	18	–
Timing belt idler pulley retaining bolt	45	33	–
Water pump retaining bolts	10	–	89
Water pump pulley retaining bolts	24	18	–

Water pump outlet pipe retaining bolts	10	–	89
Valve cover retaining bolts	10	–	89
Vacuum pump retaining bolts	23	17	–
Vacuum pump retaining nuts	13	10	–

Engine



E52128

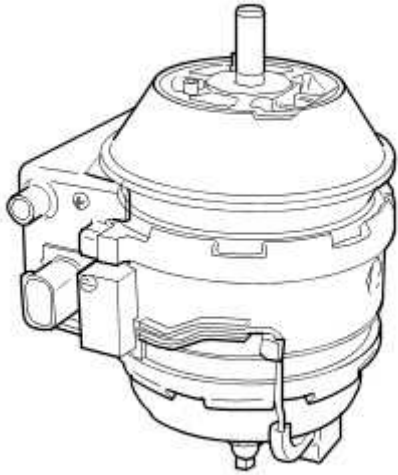
The 2.7 litre engine consists of a six cylinder 60-degree 'Enclosed Vee' configuration liquid cooled Compacted Graphite Iron (CGI) with the cylinder bores machined directly into the block.

Viewed from the driving position, the right-hand cylinder bank is numbered 1 to 3, from the front of the vehicle and the left-hand cylinder bank are numbered 4 to 6, from the front of the vehicle.

Knock Sensors

The knock sensor registers increased vibrations which occur due to increased combustion noise. The ECM uses the signal as a correction factor for calculating the quantity of fuel to be injected during the injection phase.

Active Engine Mounts



E67630

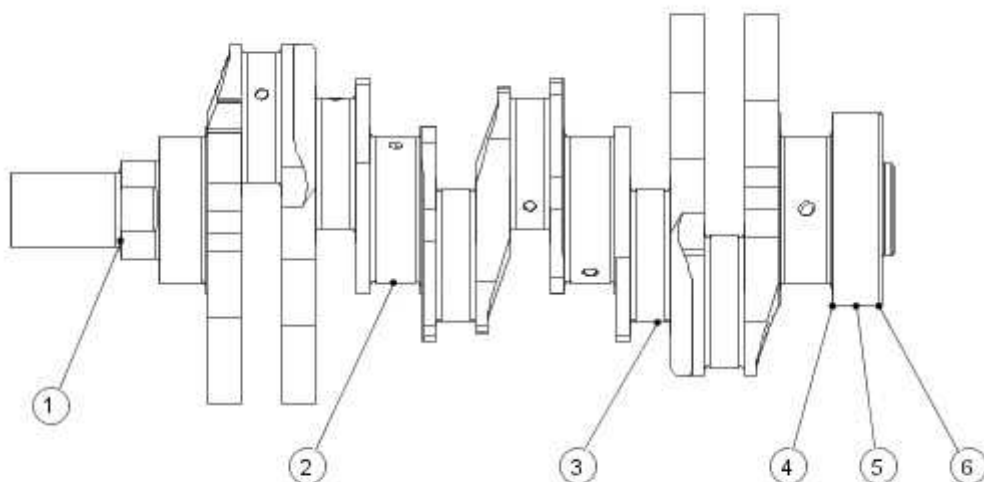
The function of the engine mounts is to support the engine, whilst also isolating vibrations transmitted from the engine to the vehicle body.

The active engine mounts are functional only when the engine is at idle, as this is when the engine high frequency vibrations are the dominant vibrations noticeable to the vehicle's occupants.

The mechanical construction of the active engine mounts is similar to the passive hydraulic engine mounts, but with the added element of an internal shaker mechanism. The shaker mechanism of the active engine mounts works on the same concept as a speaker diaphragm to move the top section of the active engine mounts to oppose the vibrations generated by the engine. The active engine mounts mechanism estimates the vibration caused by fluctuations in the engine crank rotation and isolates these vibrations by generating additional vibrations through the internal shaker mechanism. The result gives vibration isolation and reduction of chassis vibration.

To ensure accurate vibration suppression the active engine mounts have an electronic control module attached to the body and an accelerometer attached to the base.

Crankshaft



E52135

Item	Part Number	Description
1	—	Oil pump drive
2	—	Main bearing journal
3	—	Big end journal
4	—	Rear drive flange
5		Rear oil seal location
6		Trigger wheel location

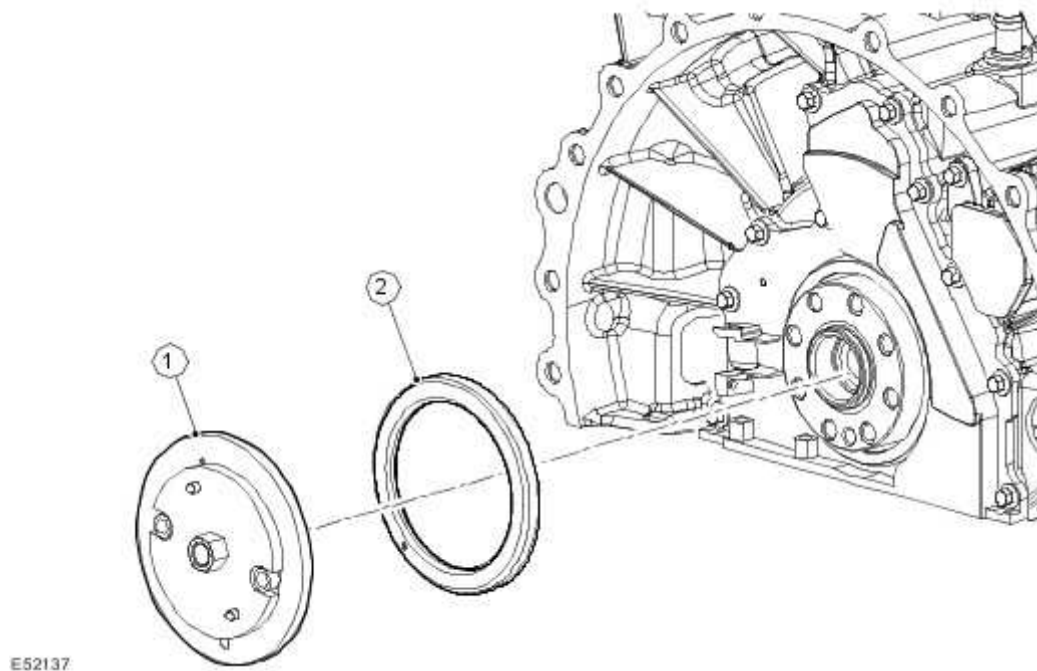
The crankshaft is forged steel and fillet rolled with induction hardened journals, which run in four bearings with clamped two layer bearing shells. The upper and lower shells of bearing number four are flanged, which limits the end float of the crankshaft. The main bearing caps are double bolted and cross bolted to increase the strength and rigidity of the engine block.

The rear main oil seal and retainer assembly is a one piece unit and is supplied with its own plastic fitting sleeve. The seal and retainer have two locating dowels and ten fixing bolts. In addition the retainer has a location for the crankshaft position sensor.

A torsional vibration crankshaft damper pulley is bolted to the front of the crankshaft.

The crankshaft trigger wheel is located on the rear of the crankshaft. It is pressed onto the crank

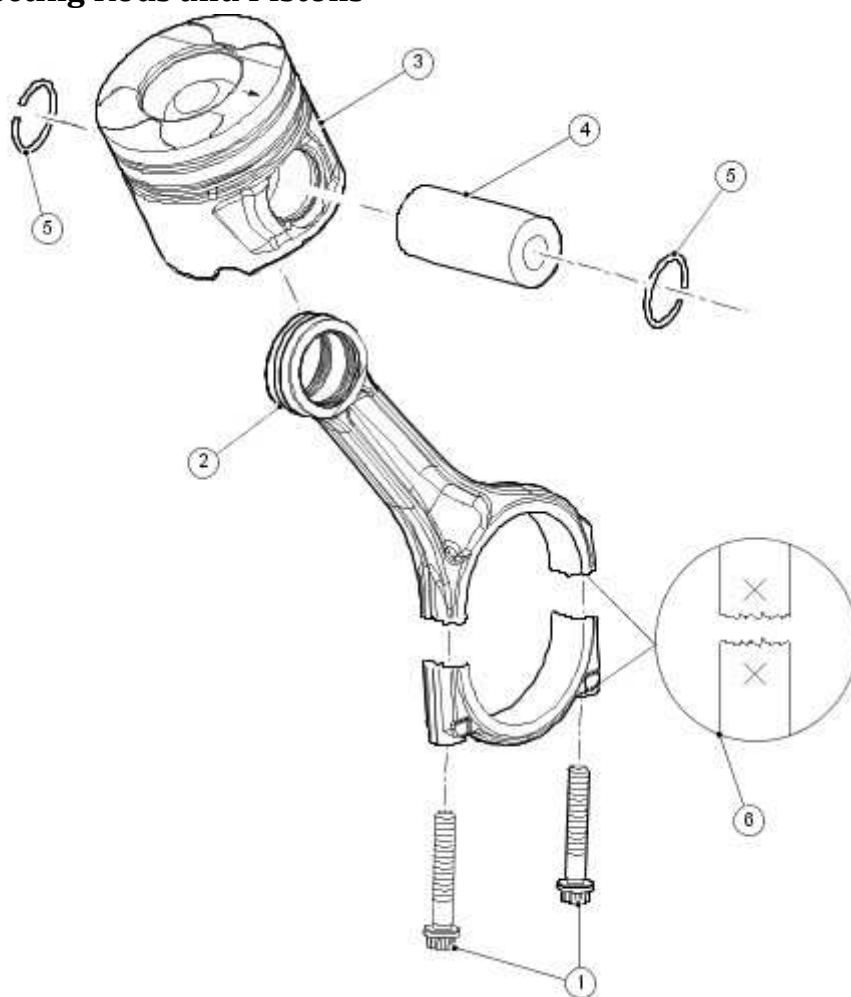
using a special tool which also precisely aligns the trigger wheel for crankshaft position and timing. The trigger wheel consists of 60 magnets minus two for ECM crankshaft position reference and synchronisation. The magnets cannot be seen on the trigger wheel, which therefore can only be positioned using a special tool.



Item	Part Number	Description
1	—	Special tool
2	—	Trigger wheel

If the trigger is removed for any reason, then a new trigger wheel **MUST** be fitted.

Connecting Rods and Pistons



E52134

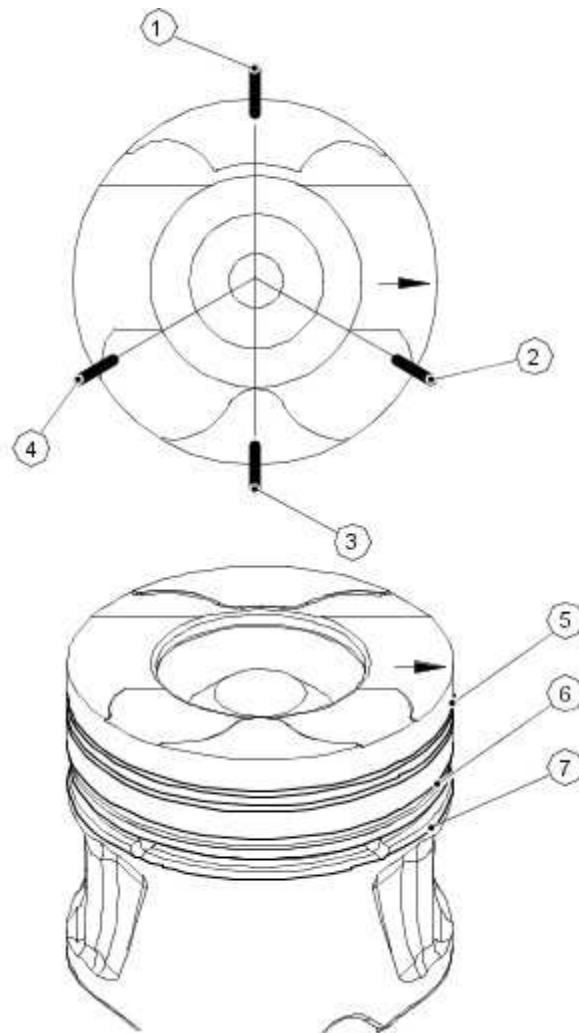
Item	Part Number	Description
1	—	Connecting rod bolts
2	—	Connecting rod
3	—	Piston
4	—	Gudgeon pin
5		Circlips
6		Connecting rod identification

In production the connecting rods are fitted in sets of six. The connecting rods are offset fracture split. Each connecting rod is marked (etched) with the cylinder number on either side of the fracture split line.

The pistons are made from aluminium alloy and fitted with three rings. The piston crown incorporates a pronounced bowl. This forms the combustion chamber which promotes swirl and turbulence, necessary for good combustion and improved emission. In addition, the piston skirt, which comes into contact with the cylinder bore, has molybdenum-coated surfaces. These counteract scoring of the cylinder and piston, therefore helping to increase engine life.

The piston also incorporates a double wave gallery within the piston crown to enhance piston cooling. The piston is supplied with oil by spray jets which are located in the engine block oil gallery. This ensures optimum piston cooling due to the high temperatures that are generated by the combustion process.

The arrows on the piston crown point to the front of the engine.



E52133

Item	Part Number	Description
1	—	Ring gap oil control
2	—	Ring gap upper compression

3	—	Spiral joint oil control
4	—	Ring gap lower compression
5		Upper compression ring
6		Lower compression ring
7		Oil control ring

All pistons are common single grade/single part number for all engines.

The piston top ring is a taper type and is fitted with a taper to the top of the piston. All rings marked 'top' are assembled with top to uppermost. All rings must be spaced evenly around the piston before installing. The circumference gap of the double bevelled oil control ring must be opposite to the spiral control joint.

Piston bowl volume is 20.025cc and the compression ratio is 17.3:1.

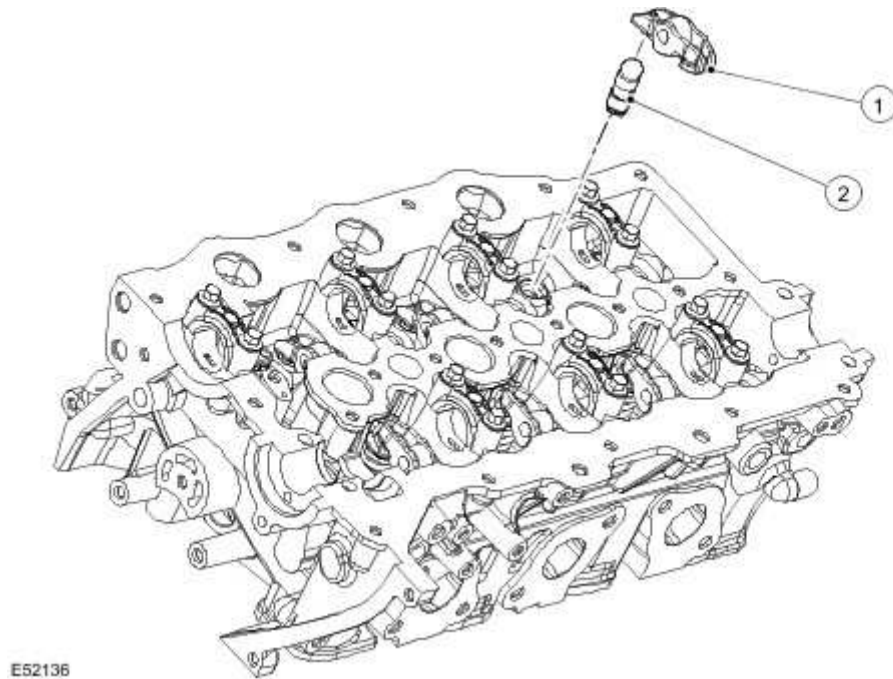
Cylinder Heads and Valve Gear

The cylinder head is of high quality aluminium and cannot be reworked. The cylinder head is secured to the engine block by eight bolts.

The cylinder head incorporates four valves per cylinder, glow plugs and a knock sensor. A vertically centrally placed fuel injector guarantees maximum distribution of fuel into the combustion chamber.

The cylinder head gasket is a three layer laminated steel construction that has an excellent service life and sealing properties. The cylinder head gasket is available in five different thicknesses depending on the piston protrusion height. The cylinder head gaskets are identified by serrations cut into the front end of the gasket.

The valves are operated directly by steel roller rockers with hydraulic lash adjusters.



Item	Part Number	Description
1	—	Steel rocker
2	—	Hydraulic adjuster

Inlet Manifold

The induction is designed to optimise torque across the engine speed/load range. The air charge enters the induction manifold from the EGR throttle valve and passes into the plenum for distribution to the cylinders.

The purpose of the plenum is to maximise the air charge into the cylinders.

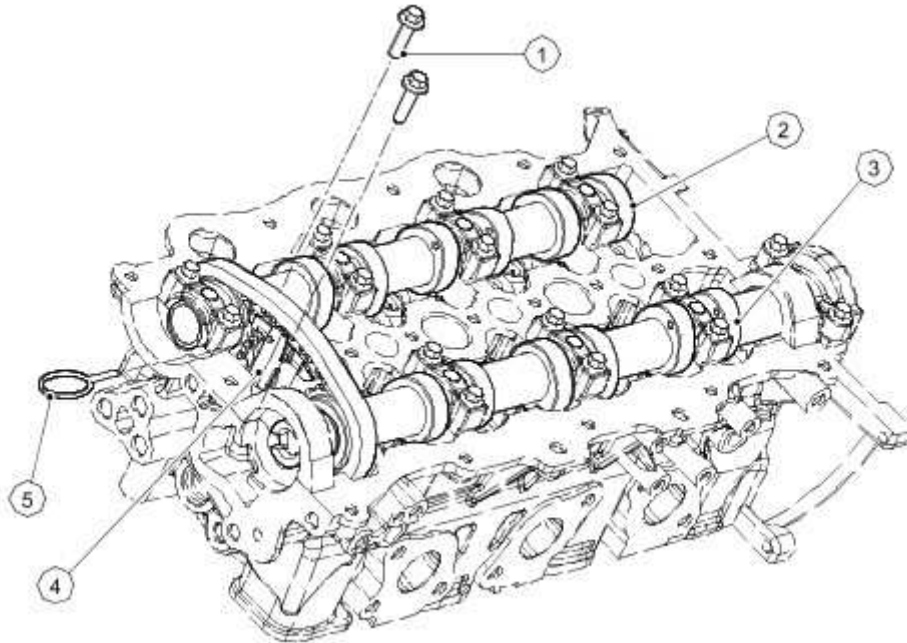
The inlet manifolds are of plastic composite construction and are handed for the left and right hand bank. The manifolds incorporate a twin plenum intake system and integrated cam covers. The plenum systems are vacuum operated, these are located at the rear of the manifolds and are ECM controlled

The inlet manifolds/cam covers are secured to the cylinder head by 13 shouldered bolts and sealed by means of rubber gasket.

Camshafts

The camshaft's construction is of hollow steel tube with pressed on syntered lobes. There are two camshafts per cylinder head. The camshafts have pressed on drive sprockets which are marked for timing purposes. The interconnecting drive chain is also marked for valve timing. The drive chain has

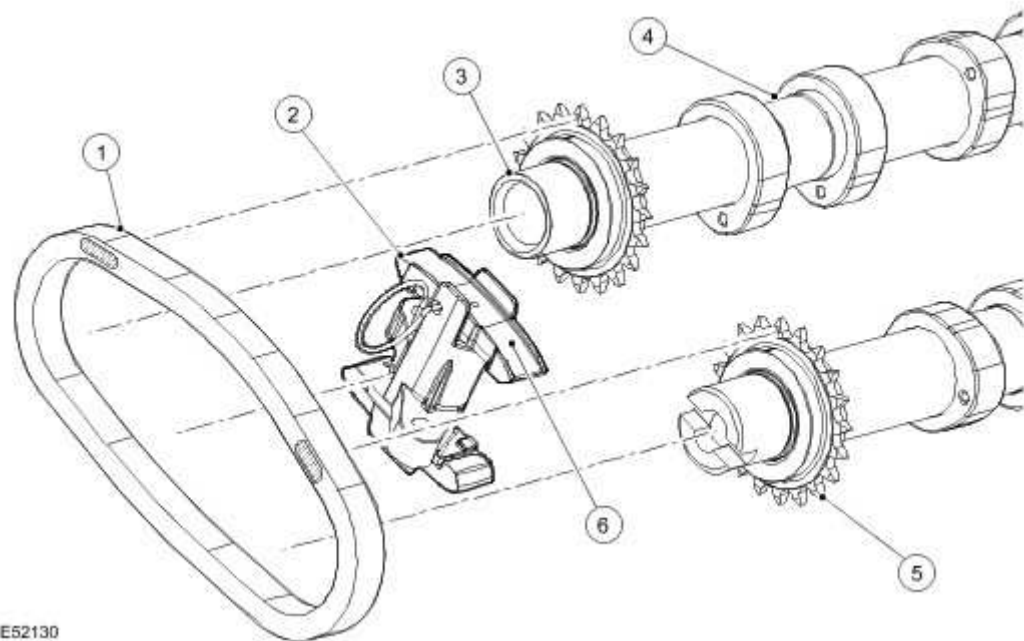
a hydraulic tensioner. Both banks are of similar construction. They are not interchangeable.



E52129

Item	Part Number	Description
1	—	Tensioner securing bolts
2	—	Camshaft bearing caps
3	—	Camshaft
4	—	Chain tensioner
5	—	Tensioner retaining pin

The drive sprockets also form the thrust faces for the camshaft. In production camshaft endfloat is set to 0.065mm-0.185mm.

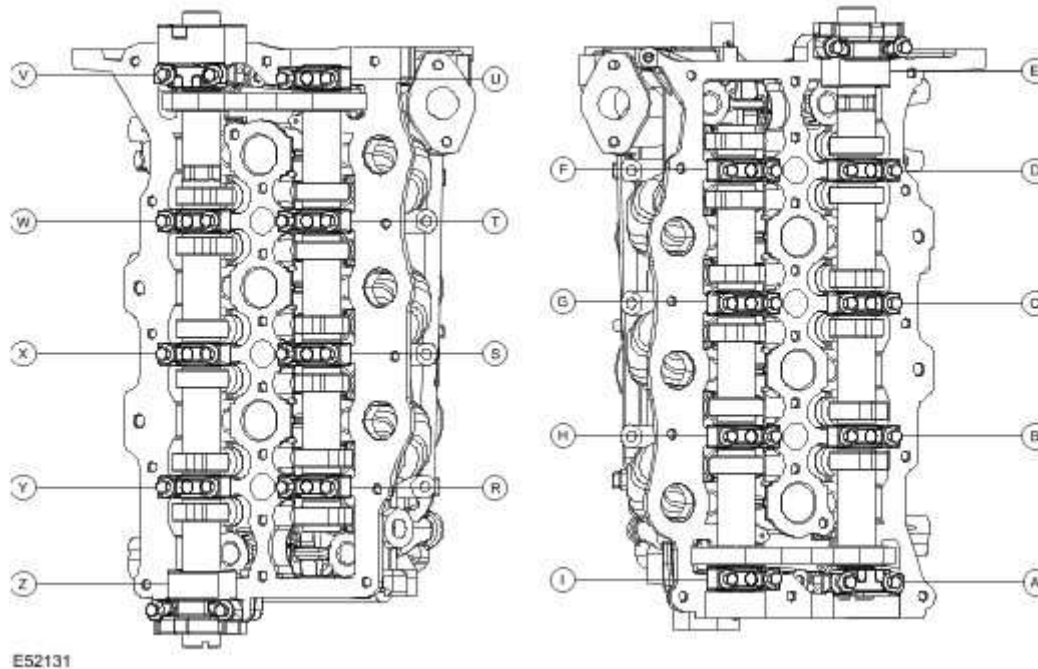


E52130

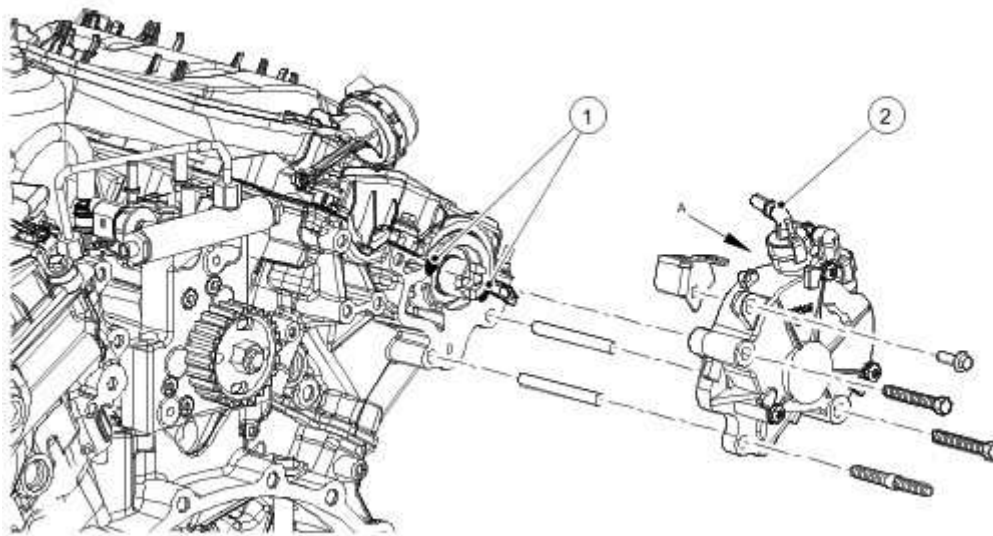
Item	Part Number	Description
1	—	Drive chain
2	—	Tensioner locking pin
3	—	Camshaft
4	—	Cam lobe
5	—	Drive gear
6	—	Tensioner

Camshaft Bearings

The camshafts are supported in five line bored bearings. The bearing caps, which are individually identified, must be fitted in the correct sequence.



The right hand exhaust camshaft drives the vacuum pump which is sealed by an O-ring seal and secured by three bolts. Both inlet camshafts are sealed at each end by the inlet manifold/cam cover.

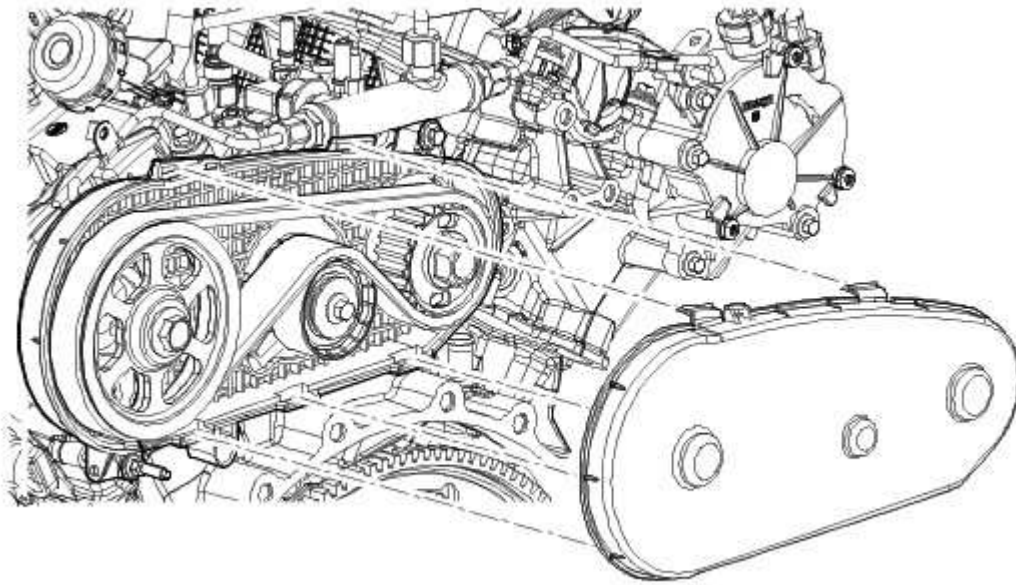


The vacuum pump supplies vacuum for the inlet port deactuation system and brake servo assistance. The pump is located at the rear of the engine and driven by the right hand side exhaust camshaft.

High Pressure Pump

The left hand exhaust camshaft drives the high pressure pump by means of a belt drive sprocket, which is supported by a boss and a single bolt fixing.

The high pressure pump is not timed to the engine.



E52143

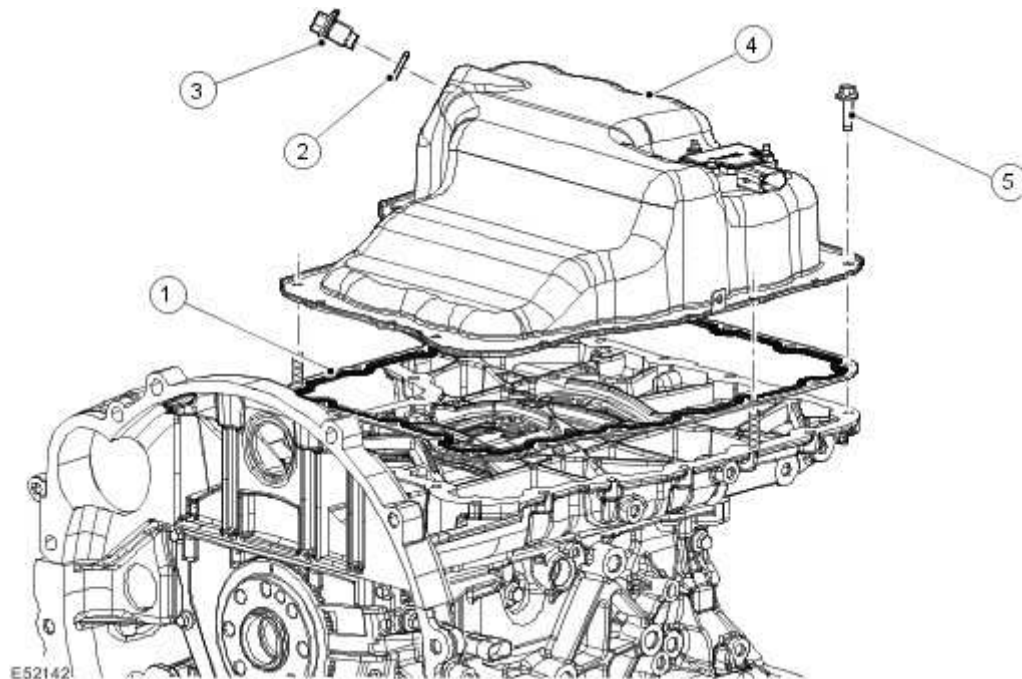
Timing Gear

The camshafts are driven from the crankshaft pulley via a timing belt to the front the of exhaust camshafts. The camshaft gears are bolted to a drive flange via three elongated adjustment holes and in turn bolted to the camshafts by a single bolt.

Each pair of camshafts are chain driven and must be timed before assembly.

Sump Pan

The sump pan is made from pressed steel and is secured to the bedplate by 21 M6 x 16 bolts.

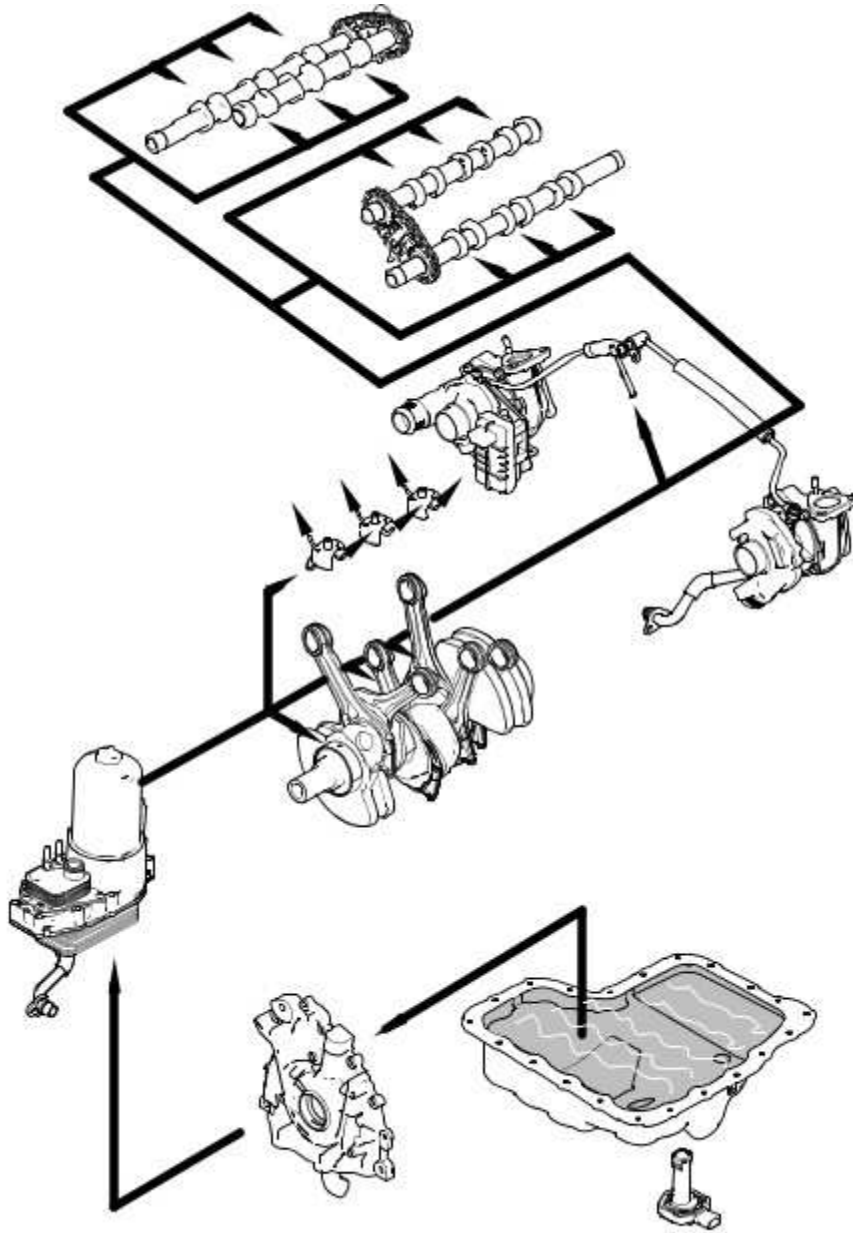


Item	Part Number	Description
1	—	Gasket
2	—	Draining bolt seal
3	—	Draining bolt
4	—	Sump pan
5	—	Retaining bolts

Engine Lubrication System

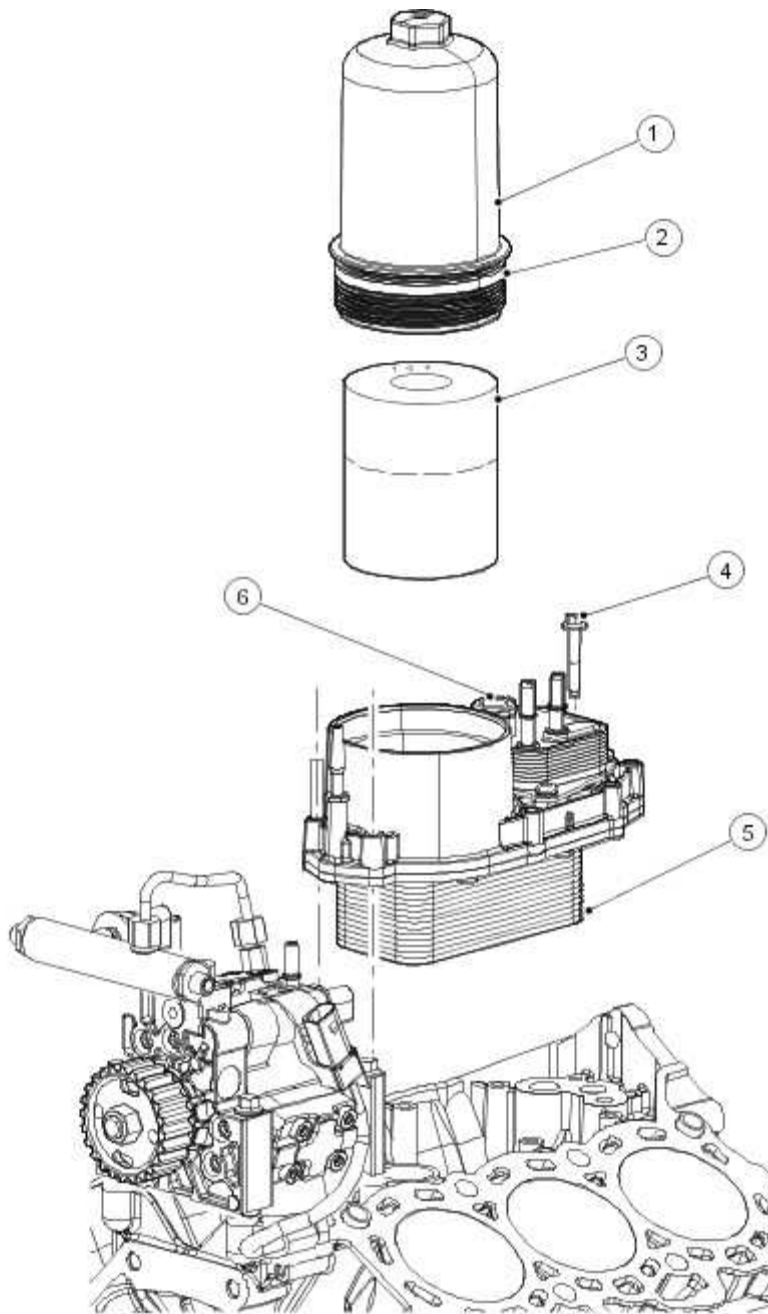
Oil is drawn from the oil pan and pressurised by the oil pump. The output from the oil pump is then filtered and distributed through the internal passage ways. Oil is cooled before entering the filter.

All moving parts are lubricated by pressure or splash oil. Pressurised oil is also provided for operation of the hydraulic adjusters, turbochargers and timing gear chain tensioners.



E52138

The engine is lubricated by a forced-feed circulation system with full flow oil filter. The oil cooler forms a unit with the oil filter and fuel cooler which is mounted centrally in the cylinder block between the two banks of cylinders. The engine oil is cooled using the engine cooling system. This eliminates the need for an additional engine oil cooler remotely mounted.



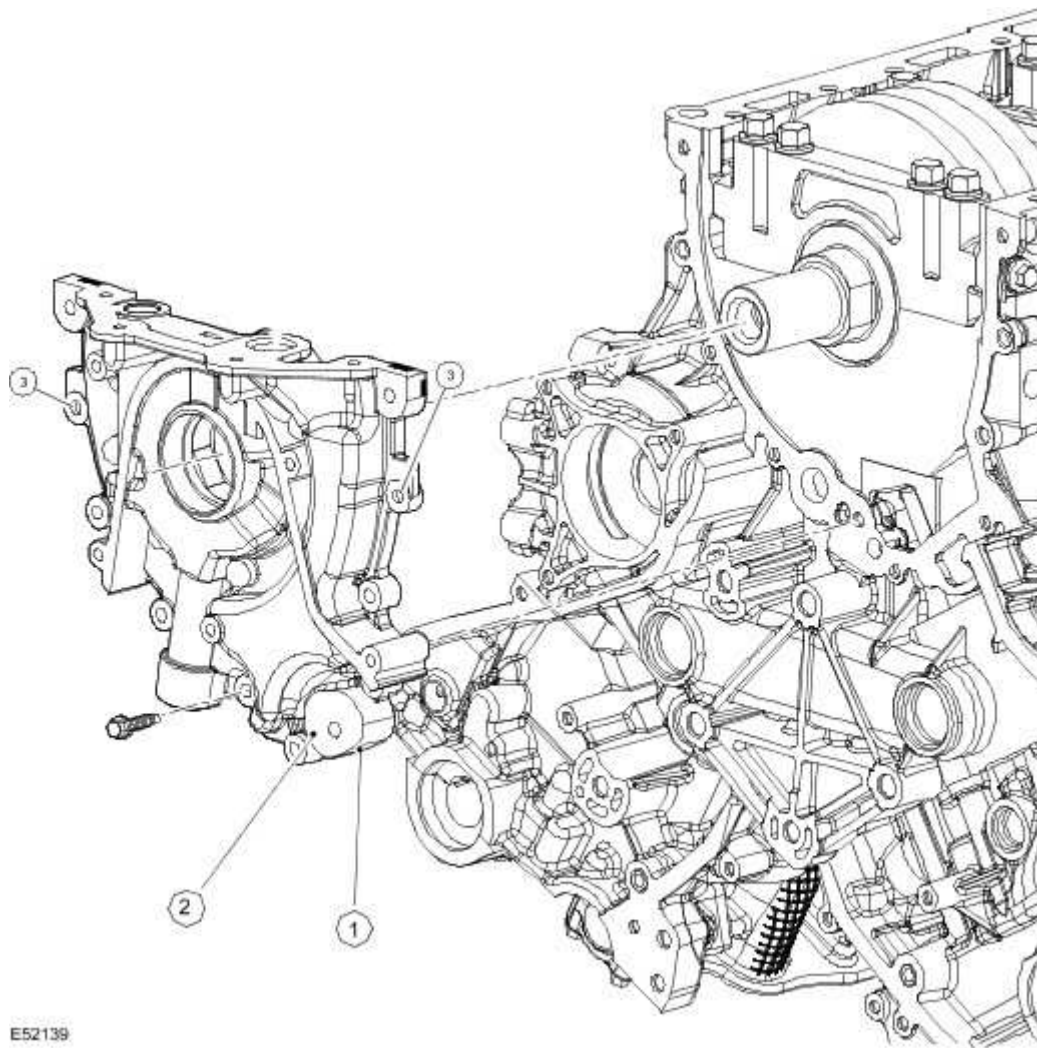
E52140

Item	Part Number	Description
1	—	Filter housing
2	—	'O' ring seal
3	—	Paper element
4	—	Retaining bolts

5	—	Cooler assembly
6	—	Water inlet connection

Oil Pump

The oil pump is a gear type pump and is bolted and dowelled to the front of the engine block. It is sealed by means of rubber gasket which is recessed into the oil pump casing. The pump is driven directly by two flats from the front of the crankshaft. The oil relief valve is an integral part of the pump.

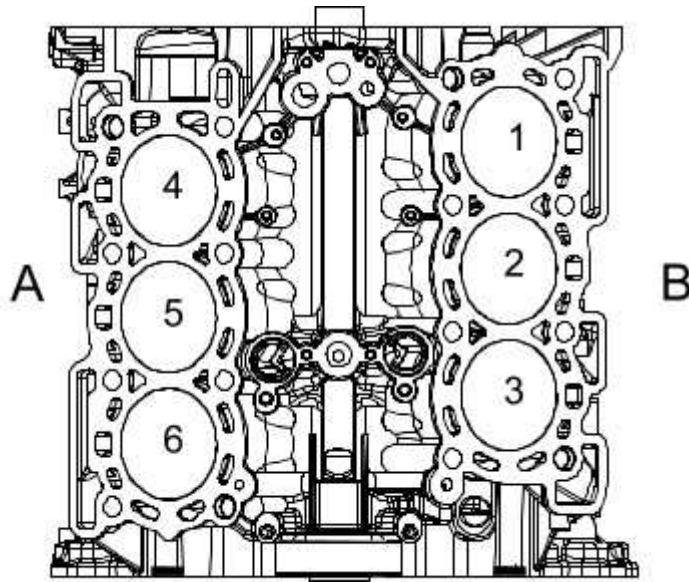


E52139

Item	Part Number	Description
1	—	Oil pump
2	—	Primary tensioner boss

3	—	Draining bolt
4	—	Sump pan
5	—	Retaining bolts

Oil spray jets are bolted in place under the cylinder bores between the crank bearing journals. The oil jets help to keep the pistons cool under arduous conditions and also prevent the oil draining back when the engine is stopped.



E52141

Engine Management

The ECM's (Engine Control Module) high capacity processor employs advanced software strategies that continuously control the engine's operating parameters. It gathers information from an array of sensors and provides output to the actuators. The ECM also operates a port deactivation system, which closes or opens flaps in the inlet system to provide the optimum swirl and flow conditions throughout the operating range of the engine.

In addition, the ECM controls the actuation of the Exhaust Gas Recirculation system, the Variable Geometry Turbochargers and the throttle, giving faster and more accurate response. A full torque-based strategy supports multiple injection control and integration with transmission and braking controllers. Transient torque and boost control enables vehicle performance to be optimised without compromising engine durability

System Components

All engine functions are controlled by the Siemens common rail ECM

Crank position (CKP) sensor

The CKP signal is used to determine: the quantity of fuel to be injected, the start of fuel delivery and the quantity of exhaust gases to be recirculated.

The crank position sensor is located at the rear of the crankshaft behind the flywheel.

The crankshaft position sensor (CKP) is a Hall effect sensor which scans a magnetic disc on the crankshaft. The air gap between the magnetic disc and the CKP is predetermined by the mounting of the sensor.

Camshaft position (CMP) sensor

Location: on the cylinder head behind the left hand camshaft timing belt pulley.

The CMP sensor is Hall effect type and is required to identify cylinder No. 1. (This is to synchronise engine to camshaft). The sensor scans a ring incorporated in the left hand camshaft timing belt pulley. The air gap between the magnetic ring and the CMP sensor is predetermined by the mounting of the sensor.

Engine coolant temperature (ECT) sensor

Location: in the top outlet hose.

The ECT is a NTC type sensor and is fitted into the top water outlet hose. The sensor has a bayonet type fitting.

Mass Air Flow (MAF) sensor

The MAF sensor is used to calculate the air mass. The MAF sensor is capable of detecting the mass air flow extremely precisely.

Location: there are two MAF sensors fitted. Each sensor is fitted to separate intake pipes.

On engines with a variable turbocharger, the MAF sensor is used solely to control the exhaust gas recirculation (EGR) and not the fuel metering. The MAF sensor also incorporates the Intake Air Temperature (IAT) sensor.

The IAT sensor measures the intake air or, the charge air temperature and supplies the ECM with an analog voltage signal.

Manifold Absolute Pressure (MAP) sensor

Location: fitted to the top of the throttle valve.

The MAP sensor measures the charging pressure in the intake pipe and sends the ECM an analog voltage signal.

Air Charge Temperature (ACT) sensor

Location: fitted to the pressure side of the air intake throttle valve.

The ACT sensor measures the intake air or the charge air temperature and supplies the ECM with an analog signal.

Fuel Rail Pressure sensor

Location: fitted to the diverter rail which in turn is bolted to the high pressure pump at the rear of the engine.

The fuel pressure sensor measures the instantaneous fuel pressure in the fuel rail very precisely within a very short time and supplies a voltage signal according to the pressure.

Fuel Temperature sensor

Location: the fuel temperature sensor is located on the low pressure side of the high pressure pump in the case of the common rail system. The sensor measures the temperature of the fuel in the low pressure system. Air and excessive heat in the fuel system can have an adverse effect on the operation of the sensor.

Exhaust Gas Recirculation (EGR) valves

Location: there are two EGR valves fitted, one to each exhaust manifold. These are water cooled and electronically controlled by the ECM.

Engine

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical
<ul style="list-style-type: none">• Coolant level• Coolant leaks• Oil level• Oil leaks• Visibly damaged or worn parts• Loose or missing nuts or bolts

- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
- 4 . If the cause is not visually evident, verify the symptom and
Engine - 3.0L/3.5L/4.2L .

Active engine mounts

Overview

The active engine mount system operates at idle speed to help damp out any vibration from the engine.

The system is triggered by a signal from the engine control module activating the mounts at engine speeds between 600 and 900 rpm, when the mounts will operate as a pair.

The system determines which side mount is which by sending a ground signal to the right hand mount (this pin is vacant on the left hand mount).

Inspection and Verification

- 1 . Verify the customer concern.



If the customer concern is of a vibration at **other** than idle speed, then the fault is **not** with the active engine mounts.

2 . Use the Jaguar approved diagnostic system or a scan tool to retrieve any fault codes, as other causes of vibration or misfire should be eliminated before condemning an active engine mount.

3 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
<ul style="list-style-type: none">• Active engine mounts, correct fitment/damage• Routing of pipework etc to avoid vibrations• Contact anywhere between the driveline and chassis	<ul style="list-style-type: none">• Fuse 9, front power distribution box• Harnesses/connectors• Active engine mounts• Engine control module (ECM)

4 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding.

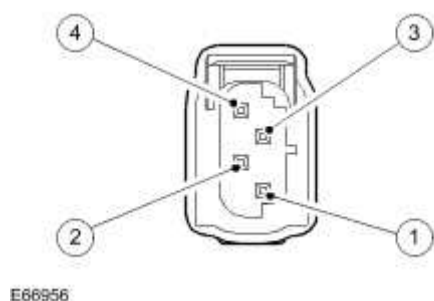
5 . If any DTCs were present in the steps above, make sure their causes are rectified before beginning any work on the active engine mounts.

Pinpoint test

PINPOINT TEST G414540p1 : ACTIVE ENGINE MOUNTS

G414540t1 : CHECK THE ACTIVE ENGINE MOUNT FUNCTION

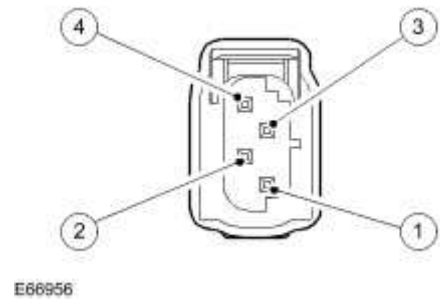
1.



Circuit	Pin
Power ground	01
Power supply	02

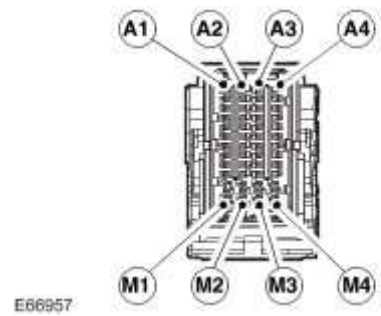
Signal	03
Ground	04

2.



Circuit	Pin
Power ground	01
Power supply	02
Signal	03

3.



Circuit	Pin
Active engine mount signal	H1

4. Key off. 5. Disconnect the right hand active engine mount connector, PI065. 6. Using the Jaguar approved diagnostic system, activate the mounts. 7. Check for operation of the left hand mount.

Operation can be confirmed by feeling for vibration of the mount. 8. Key off. 9. Reconnect the right hand active engine mount connector, PI065. 10. Disconnect the left hand active engine mount connector, PI066. 11. Using the Jaguar approved diagnostic system, activate the mounts. 12. Check for operation of the right hand mount.

Operation can be confirmed by feeling for vibration of the mount.

- **Did both mounts operate when activated?**

-> **Yes**

GO to Pinpoint Test G414540t8.

-> **No**

GO to Pinpoint Test G414540t2.

G414540t8 : CHECK THE INTERNAL DIAGNOSTIC CIRCUIT FOR SHORT CIRCUIT

1. Measure the resistance between:

PI065, component side	PI065, component side
Pin 04	Pin 01

PI066, component side	PI066, component side
Pin 04	Pin 01

- **Are both resistances greater than 10 Kohms?**

-> **Yes**

An intermittent fault may be present in the wiring harness. GO to Pinpoint Test G414540t2.

-> **No**

INSTALL a new active engine mount in place of the suspect unit. Clear any DTCs, test the system for normal operation.

G414540t2 : CHECK FOR POWER SUPPLY TO THE ACTIVE ENGINE MOUNTS

1. Disconnect the right hand active engine mount connector, PI065. 2. Key on, engine off. 3. Measure the voltage between:

PI065, harness side	Battery
----------------------------	----------------

Pin 02	Negative terminal
--------	-------------------

PI066, harness side	Battery
Pin 02	Negative terminal

- **Is the voltage at both pins greater than 10 volts?**

-> **Yes**

GO to Pinpoint Test G414540t4.

-> **No**

REPAIR the power supply circuit. This circuit includes harness splice, PIS87. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G414540t4 : CHECK THE SIGNAL FROM THE ECM

1. Using the Jaguar approved diagnostic system, activate the mounts. 2. Measure the signal voltage between:

PI065, harness side	Battery
Pin 03	Negative terminal

PI066, harness side	Battery
Pin 03	Negative terminal

- **Is the voltage between 1 and 2.5 volts with the mount active? (the circuit should register 4-5 volts with the mount inactive).**

-> **Yes**

GO to Pinpoint Test G414540t3.

-> **No**

GO to Pinpoint Test G414540t5.

G414540t3 : CHECK FOR GROUND TO THE ACTIVE ENGINE MOUNTS

1. Disconnect the battery negative terminal. [Link to genproc.](#) 2. Measure the resistance between:

PI065, harness side	Battery
Pin 01	Negative lead
Pin 04	Negative lead

PI066, harness side	Battery
Pin 01	Negative lead

- **Are the resistances less than 10 ohms?**

-> **Yes**

INSTALL a new active engine mount in place of the inoperative unit. Clear any DTCs, test the system for normal operation.

-> **No**

REPAIR the ground circuit. This circuit includes harness splice, PIS88. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G414540t5 : CHECK THE SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the ECM connector, EC066. 2. Measure the resistance between:

PI065, harness side	Battery
Pin 03	Negative lead

PI066, harness side	Battery
Pin 03	Negative lead

- **Is the resistance greater than 10 Kohms?**

-> **Yes**

GO to Pinpoint Test G414540t6.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation. REFER to the warranty policy and procedures manual if an ECM is suspect.

G414540t6 : CHECK THE SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

PI065, harness side	Battery
Pin 03	Positive terminal

PI066, harness side	Battery
Pin 03	Positive terminal

- **Is the resistance greater than 10 Kohms?**

-> **Yes**

GO to Pinpoint Test G414540t7.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation. REFER to the warranty policy and procedures manual if an ECM is suspect.

G414540t7 : CHECK THE SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

PI065, harness side	ECM, harness side
Pin 03	Pin H1

PI066, harness side	ECM, harness side
Pin 03	Pin H1

- **Is the resistance less than 10 ohms?**

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness or connectors. REFER to the warranty policy and procedures manual if an ECM is suspect.

-> No

REPAIR the high resistance circuit. This circuit includes harness splice, PIS86. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

Engine (12.41.01)

Special Service Tools



Engine Lifting Brackets
303-1129



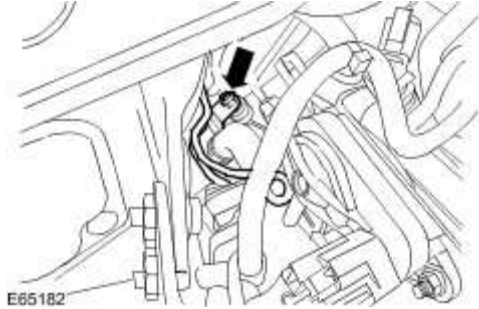
Engine Support Bracket
303-021

Removal

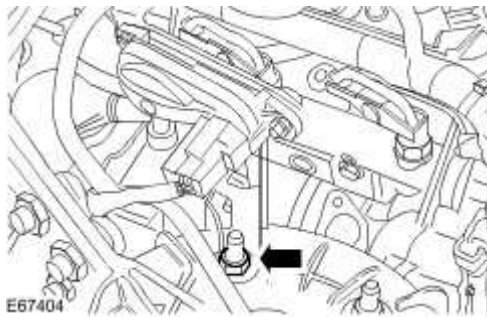
- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Remove the secondary bulkhead center panel.
For additional information, refer to Secondary Bulkhead Center Panel
- 3 . Remove the air cleaner.
For additional information, refer to Air Cleaner (19.10.05)
- 4 . Remove the automatic transmission.
For additional information, refer to Transmission - 2.7L Diesel (44.20.01)
- 5 . Drain the power steering fluid.

6 . Lower the vehicle.

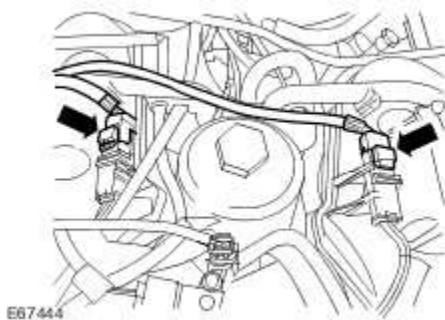
7 . Detach the diesel particulate filter high and low-pressure pipes.



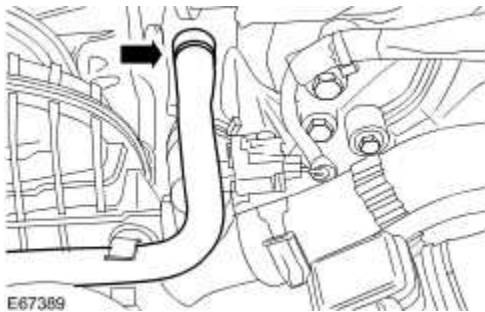
8 . Detach the diesel particulate filter differential pressure sensor retaining bracket.



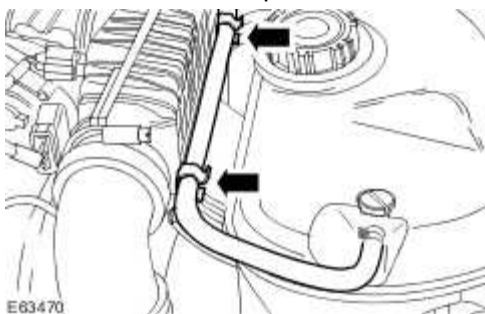
9 . Disconnect the glow plug harness electrical connectors.



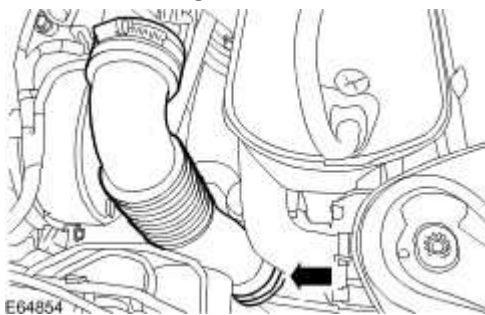
10 . Disconnect the coolant expansion tank coolant hose from the cylinder head coolant outlet assembly.



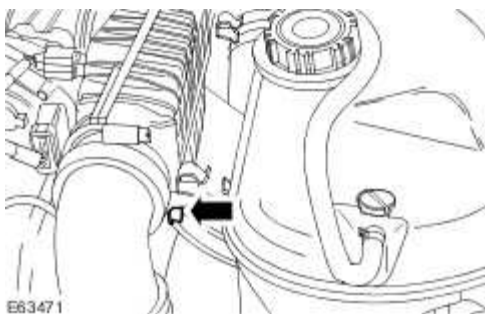
11 . Detach the coolant expansion tank coolant hose from the intake air shutoff throttle elbow.



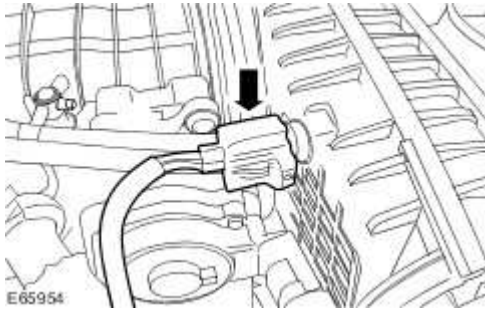
12 . Loosen the charge air cooler outlet tube retaining clip.



13 . Remove the intake air shutoff throttle elbow retaining bolt.



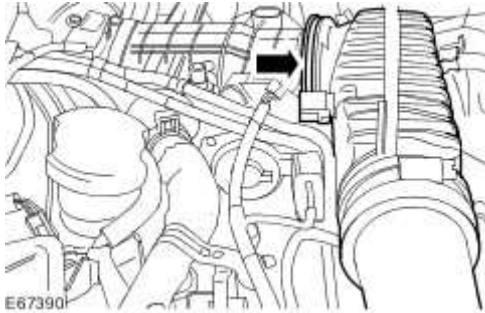
14 . Disconnect the intake air temperature (IAT) sensor electrical connector.



15 . **NOTE:**

Remove and discard the O-ring seal.

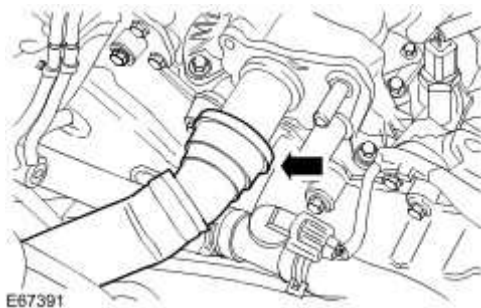
Remove the intake air shutoff throttle elbow and charge air cooler outlet tube assembly.



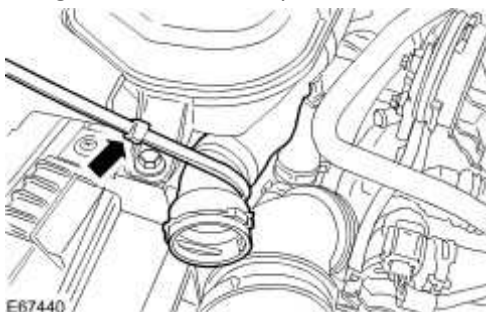
16 . Disconnect the exhaust gas recirculation (EGR) coolant hose.



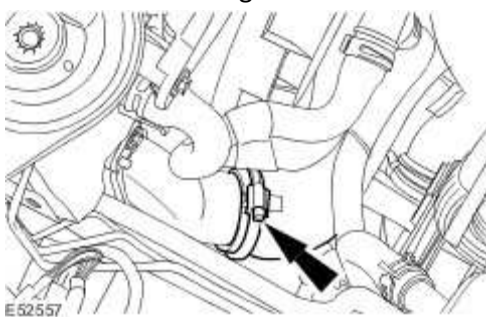
17 . Disconnect the radiator top hose from the cylinder head coolant outlet assembly.



18 . Using a suitable tie strap, secure the radiator top hose.



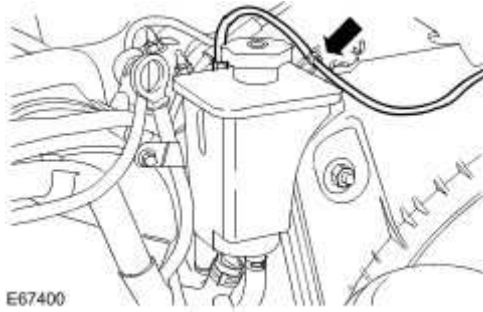
19 . Disconnect the charge air cooler intake hose.



20 . Disconnect the power assisted steering (PAS) pump supply hose.



21 . Detach the front air spring supply tube.



22 . Detach the PAS fluid reservoir.



23



CAUTION: If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.

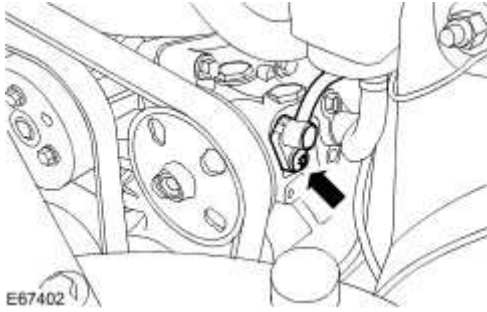
NOTE:

Cap the power steering lines to prevent loss of fluid and dirt ingress.

NOTE:

Remove and discard the O-ring seal.

Disconnect the PAS pump to steering gear high-pressure line.



24 . NOTE:

PAS pump shown removed for clarity.

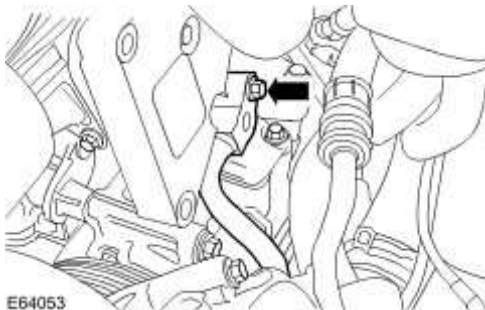
NOTE:

Remove and discard the O-ring seal.

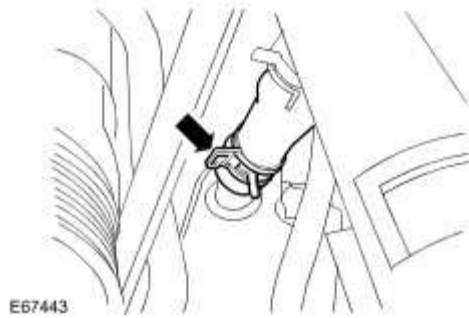
NOTE:

Cap the exposed ports.

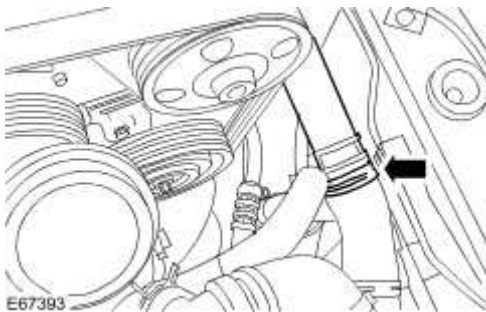
Disconnect the air conditioning (A/C) high-pressure line.



25 . Disconnect the automatic transmission cooler coolant hose.



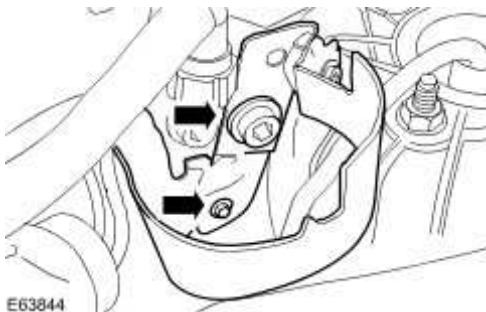
- 26 . Disconnect the radiator bottom hose.



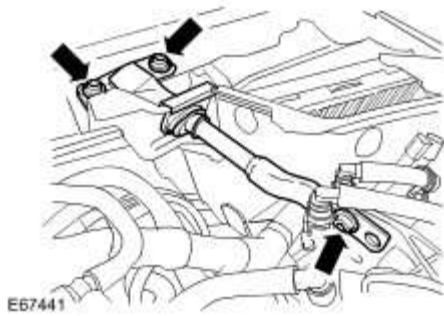
- 27 . Remove the fuel filter.

For additional information, refer to Fuel Filter - 2.7L Diesel (19.25.02)

- 28 . Remove the fuel filter securing bracket.



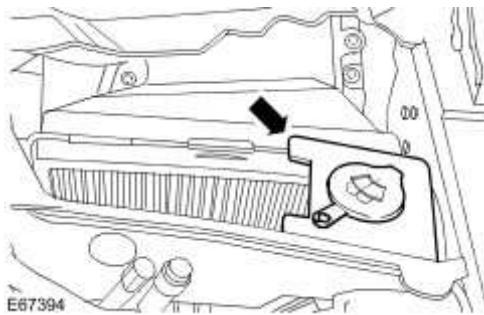
- 29 . Remove the engine compartment brace bar.



30 . **NOTE:**

Remove and discard the O-ring seal.

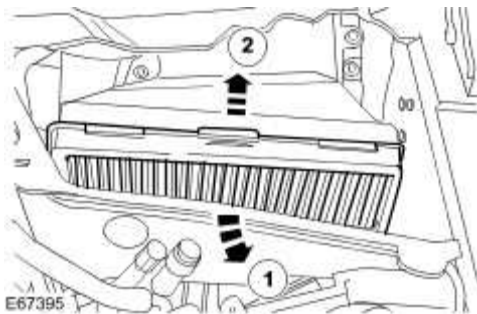
Remove the windshield washer reservoir filler neck.



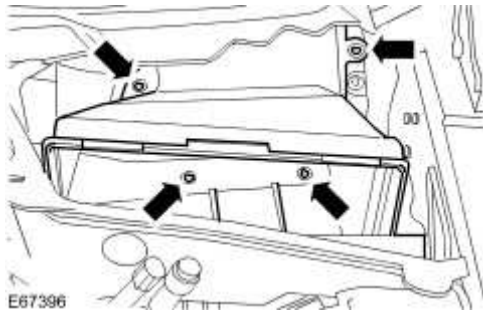
31 . Remove the cabin air filter.

1) Detach the cabin air filter.

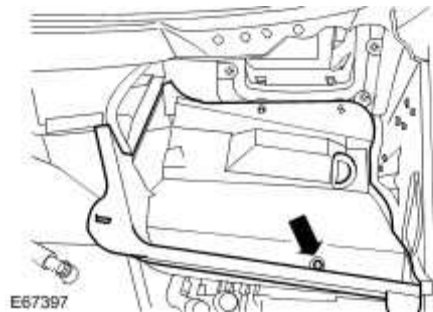
2) Remove the cabin air filter.



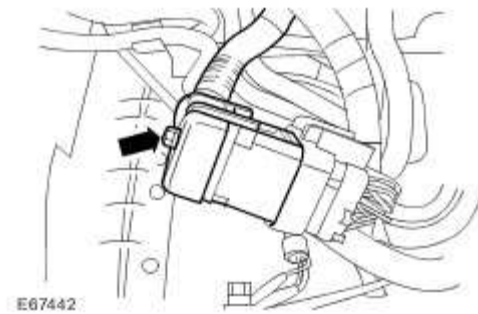
32 . Remove the cabin air filter housing.



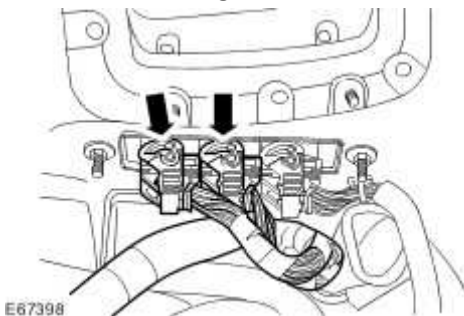
33 . Remove the engine compartment left-hand panel.



34 . Disconnect the engine harness electrical connector.

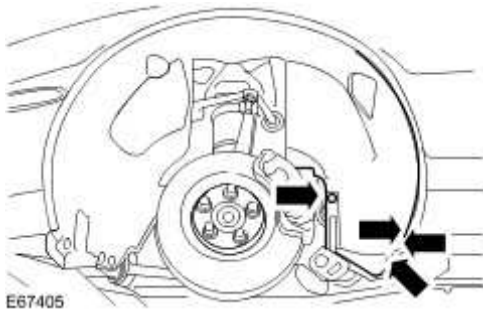


35 . Disconnect the engine control module (ECM) electrical connectors.



36 . Raise the vehicle.

37 . Detach the left-hand fender splash shield.



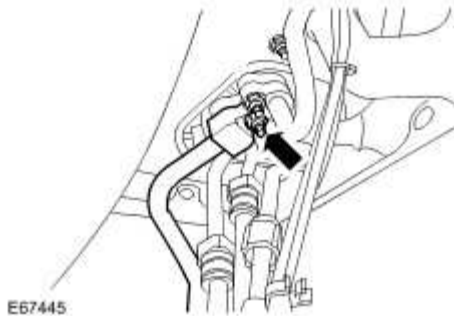
38 . **NOTE:**

Remove and discard the O-ring seal.

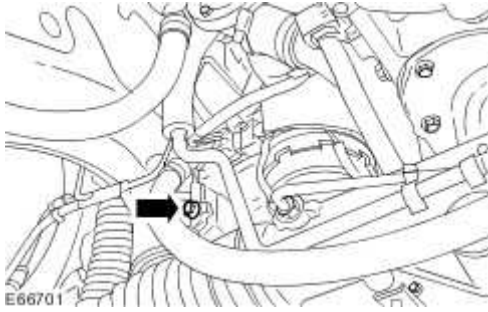
NOTE:

Cap the exposed ports.

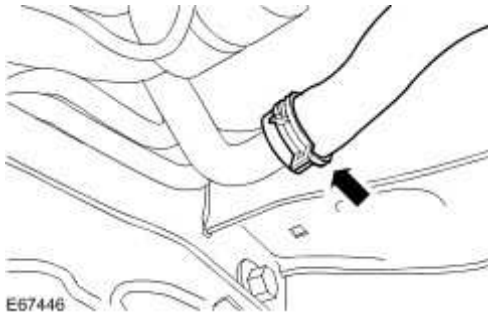
Disconnect the A/C high-pressure line.



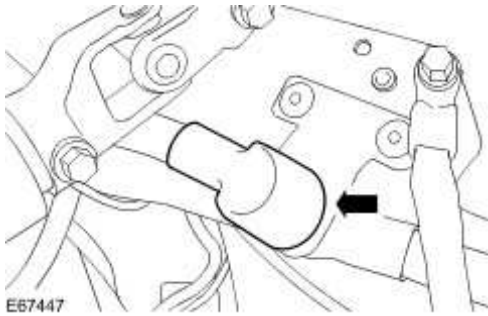
39 . Remove the power steering line retaining bolt.



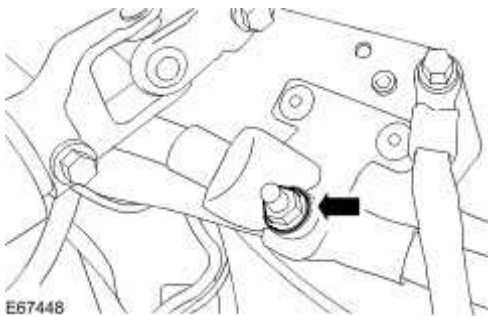
40 . Disconnect the engine coolant inlet hose.



41 . Reposition the starter motor positive cable insulation cover.



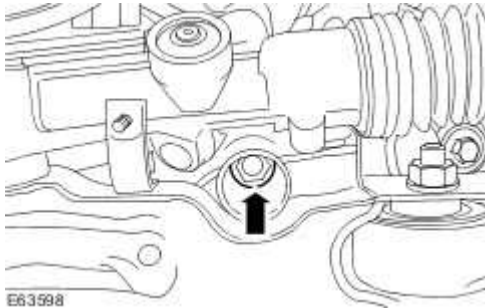
42 . Detach the starter motor positive cable.



43 . **NOTE:**

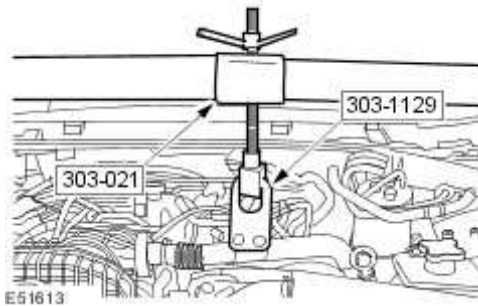
Right-hand shown, left-hand similar.

Remove the engine mounts lower retaining nuts.

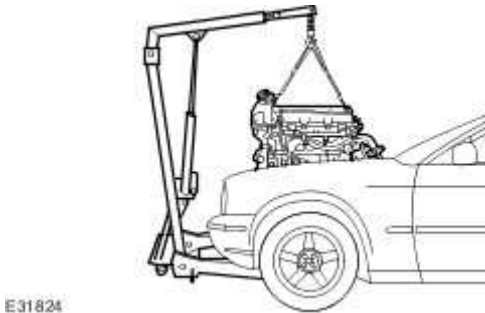


44 . Lower the vehicle.

45 . Remove the special tools.



46 . Remove the engine.



Engine (12.41.01)

Special Service Tools



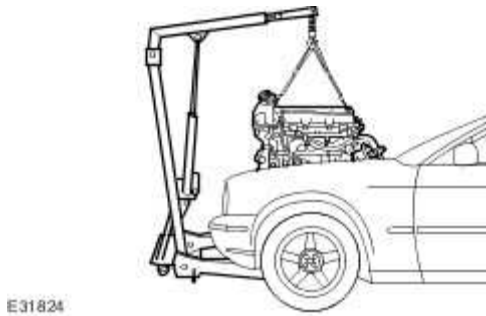
Engine Lifting Brackets
303-1129



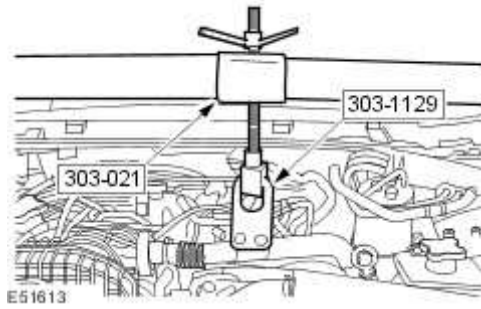
Engine Support Bracket
303-021

Installation

- 1 . Install the engine.



- 2 . Install the special tools.



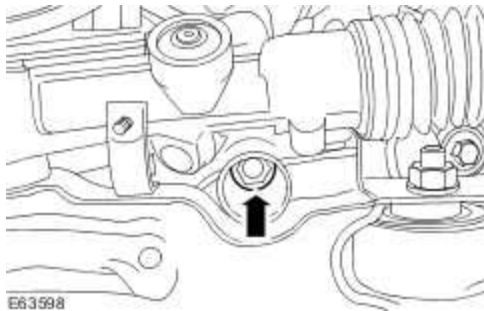
3 . Raise the vehicle.

4 . **NOTE:**

Right-hand shown, left-hand similar.

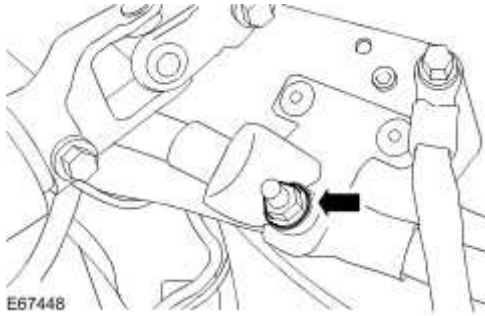
Install the engine mounts lower retaining nuts.

► Tighten to 63 Nm.

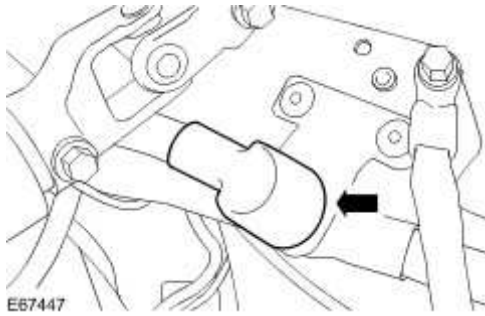


5 . Attach the starter motor positive cable.

► Tighten to 12 Nm.



6 . Reposition the starter motor positive cable insulation cover.

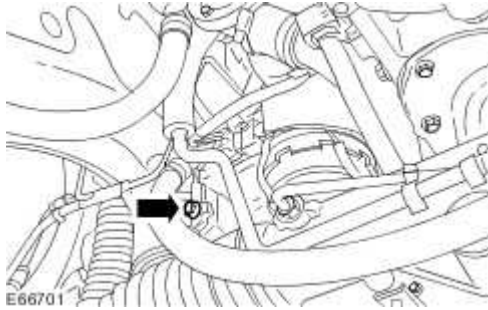


7 . Connect the engine coolant inlet hose.



8 . Install the power steering line retaining bolt.

► Tighten to 10 Nm.



9 . NOTE:

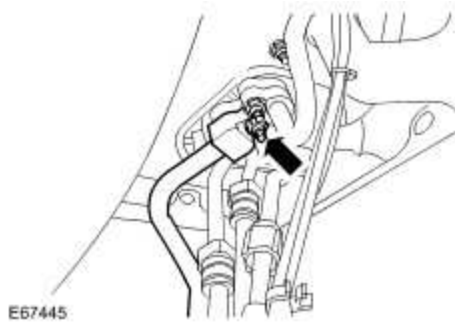
Remove the blanking caps.

NOTE:

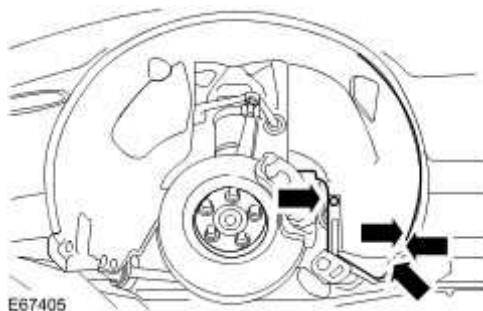
Install a new O-ring seal.

Connect the air conditioning (A/C) high-pressure line.

▶ Tighten to 10 Nm.

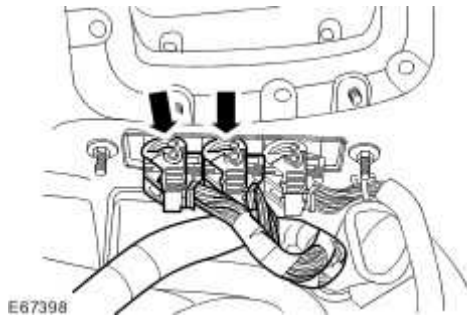


10 . Attach the left-hand fender splash shield.



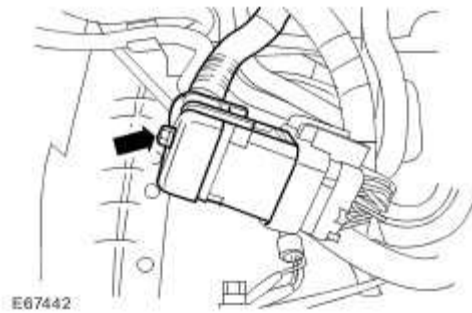
11 . Lower the vehicle.

12 . Connect the engine control module (ECM) electrical connectors.

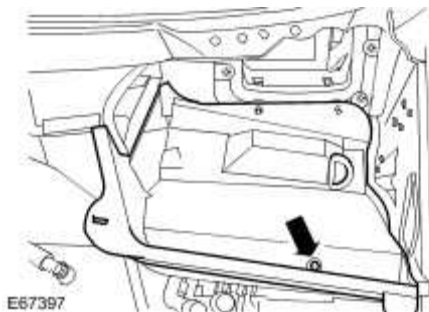


13 . Connect the engine harness electrical connector.

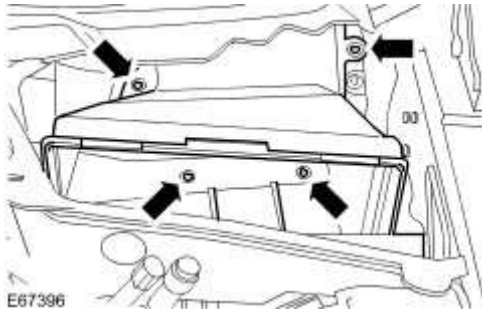
► Tighten to 10 Nm.



14 . Install the engine compartment left-hand panel.



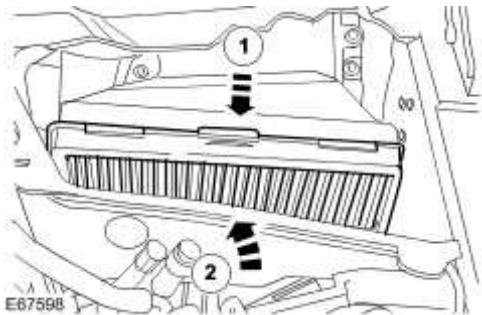
15 . Install the cabin air filter housing.



16 . Attach the cabin air filter.

1) Install the cabin air filter.

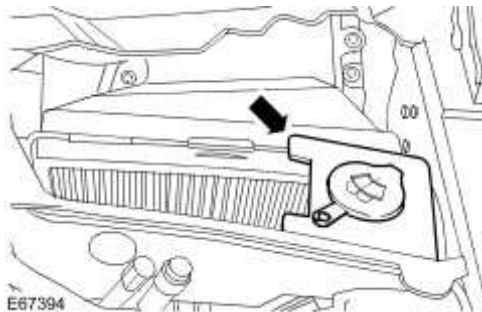
2) Attach the cabin air filter.



17 . **NOTE:**

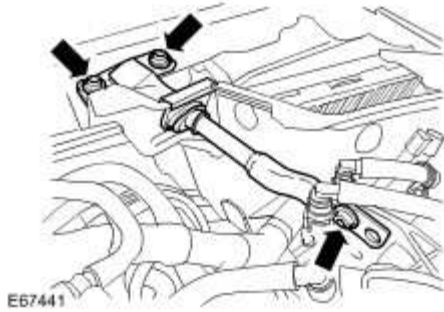
Install a new O-ring seal.

Install the windshield washer reservoir filler neck.



18 . Install the engine compartment brace bar.

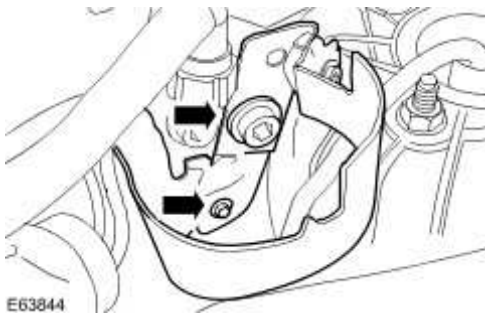
▶ Tighten to 25 Nm.



19 . Install the fuel filter securing bracket.

▶ Tighten 10 mm (0.394 inch's) bolt to 25 Nm.

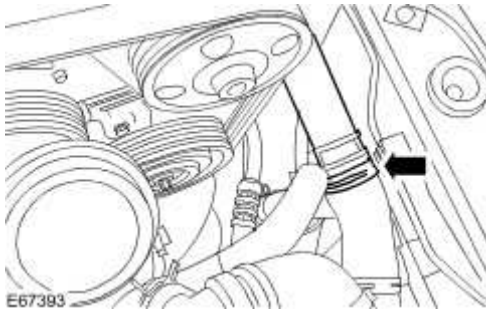
▶ Tighten 6 mm (0.236 inch's) bolt to 8 Nm.



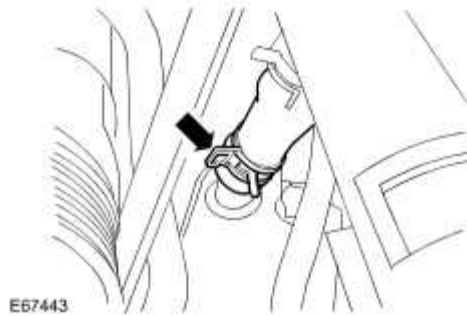
20 . Install the fuel filter.

For additional information, refer to Fuel Filter - 2.7L Diesel (19.25.02)

21 . Connect the radiator bottom hose.



22 . Connect the automatic transmission cooler coolant hose.



23 . **NOTE:**

Power steering pump shown removed for clarity.


NOTE:

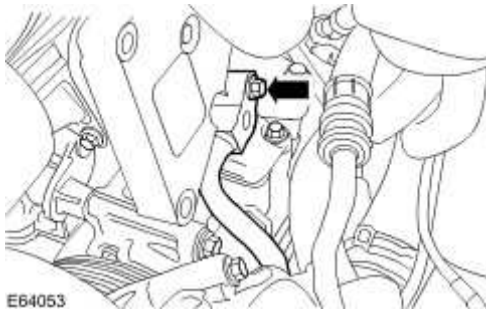
Remove the blanking caps.

NOTE:

Install a new O-ring seal.

Connect the A/C high pressure line.

 Tighten to 10 Nm.



24



CAUTION: If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.


NOTE:

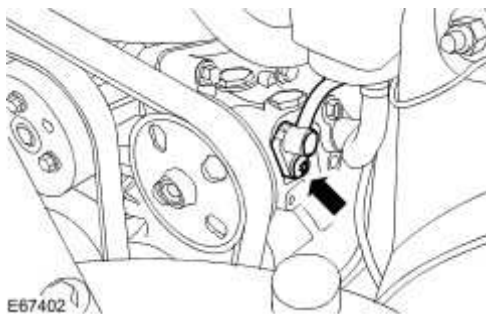
Remove the blanking caps.

NOTE:

Install a new O-ring seal.

Connect the power assisted steering (PAS) pump to steering gear high-pressure line.

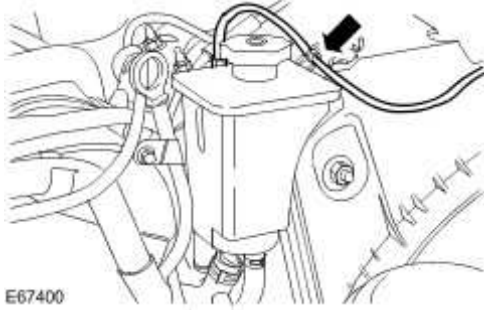
 Tighten to 22 Nm.



25 . Attach the PAS fluid reservoir.



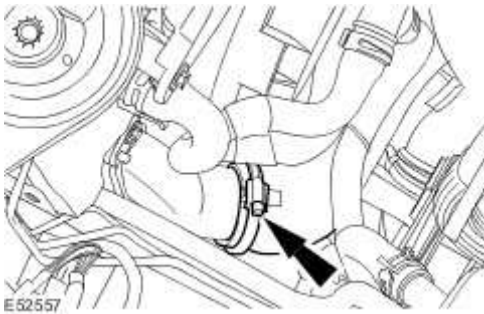
26 . Attach the front air spring supply tube.



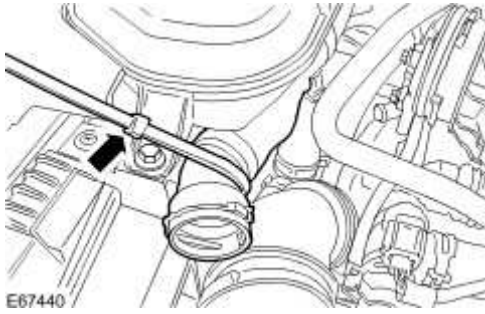
27 . Connect the PAS pump supply hose.



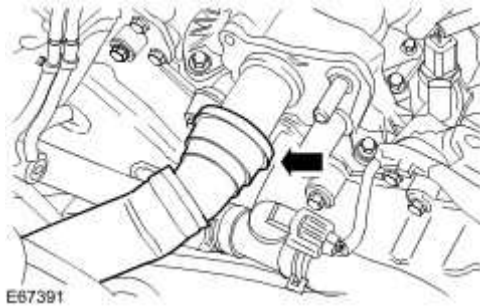
28 . Connect the charge air cooler intake hose.



29 . Remove and discard the tie strap.



30 . Connect the radiator top hose from the cylinder head coolant outlet assembly.



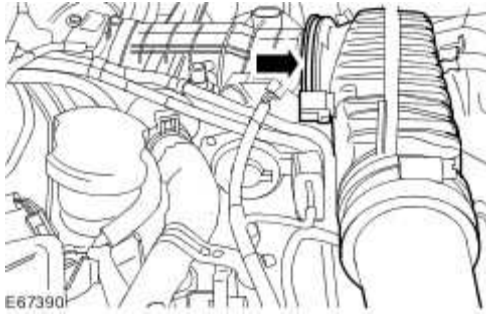
31 . Connect the exhaust gas recirculation (EGR) coolant hose.



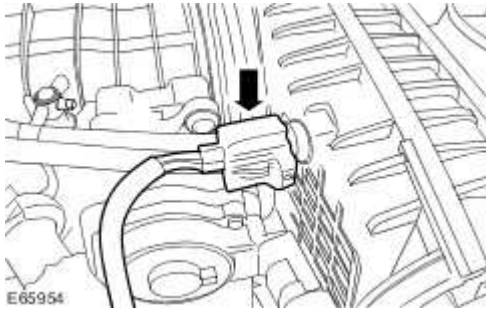
32 . **NOTE:**

Install a new O-ring seal.

Install the intake air shutoff throttle elbow and charge air cooler outlet tube assembly.

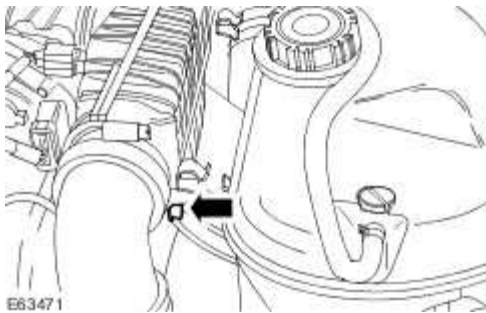


33 . Connect the intake air temperature (IAT) sensor electrical connector.

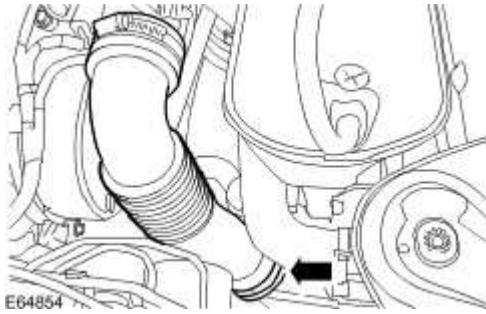


34 . Install the intake air shutoff throttle elbow retaining bolt.

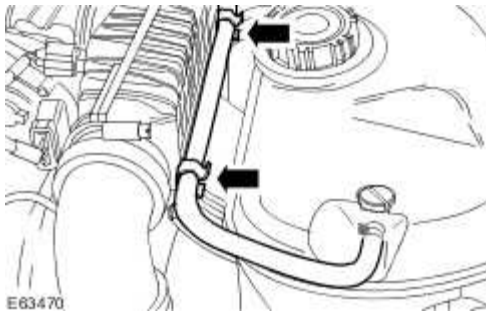
► Tighten to 10 Nm.



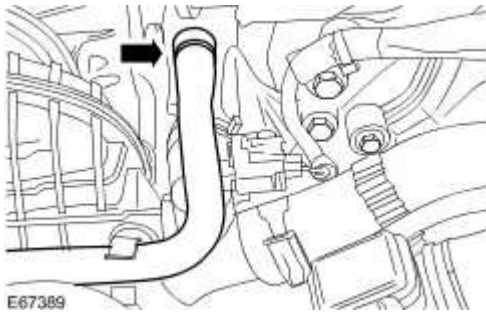
35 . Tighten the charge air cooler outlet tube retaining clip.



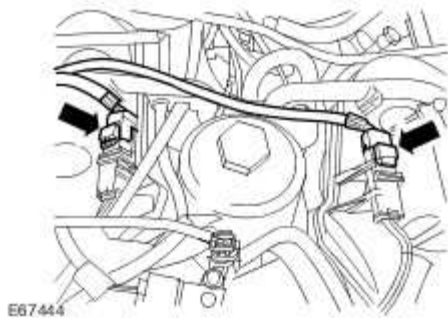
36 . Attach the coolant expansion tank coolant hose to the intake air shutoff throttle elbow.



37 Connect the coolant expansion tank coolant hose from the cylinder head coolant outlet assembly.

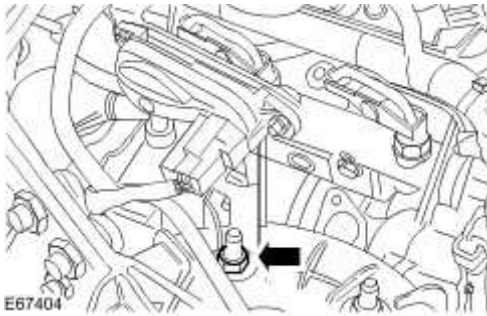


38 . Connect the glow plug harness electrical connectors.



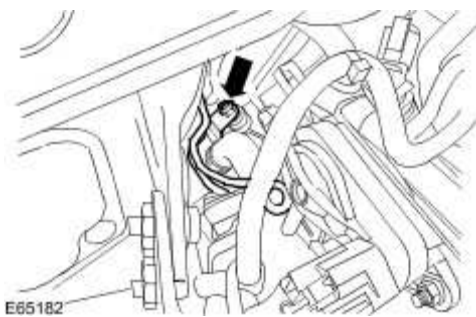
39 . Attach the diesel particulate filter differential pressure sensor securing bracket.

► Tighten to 25 Nm.



40 . Attach the diesel particulate filter high and low-pressure pipes.

► Tighten to 10 Nm.



41 . Raise the vehicle.

42 . Install the automatic transmission.

For additional information, refer to Transmission - 2.7L Diesel (44.20.01)

43 . Install the air cleaner.

For additional information, refer to Air Cleaner (19.10.05)

44 . Install the secondary bulkhead center panel.

For additional information, refer to Secondary Bulkhead Center Panel

- 45 . Fill the power steering fluid reservoir and bleed the system.

For additional information, refer to Power Steering System Bleeding (57.15.02)

- 46 . Connect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)

Camshaft Front Seal

Special Service Tools



Holder - camshaft pulleys front
303-1124



Installer - camshaft oil seal
303-1119



Remover - camshaft oil seal
303-1118



Timing pin - camshaft pulleys
303-1126

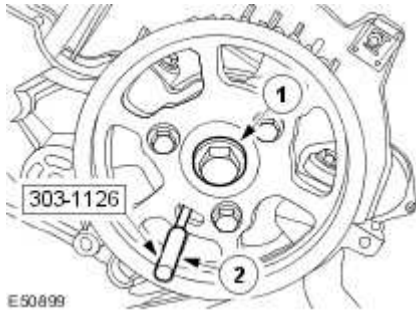
Removal

- 1 . Remove the timing belt.
For additional information, refer to Timing Belt

2 . Remove the special tool.

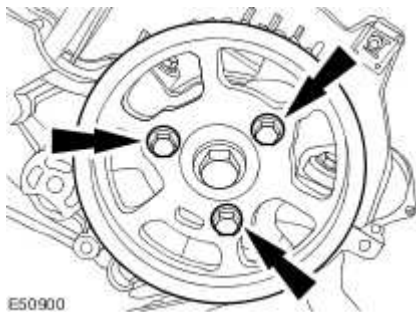
1) Retain the camshaft pulley.

2) Remove the special tool.



3 . Remove the camshaft pulley.

▶ Remove the camshaft pulley retaining bolts.

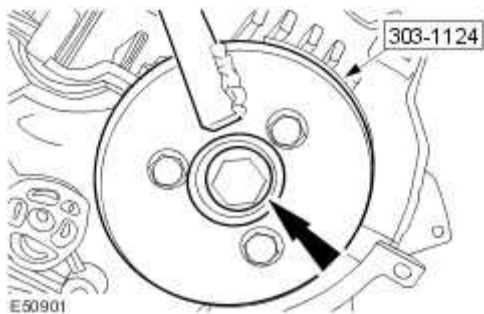


4 . **NOTE:**

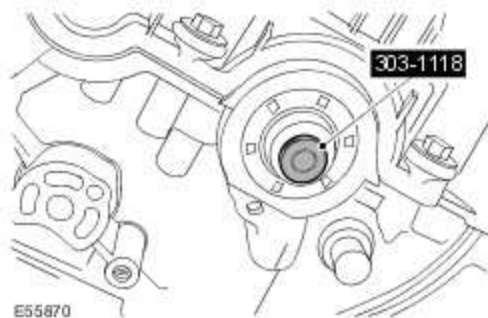
Discard the camshaft pulley hub retaining bolt.

Using special tool, remove the camshaft pulley hub.

▶ Remove the camshaft pulley hub retaining bolt.



5 . Install the special tool to the camshaft.

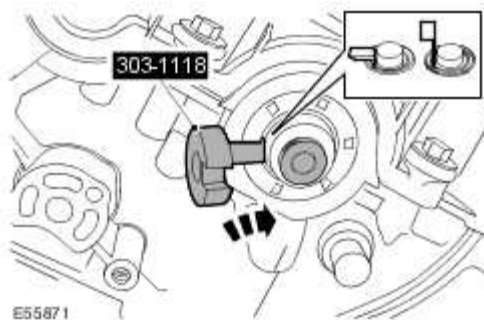


6

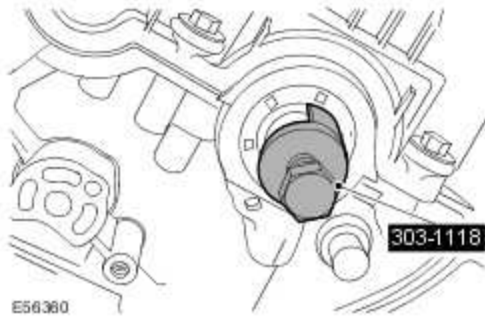



CAUTION: Make sure the special tool is correctly seated behind the camshaft seal.
Failure to follow this instruction may result in damage to the special tool.

Install the special tool into the camshaft front seal.

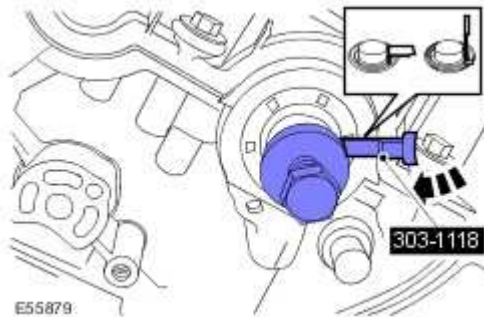


7 . Install the special tool extracting bolt.

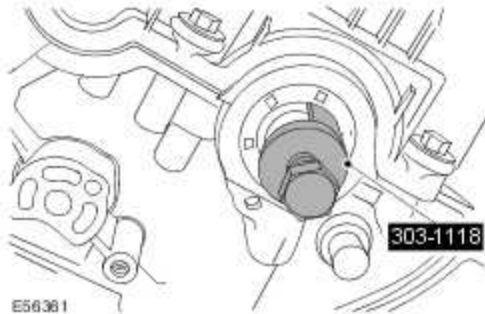


- 8  **CAUTION:** Make sure the special tool is correctly seated behind the camshaft seal. Failure to follow this instruction may result in damage to the special tool.

Install the special tool into the camshaft front seal.



- 9 . Using the special tool, remove the camshaft front seal.



Installation

- 1  **CAUTION:** Do not use any lubricant on the seal or the camshaft. Failure to follow

this instruction may result in damage to the vehicle.



CAUTION: Make sure the seal is installed correctly.

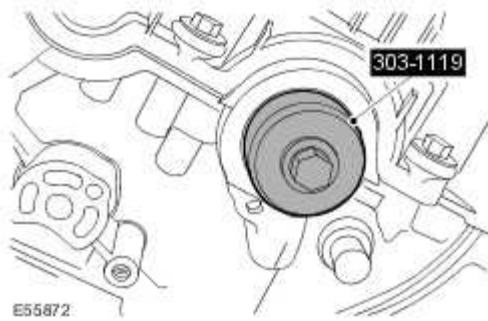
NOTE:

Clean the component mating faces.

NOTE:

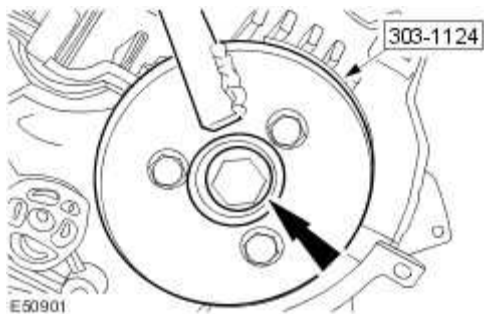
Use the discarded camshaft pulley hub retaining bolt with the special tool.

Using the special tool, install the camshaft front seal.



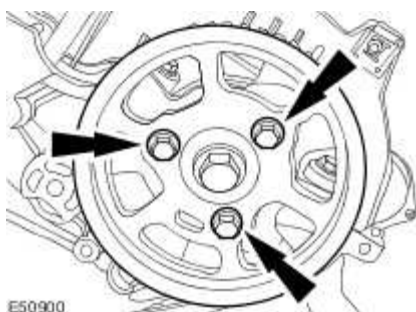
2 . Using special tool, install the camshaft pulley hub.

- ▶ Tighten the bolts in the sequence shown in two stages.
- ▶ Stage 1: Tighten to 80 Nm.
- ▶ Stage 2: Tighten to 90 degrees.



3 . Install the camshaft pulley.

▶ Tighten to 22 Nm.



4 . Install the special tool.

1) Retain the camshaft pulley.

2) Install the special tool.

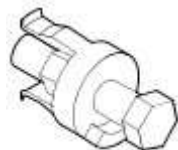


5 . Install the timing belt.

For additional information, refer to Timing Belt

Camshaft Rear Seal

Special Service Tools



E52712

Camshaft Seal Remover

303-1118



E52713

Camshaft Seal Installer

303-1119



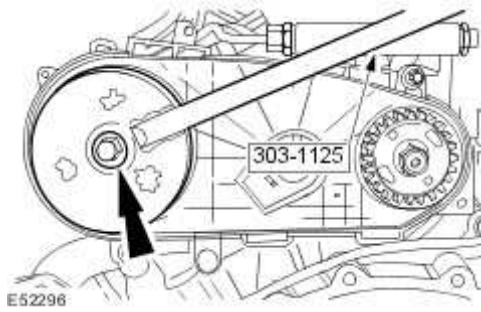
E52715

Holder - Camshaft Pulley Rear

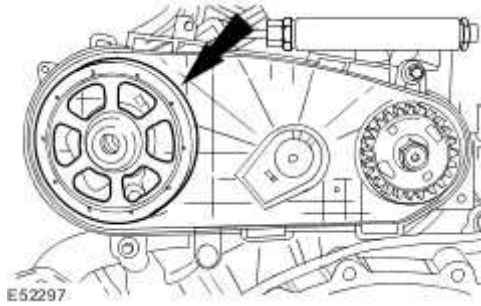
303-1125

Removal

- 1 . Remove the fuel injection pump belt.
For additional information, refer to
- 2 . Using the special tool, remove the camshaft rear pulley bolt.



3 . Remove the camshaft rear pulley.



4 . Install the special tool to the camshaft.

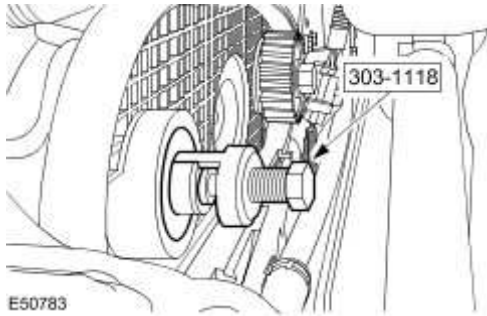



5



· **CAUTION:** Make sure the special tool is seated correctly behind the camshaft rear seal. Failure to follow this instruction will result in damage to the vehicle.

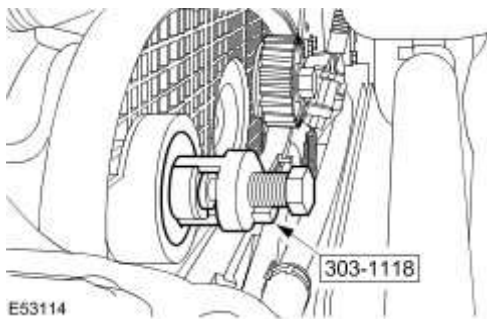
Install the special tool to the camshaft rear seal.



- 6  **CAUTION:** Make sure the special tool is seated correctly behind the camshaft rear seal. Failure to follow this instruction will result in damage to the vehicle.

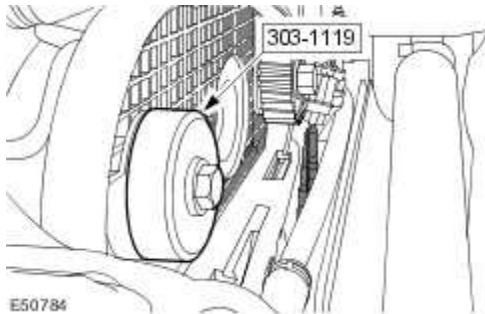
Using the special tool, remove the camshaft rear seal.

► Install the reaction arm.

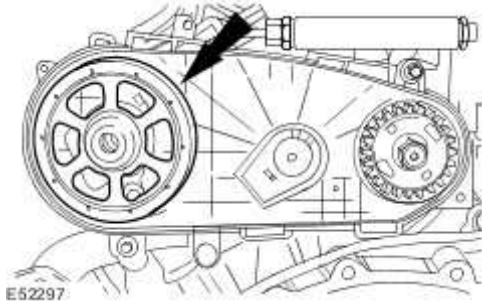


Installation

- 1 . Using the special tool, install the camshaft rear seal.



2 . Install the camshaft rear pulley.



3 .

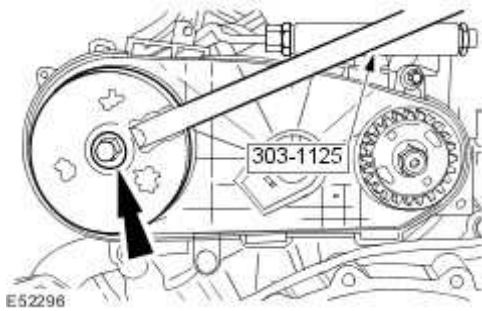


CAUTION: The camshaft pulley bolt must be tightened in two stages.

Using the special tool, install the camshaft rear pulley bolt.

► Stage 1: Tighten to 80 Nm.

► stage 2: Tighten to 90 degrees.



4 . Install the fuel injection pump belt.

For additional information, refer to

Camshafts LH (12.13.19)

Special Service Tools



E52714

Holder Camshaft Pulleys Front
303-1124



E52713

Installer Camshaft Oil Seal
303-1119



E52715

Holder Camshaft Pulleys Rear
303-1125



E52710

Timing pin - camshaft pulleys
303-1126

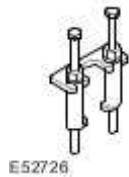


E52724

Reaction Arm - Fuel Pump Pulley
310-138



Holder - Fuel Pump Pulley
310-139



Fuel Injector Remover
303-1127

Removal

1



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow this instruction may result in personal injury.



WARNING: Do not carry out any repairs to the fuel injection system with the engine running. The fuel pressure within the system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any exposed ports.

Remove the fuel injection pump belt.

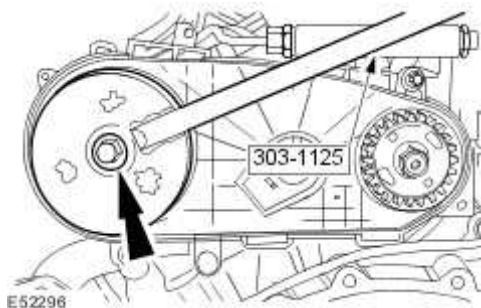
For additional information, refer to Fuel Injection Pump Belt

2 . NOTE:

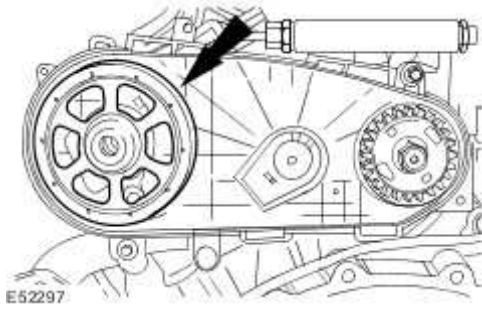
Discard the camshaft rear pulley retaining bolt.

Remove the camshaft rear pulley retaining bolt.

► Using the special tool, retain the camshaft rear pulley.



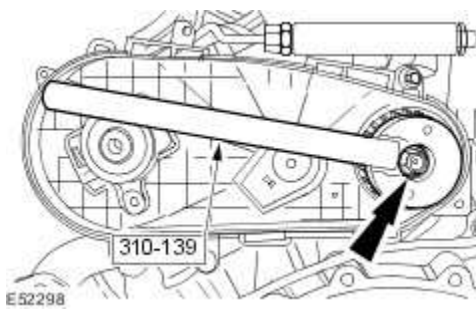
3 . Remove the camshaft rear pulley.



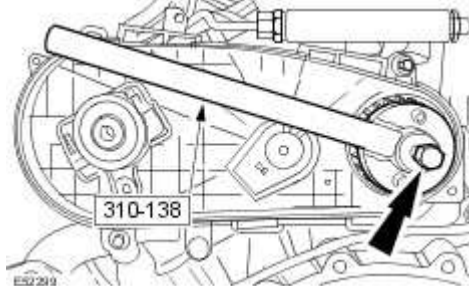
4 . Remove the fuel injection pump pulley retaining nut.

► Using the special tool, retain the fuel injection pump pulley.

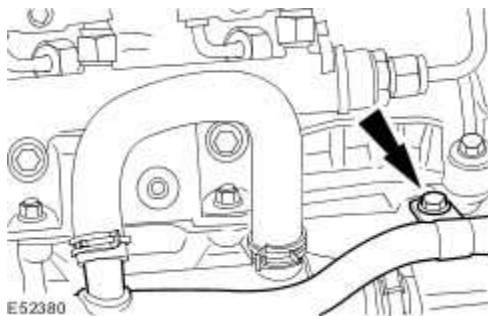
► Remove the fuel injection pump pulley retaining nut.



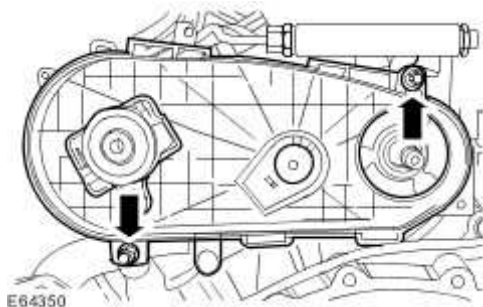
5 . Using the special tool, remove the fuel injection pump pulley.



6 . Detach the exhaust gas recirculation (EGR) coolant outlet tube.



7 . Remove the fuel injection pump belt rear cover.



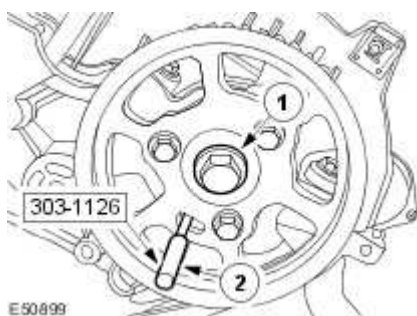
8 . Remove the timing belt.

For additional information, refer to Timing Belt

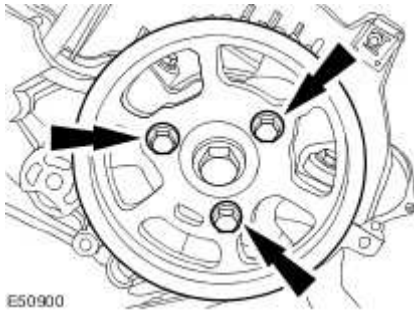
9 . Remove the special tool.

1) Retain the camshaft sprocket.

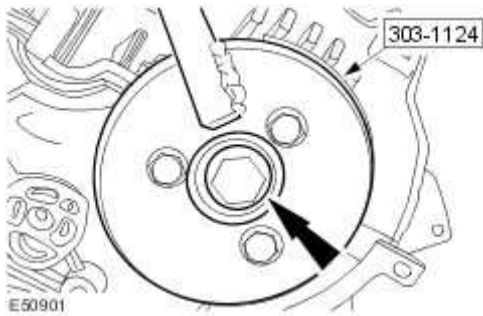
2) Remove the special tool.



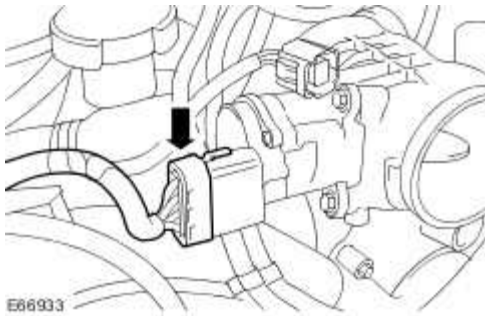
10 . Remove the camshaft sprocket.



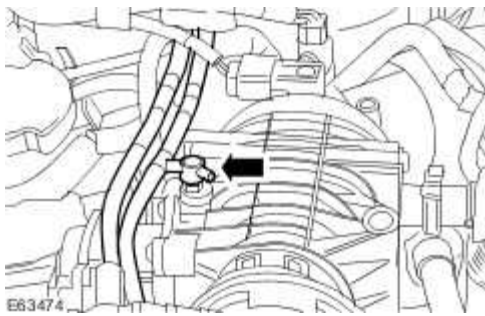
11 . Using special tool, remove the camshaft sprocket hub.



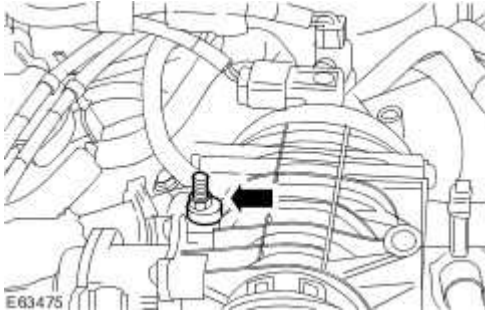
12 . Disconnect the intake air shutoff throttle electrical connector.



13 . Detach the vacuum hoses.



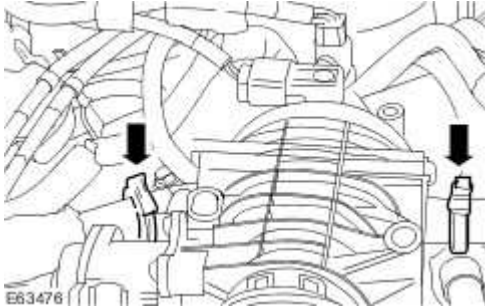
14 . Remove the retaining bolt.



15 . **NOTE:**

Discard the retaining clips.

Detach the EGR valve outlet tube retaining clips.



16 . **NOTE:**

Engine shown removed for clarity.

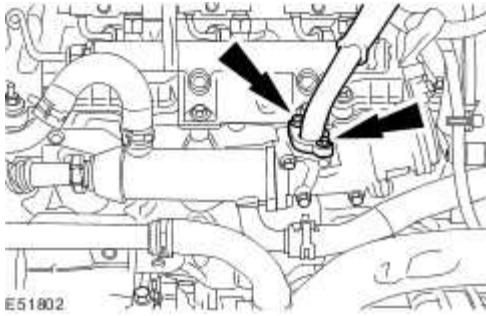
NOTE:

Right-hand shown, left-hand similar.

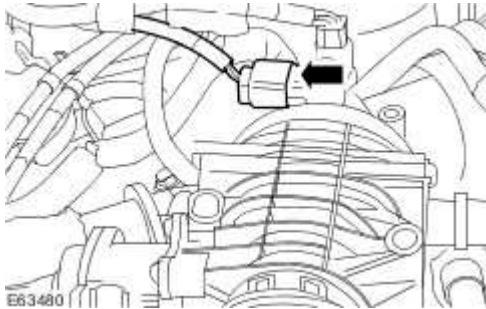
NOTE:

Discard the gaskets.

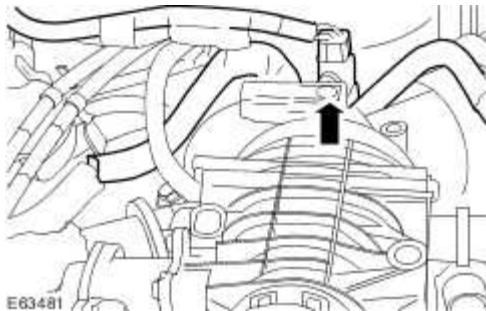
Remove the right-hand and left-hand EGR valve outlet tubes.



17 . Disconnect the manifold absolute pressure (MAP) sensor electrical connector.



18 . Detach the fuel return line valve from the intake air shutoff throttle.

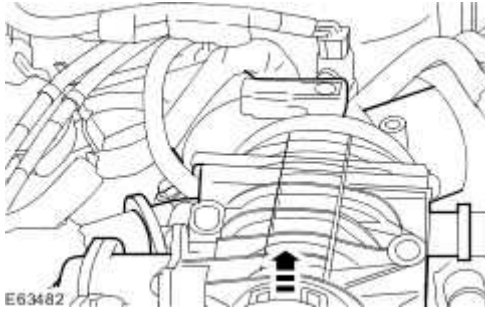


19



CAUTION: Make sure the fuel return line valve retaining clip is not damaged.
Failure to follow this instruction may result in damage to the vehicle.

Reposition the intake air shutoff throttle.

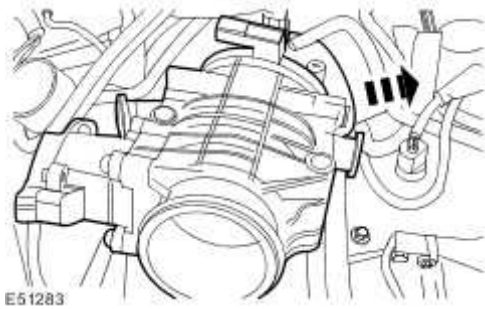


20



CAUTION: Make sure the fuel return line valve retaining clip is not damaged.
Failure to follow this instruction may result in damage to the vehicle.

Reposition the intake air shutoff throttle.



21

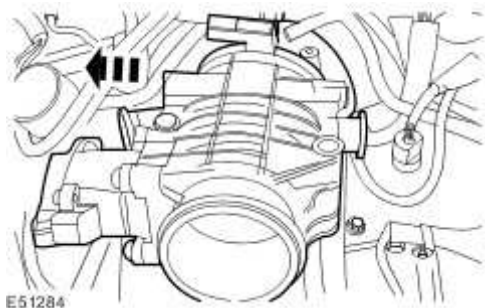


CAUTION: Make sure the fuel return line valve retaining clip is not damaged.
Failure to follow this instruction may result in damage to the vehicle.

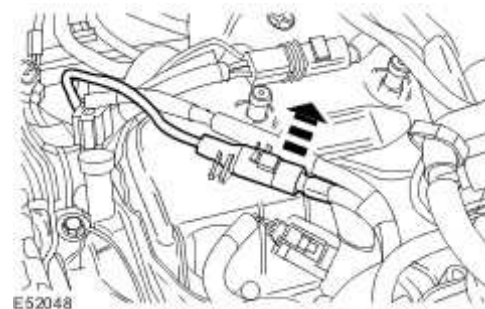
NOTE:

Discard the intake air shutoff throttle seals.

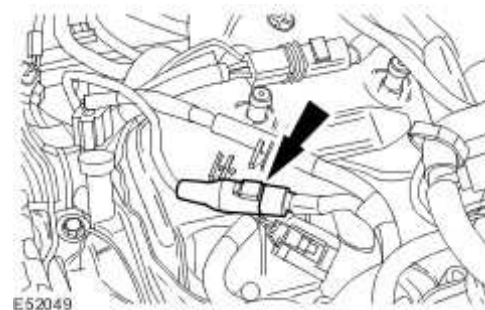
Remove the intake air shutoff throttle.



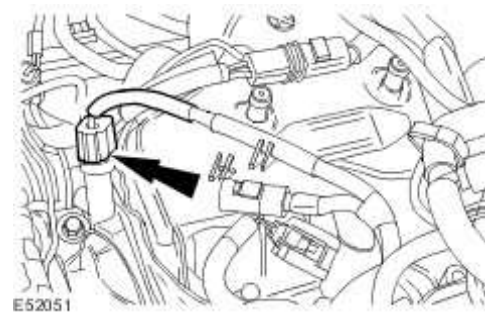
22 . Detach the knock sensor (KS) electrical connector from the left-hand valve cover.



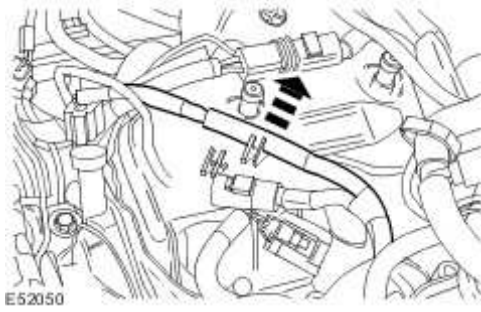
23 . Disconnect the KS electrical connector.



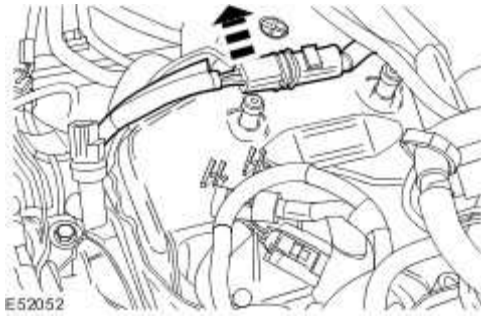
24 . Disconnect the oil pressure sensor electrical connector.



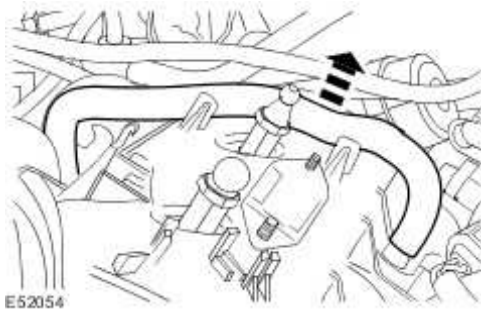
25 . Detach the engine harness.



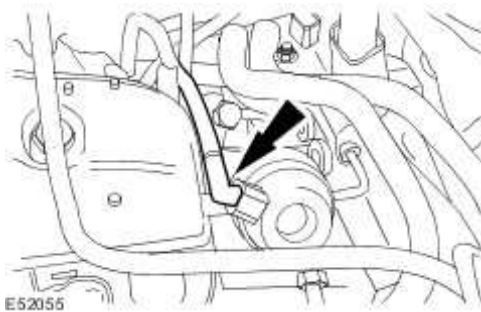
26 . Detach the glow plug electrical connector from the left-hand valve cover.



27 . Detach the engine breather hose.



28 . Disconnect the vacuum hose.



29

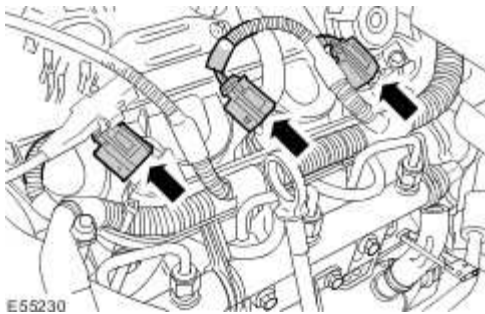


CAUTION: Make sure that the high-pressure fuel supply line remains in contact with both the fuel injector and the fuel injection supply manifold until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

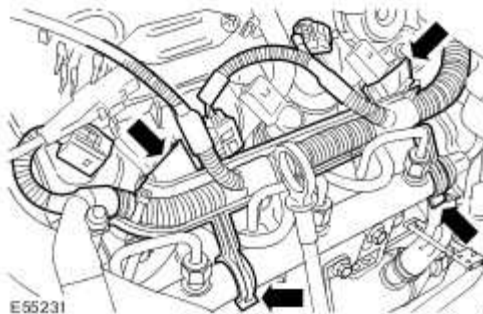
Using the pneumatic vacuum gun, vacuum foreign material from the high-pressure fuel supply lines, the fuel injectors and the fuel injection supply manifold.

For additional information, refer to Fuel Injection Component Cleaning

30 . Disconnect the fuel injector electrical connectors.



31 . Detach the fuel injection wiring harness.



32



CAUTION: Make sure that the high-pressure fuel supply line remains in contact with both the fuel injector and the fuel injection supply manifold until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

Using the pneumatic vacuum gun, vacuum foreign material from the high-pressure fuel supply lines, the fuel injectors and the fuel injection supply manifold.

For additional information, refer to Fuel Injection Component Cleaning

33



CAUTION: Make sure that the high-pressure fuel supply line remains in contact with both the fuel injector and the fuel rail until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

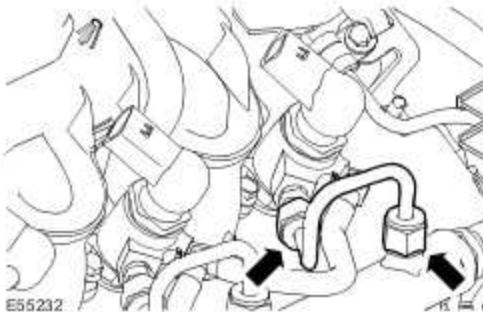


CAUTION: Make sure that the fuel injector adaptor union does not move when loosening the high-pressure fuel supply lines. Failure to follow this instruction may result in damage to the fuel injector or the fuel injector adaptor union.

NOTE:

Left-hand rear injector shown, left-hand center and front similar.

Loosen the high-pressure fuel supply lines from the fuel injectors and fuel rail.



34



CAUTION: Make sure that the high-pressure fuel supply line remains in contact with both the fuel injector and the fuel injection supply manifold until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

Using the pneumatic vacuum gun, vacuum foreign material from the high-pressure fuel supply lines, the fuel injectors and the fuel injection supply manifold.

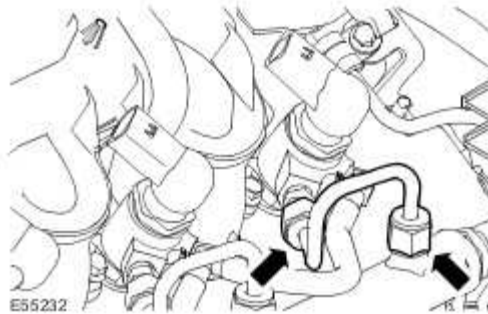
For additional information, refer to Fuel Injection Component Cleaning

35 **NOTE:**

Left-hand rear injector shown, left-hand center and front similar.

Remove and discard the high-pressure fuel supply lines.

- ▶ Install suitable blanking caps to the open threaded ports on the fuel injector and the fuel injection supply manifold.



- 36 Using the pneumatic vacuum gun, vacuum foreign material from the fuel injectors and the fuel rail.

For additional information, refer to Fuel Injection Component Cleaning

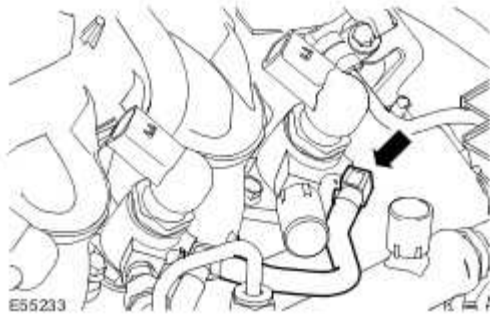
37 **NOTE:**

Left-hand rear injector shown, left-hand center and front similar.

Disconnect the fuel return line from the fuel injectors.

- ▶ Remove and discard the fuel return line retaining clips from the fuel injectors.

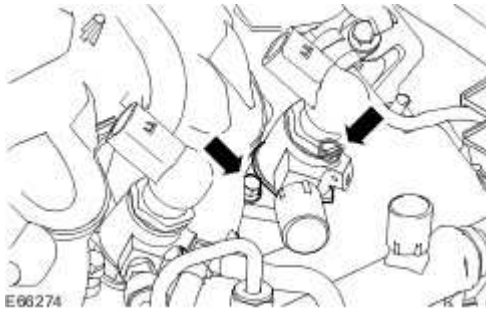
- ▶ Disconnect the fuel return line from the fuel injectors.



38 . NOTE:

Left-hand rear injector shown, left-hand center and front similar.

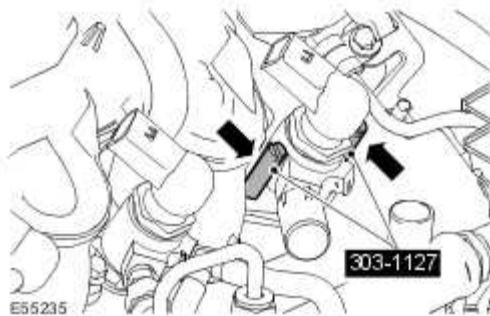
Remove the fuel injectors retaining bolts.



39 . NOTE:

Left-hand rear injector shown, left-hand center and front similar.

Install the special tool studs.



40

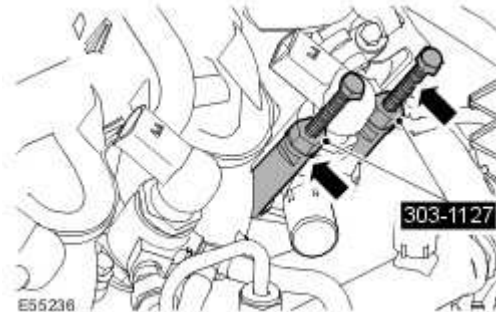


CAUTION: Make sure the fuel injector remover legs are correctly engaged to the fuel injector. Failure to follow this instruction may result in damage to the component.

NOTE:

Left-hand rear injector shown, left-hand centre and front similar.

Install the special tool puller legs to the studs.



41



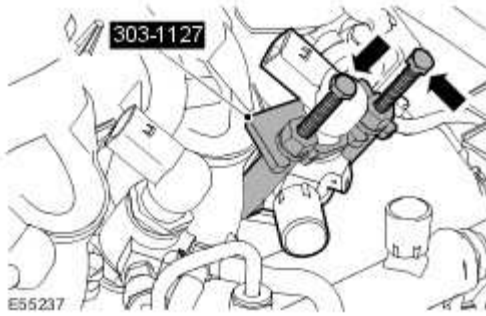
CAUTION: Make sure the special tool puller bolts are rotated evenly. Failure to follow this instruction may result in damage to the special tool or fuel injector.

NOTE:

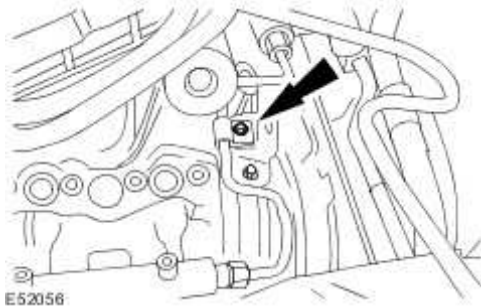
Left-hand rear injector shown, left-hand centre and front similar.

Using the special tool, remove the fuel injectors.

- ▶ Install the special tool locking plate to the puller legs.
- ▶ Rotate the bolts evenly, in a clockwise direction.
- ▶ Remove the fuel injectors.
- ▶ Remove the special tool.
- ▶ Remove and discard the fuel injectors retaining clamps.
- ▶ Remove and discard the fuel injectors sealing washers.



42 . Remove the high-pressure fuel supply line retaining bolt.



43



CAUTION: Make sure that the high-pressure fuel supply line remains in contact with both the fuel injector and the fuel injection supply manifold until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

Using the pneumatic vacuum gun, vacuum foreign material from the high-pressure fuel supply lines, the fuel injectors and the fuel injection supply manifold.

For additional information, refer to Fuel Injection Component Cleaning

44



CAUTION: Make sure the tool used to loosen the high-pressure fuel supply line union is used at the top of the union as this is where there is most material. Failure to follow this instruction may result in damage to the union.



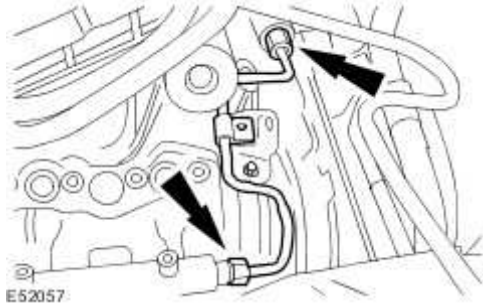
CAUTION: Make sure that the high pressure fuel supply line remains in contact

with both the fuel pump and the fuel rail until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

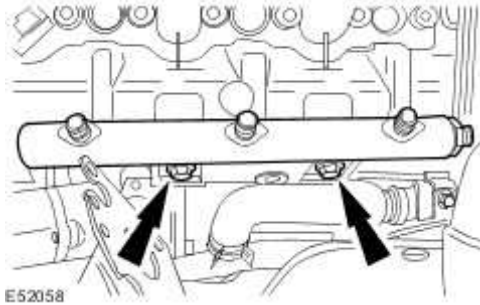


CAUTION: While maintaining the pressure on the high-pressure fuel supply line, clean and vacuum foreign material from the line and unions.

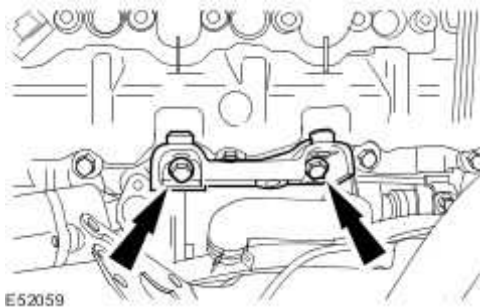
Remove the high-pressure fuel supply line.



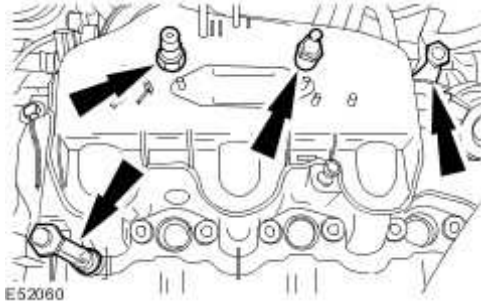
45 . Remove the fuel rail.



46 . Remove the fuel rail securing bracket .



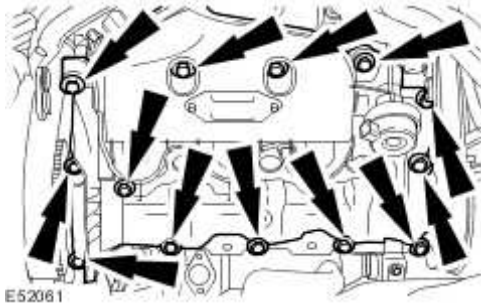
47 . Remove the engine cover and wiring harness retainers.



48 . **NOTE:**

Discard the valve cover gasket.

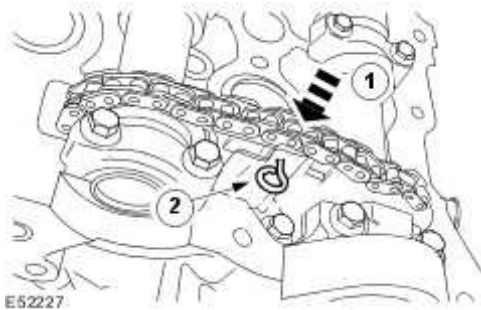
Remove the left-hand valve cover.



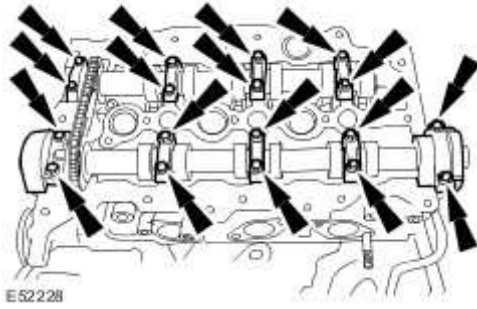
49 . Retain the secondary timing chain tensioner plunger.

1) Reposition the secondary timing chain tensioner.

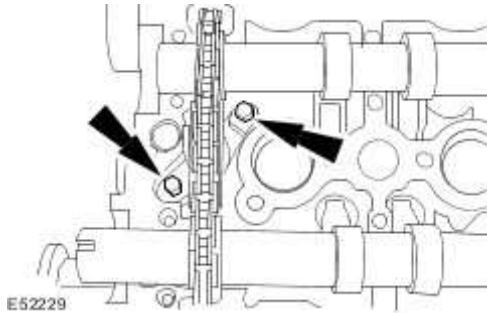
2) Retain the secondary timing chain tensioner plunger.



50 . Remove the camshaft bearing caps evenly.



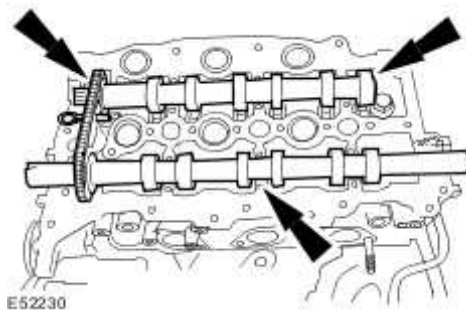
51 . Remove the secondary timing chain tensioner retaining bolts.



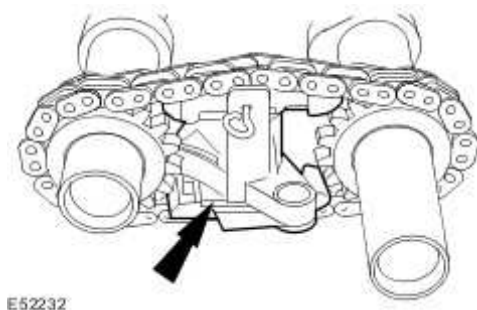
52 . **NOTE:**

Discard the left-hand exhaust camshaft seals.

Remove the left-hand camshafts and secondary timing chain tensioner assembly.

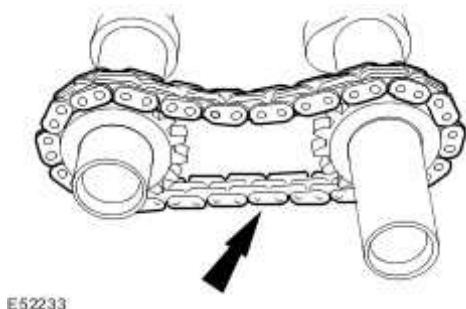


53 . Remove the secondary timing chain tensioner assembly.



54 . Remove the camshafts.

- ▶ Remove the secondary timing chain from the camshafts.



Installation

1



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow this instruction may

result in personal injury.



WARNING: Do not carry out any repairs to the fuel injection system with the engine running. The fuel pressure within the system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any exposed ports.

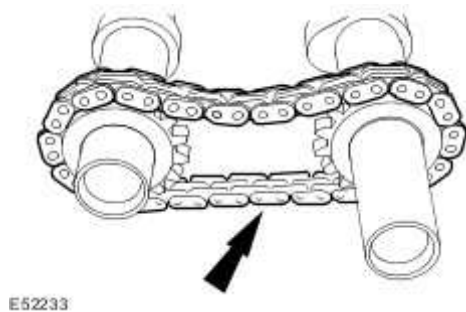


CAUTION: Make sure that the colored links on the secondary timing chain align with the dots and scribed line on the sprocket shoulder. Failure to follow this instruction may result in damage to the engine.

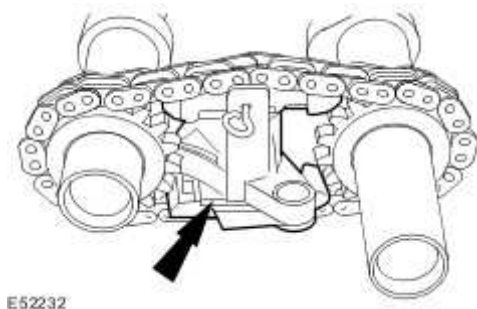
Install the camshafts.




Install the secondary timing chain onto the camshafts.



2 . Install the secondary timing chain tensioner assembly.

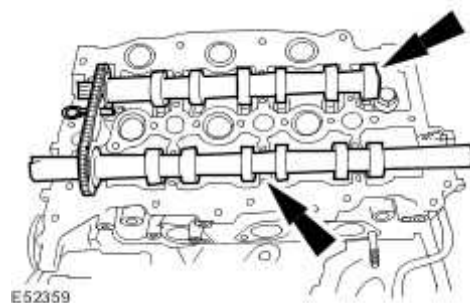


3  **CAUTION:** Make sure that the dots on the camshafts are aligned at the 12 o'clock position. Failure to follow this instruction may result in damage to the engine.

NOTE:

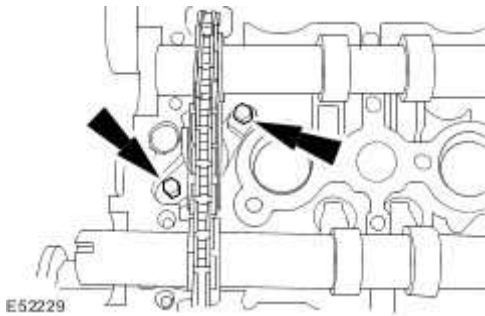
Lubricate the camshafts and the camshaft bearing caps with oil meeting Jaguar specification prior to installation.

Install the camshafts.



4 . Install the secondary timing chain tensioner retaining bolts.

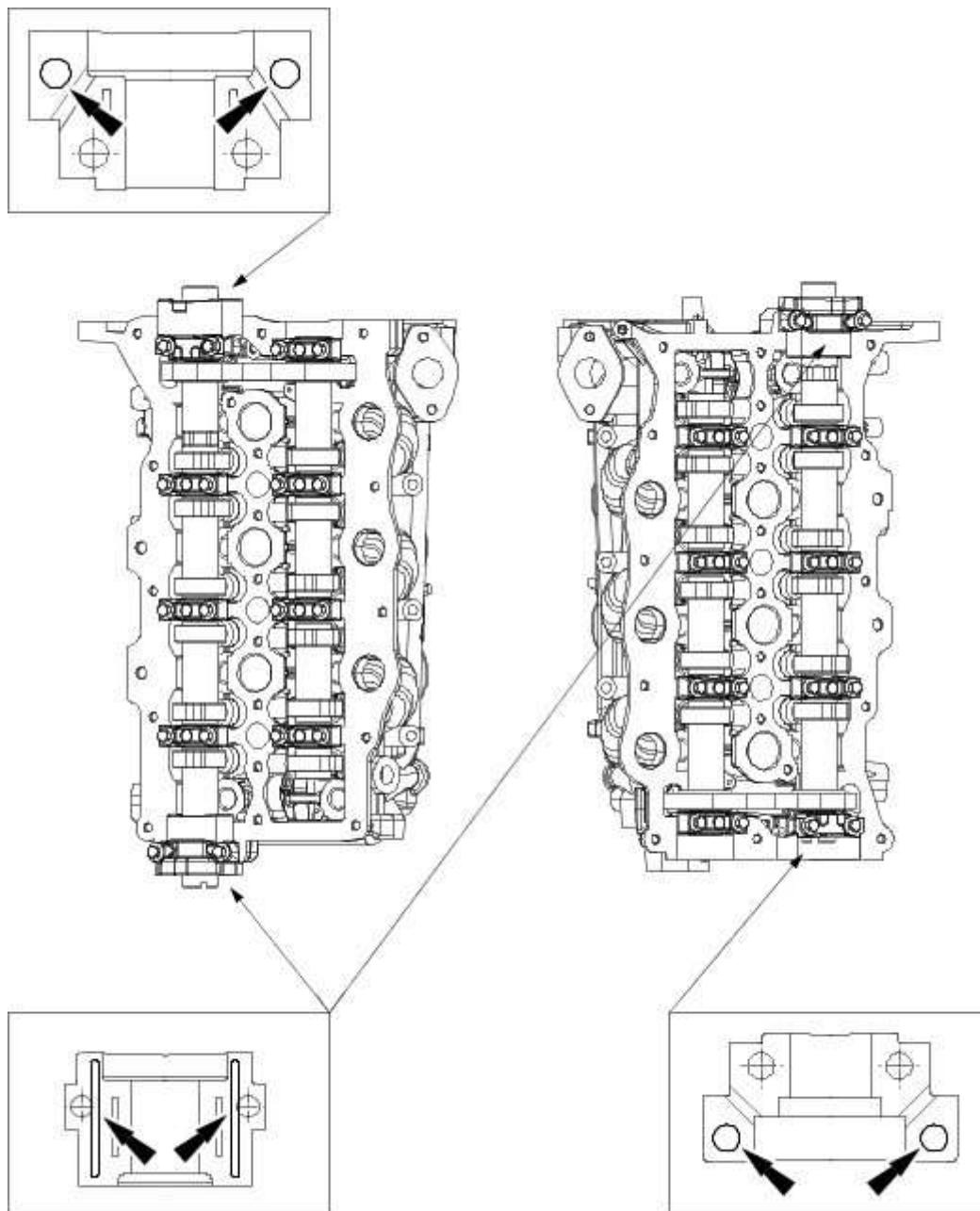
▶ Tighten to 10 Nm.



5 Apply Loctite 518 sealant to the exhaust camshaft seal bearing caps.

▶ Apply Loctite 518 sealant, 2 mm wide, to the left-hand rear and right-hand front camshaft bearing caps.

▶ Apply Loctite 518 sealant, 7 mm in diameter, to the left-hand front and right-hand rear camshaft bearing caps.



E53719

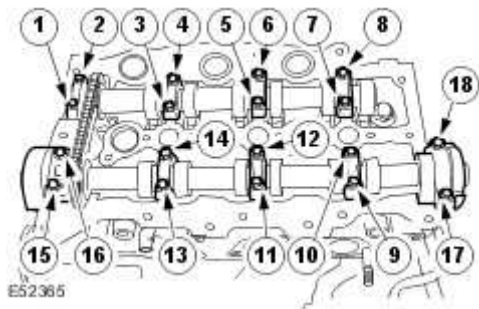
6 . NOTE:

Install the camshaft bearing cap retaining bolts evenly.

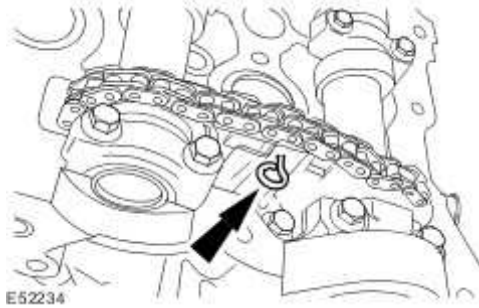
Install the camshaft bearing caps in their original position.

► Tighten the retaining bolts in the sequence shown.

- ▶ Stage 1: Bolts 1 to 14, 1 Nm.
- ▶ Stage 2: Bolts 1 to 14, 5 Nm.
- ▶ Stage 3: Bolts 1 to 14, 10 Nm.
- ▶ Stage 4: Bolts 15 to 18, 1 Nm.
- ▶ Stage 5: Bolts 15 to 18, 5 Nm.
- ▶ Stage 6: Bolts 15 to 18, 10 Nm.



7 . Remove the secondary timing chain tensioner retaining pin.

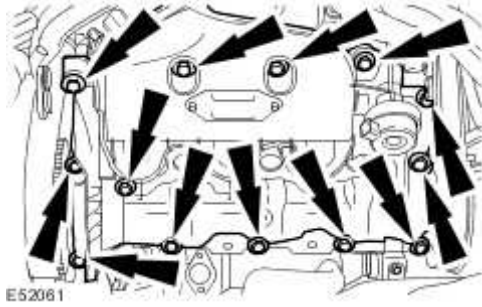


8 . **NOTE:**

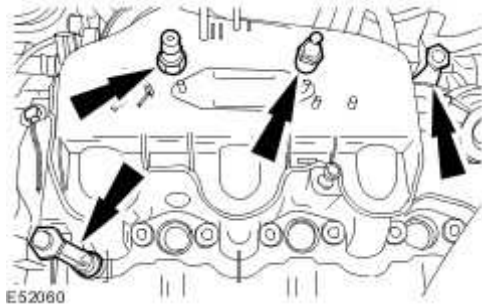
Install a new valve cover gasket.

Install the left-hand valve cover.

- ▶ Tighten to 10 Nm.



9 . Install the engine cover and wiring harness retainers.



10

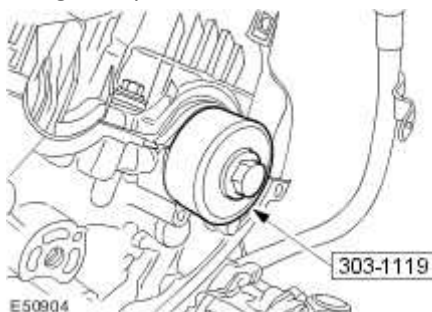


CAUTION: Do not use any lubricant on the seal or the camshaft. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

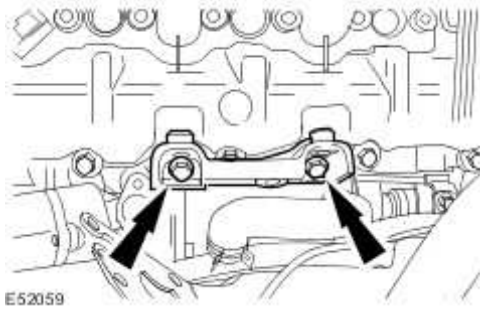
Make sure all components are clean and dry.

Using the special tool, install the camshaft front seal.



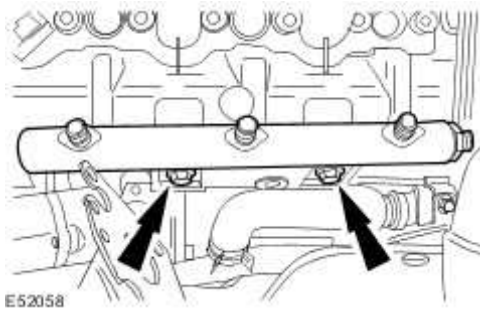
11 . Install the fuel rail securing bracket.

► Tighten to 24 Nm.



12 . Install the fuel rail.

► Tighten to 24 Nm.



13 **NOTE:**

Remove the blanking caps.

Install a new high-pressure fuel supply line.

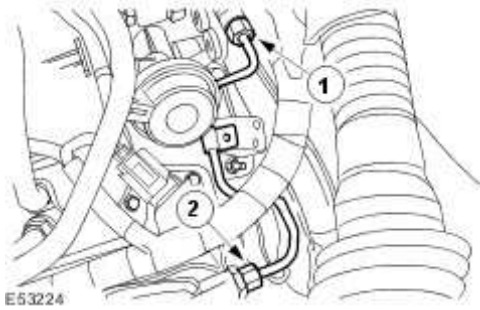
► Tighten the high-pressure fuel supply line in the sequence shown:

► Tighten the high-pressure fuel supply line union 1 to fuel injector to 15 Nm.

► Tighten the high-pressure fuel supply line union 2 to fuel rail to 15 Nm.

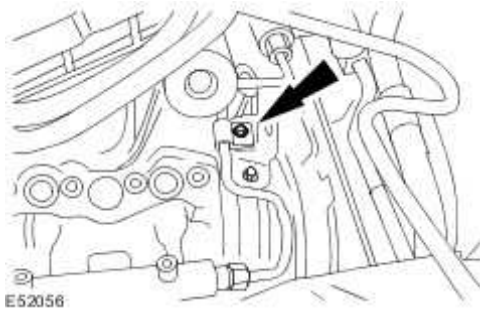
► Tighten the high-pressure fuel supply line union 1 to fuel injector to 30 Nm.

- Tighten the high-pressure fuel supply line union 2 to fuel rail to 30 Nm.



- 14 . Install the high-pressure fuel supply line retaining bolt.

- Tighten to 10 Nm.



15



CAUTION: Do not use tools to install the new fuel return line retaining clip. Failure to follow this instruction may result in damage to the retaining clip.

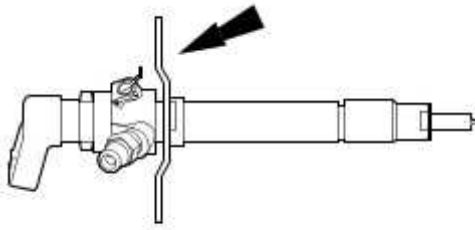
NOTE:

Install a new fuel return line retaining clip.

NOTE:

Install a new fuel injector sealing washer.

Install a new fuel injector retaining clamp.



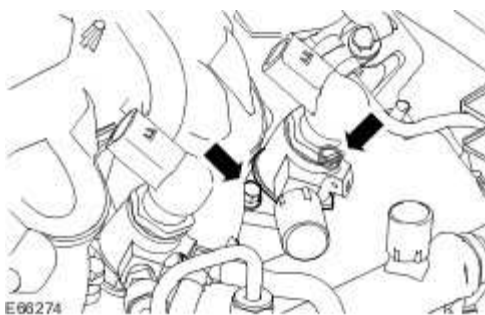
E52071

16 . **NOTE:**

Left-hand rear injector shown, left-hand center and front similar.

Install the fuel injector.

▶ Tighten to 10 Nm.



E66274

17



CAUTION: Make sure the fuel return line retaining clip is correctly installed to the fuel injector before installing the fuel return line.

NOTE:

Left-hand rear injector shown, left-hand center and front similar.

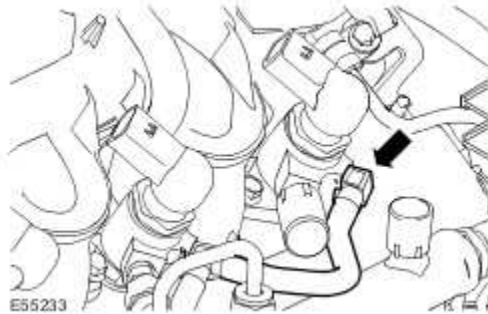
Connect the fuel return line to the fuel injector.

▶ Visually inspect the fuel return line O-ring for damage.

▶ Apply a light coating of petroleum jelly to the fuel line return line O-ring

seals.

- ▶ Connect the fuel return line to the fuel injector.



- 18
- ⚠ **CAUTION: Do not allow the unions to hit the olive ends of the high-pressure fuel supply line as this may damage the ends of the line and allow foreign matter enter the fuel injection system.**

Position the high-pressure fuel supply line as near to the final installation position as possible and then remove and discard the blanking plugs from the high-pressure fuel supply line.

- 19
- ⚠ **CAUTION: Maintain pressure on the high-pressure fuel supply line to keep the olives in contact with the fuel injectors and the fuel rail cones while installing the unions.**

NOTE:

Install the high-pressure fuel supply lines to the fuel rail end first followed by the fuel injector end.

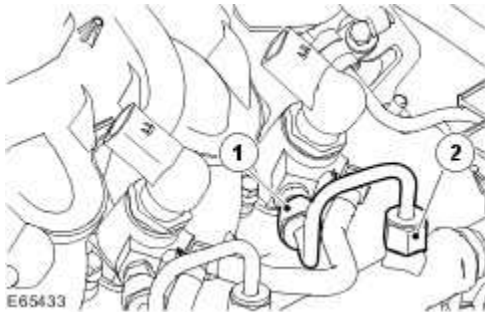
NOTE:

Left-hand shown, right-hand similar.

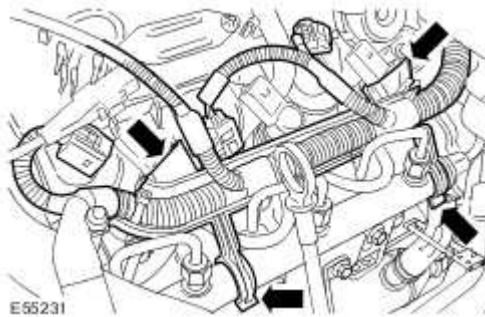
Install the new high-pressure fuel supply line.

- ▶ Tighten the high-pressure fuel supply line in the sequence shown:

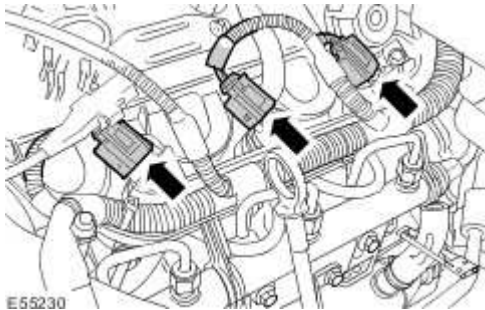
- ▶ Tighten the high-pressure fuel supply line union 1 to fuel injector to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 2 to fuel rail to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 1 to fuel injector to 30 Nm.
- ▶ Tighten the high-pressure fuel supply line union 2 to fuel rail to 30 Nm.



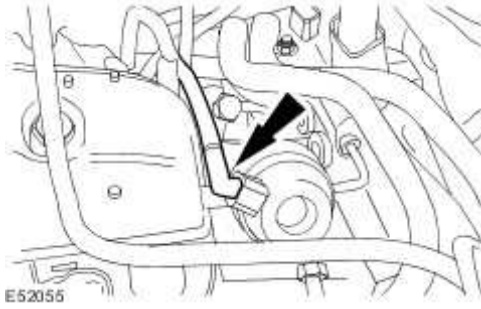
20 . Attach the fuel injection wiring harness.



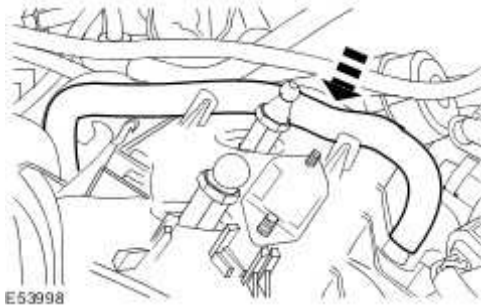
21 . Connect the fuel injector electrical connectors.



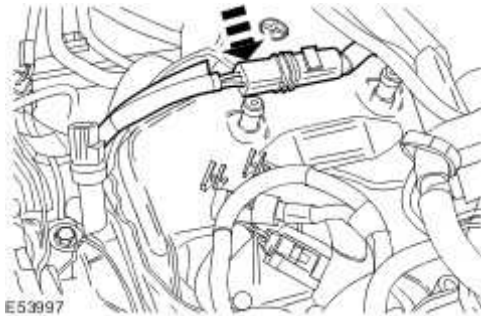
22 . Connect the vacuum hose.



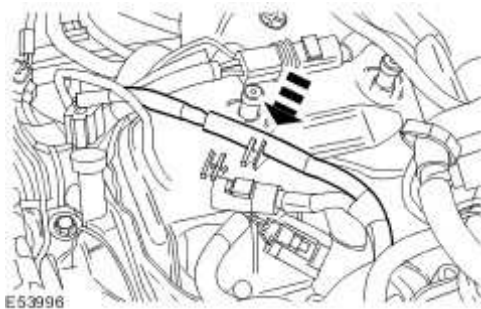
23 . Attach the engine breather hose.



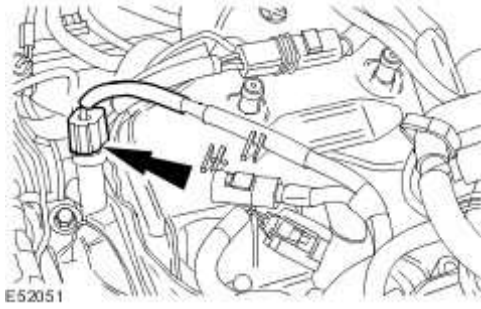
24 . Attach the glow plug electrical connector onto the left-hand valve cover.



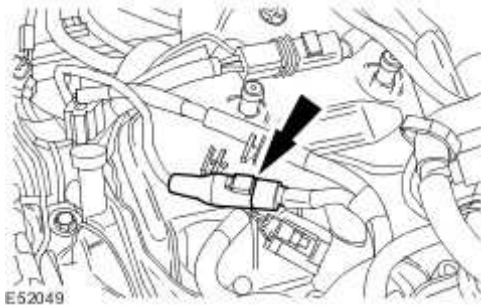
25 . Attach the engine harness.



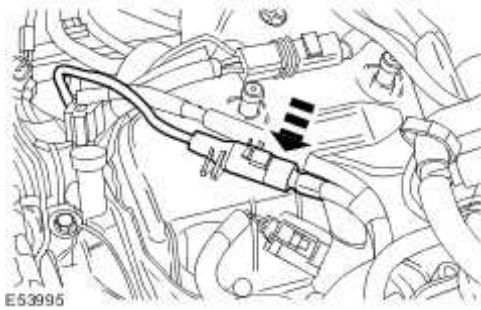
26 . Connect the oil pressure sensor electrical connector.



27 . Connect the KS electrical connector.



28 . Attach the KS electrical connector onto the left-hand valve cover.

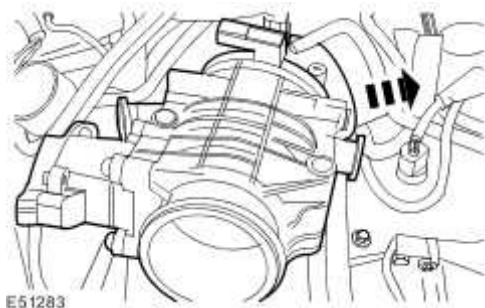


29

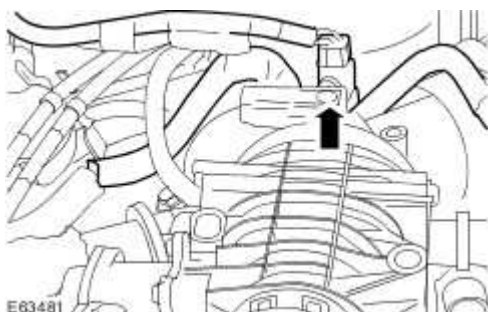


- **CAUTION:** Make sure the fuel return line valve retaining clip is not damaged. Failure to follow this instruction may result in damage to the vehicle.

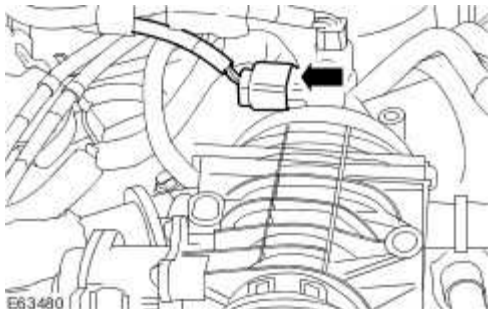
Install the intake air shutoff throttle.



30 . Attach the fuel return line valve onto the intake air shutoff throttle.



31 . Connect the MAP sensor electrical connector.



32 . **NOTE:**

Engine shown removed for clarity.

NOTE:

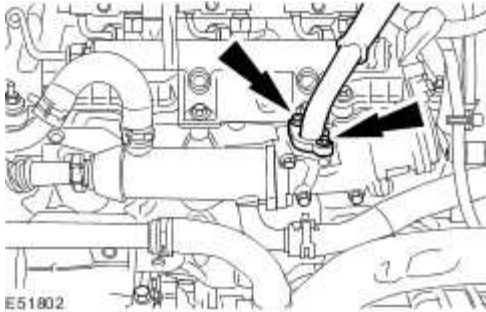
Right-hand shown, left-hand similar.

NOTE:

Fit new gaskets.

Install the right-hand and left-hand EGR valve outlet tubes.

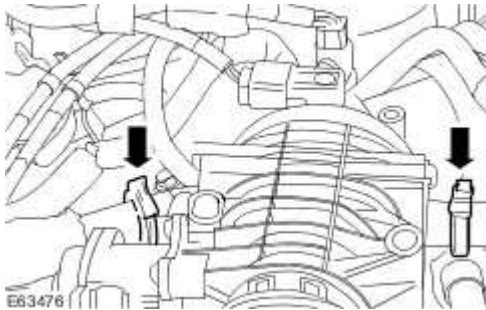
▶ Tighten to 10 Nm.



33 . NOTE:

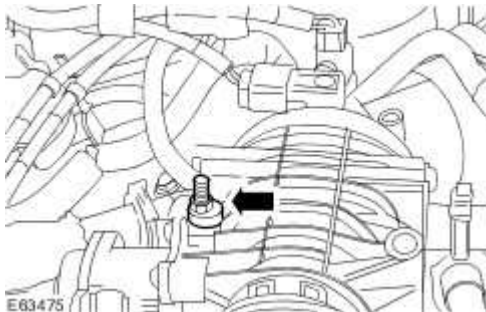
Fit new retaining clips.

Attach the EGR valve outlet tube retaining clips.

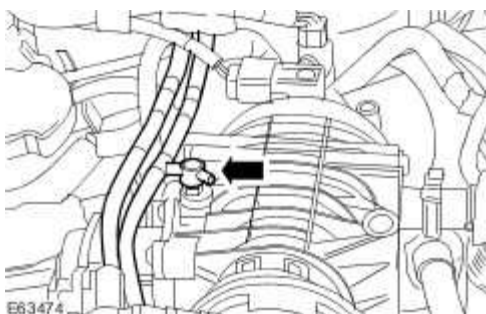


34 . Install the retaining bolt.

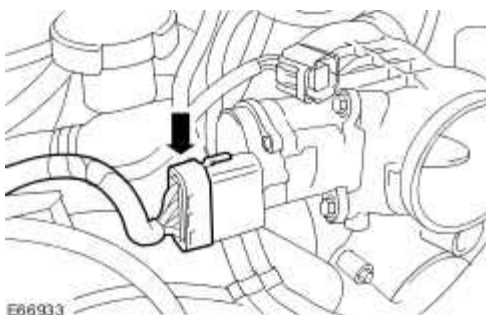
▶ Tighten to 10 Nm.



35 . Attach the vacuum hoses.

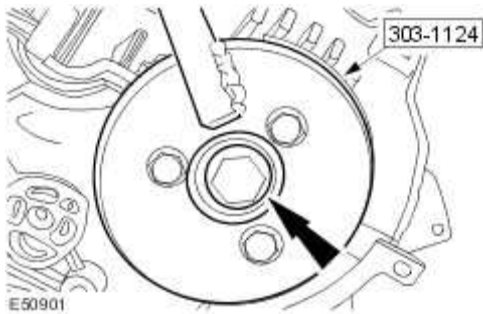


36 . Connect the intake air shutoff throttle electrical connector.



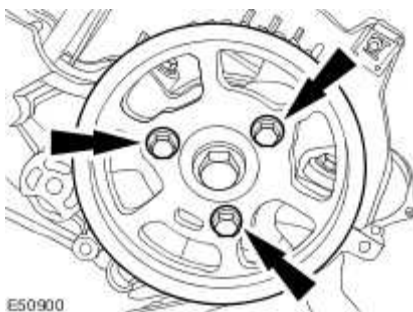
37 . Using special tool, install the camshaft sprocket hub.

► Install the camshaft sprocket hub retaining bolt.



38 . Install the camshaft sprocket.

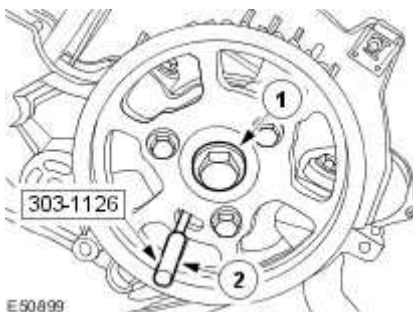
▶ Install the camshaft sprocket retaining bolts.



39 . Install the special tool.

1) Retain the camshaft sprocket.

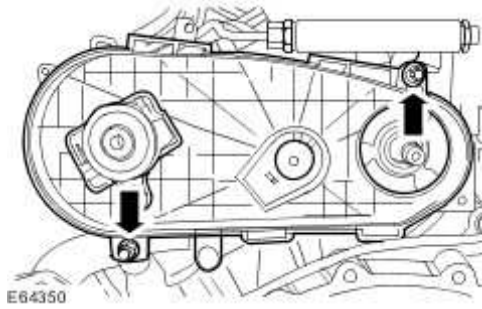
2) Install the special tool.



40 . Install the timing belt.

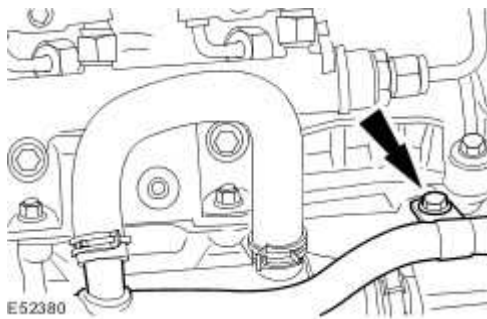
For additional information, refer to Timing Belt

41 . Install the fuel injection pump belt rear cover.

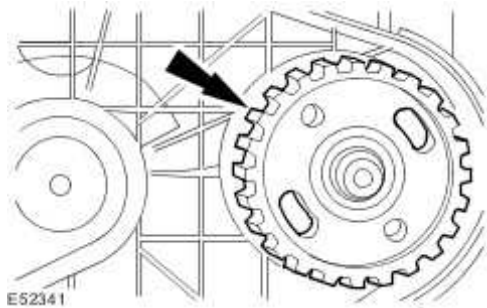


42 . Attach the EGR coolant inlet tube.

► Tighten to 10 Nm.



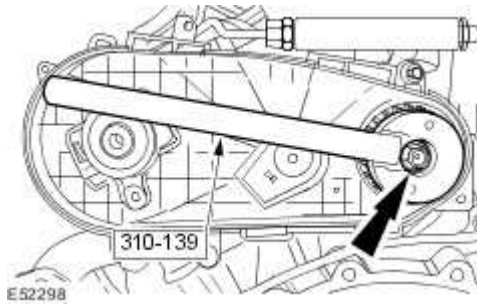
43 . Install the fuel injection pump pulley.



44 . Install the retaining nut.

► Using the special tool, retain the fuel injection pump pulley.

► Tighten to 50 Nm.



45



CAUTION: A new camshaft seal is supplied with an transit sleeve that must not be removed until the camshaft front seal is fully installed. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Do not use any lubricant on the seal, the transit sleeve or the camshaft. Failure to follow this instruction may result in damage to the vehicle.

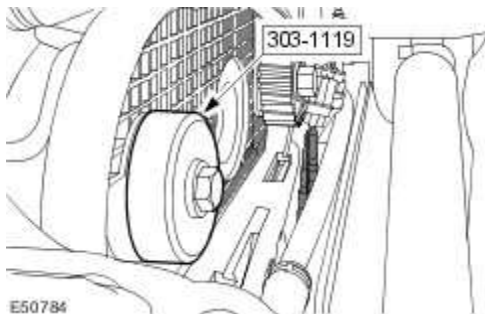
NOTE:

Make sure all components are clean and dry.

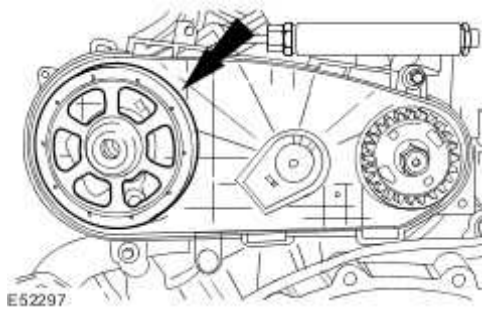
Using the special tool, install the camshaft rear seal.



Remove and discard the transit sleeve.



46 . Install the camshaft rear pulley.



47

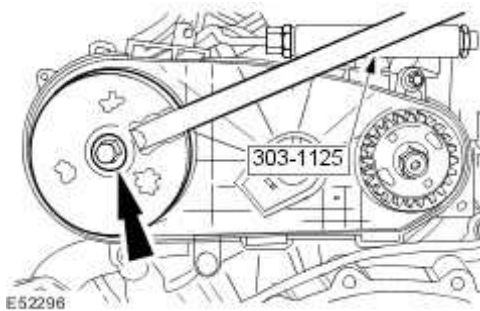


CAUTION: The camshaft pulley bolt must be tightened in two stages. Failure to follow this instruction may result in damage to the vehicle.

Using the special tool, install the camshaft rear pulley retaining bolt.

► Stage 1: Tighten to 80 Nm.

► Stage 2: Tighten to 90 degrees.



48 . Install the fuel injection pump belt.

For additional information, refer to Fuel Injection Pump Belt

Crankshaft Front Seal (12.21.14)

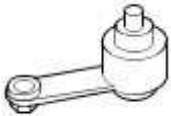
Special Service Tools



E52719

Locking Tool Flywheel

303-1123



E52709

Timing Pin - Automatic Transmission

303-1117



E52716

Crankshaft Seal Remover

303-1120



E52718

Crankshaft Seal Sleeve

303-1122



E52717

Crankshaft Seal Installer

303-1121

Removal

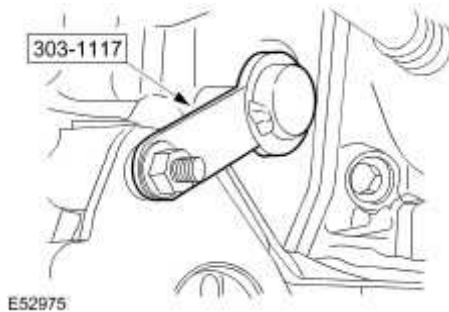
- 1 . Remove the timing belt.

For additional information, refer to Timing Belt

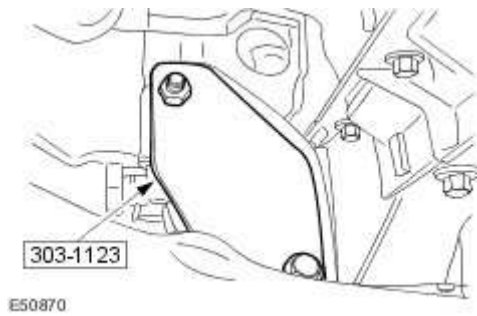
- 2 . Remove the starter motor.

For additional information, refer to Starter Motor - 2.7L Diesel (86.60.01)

- 3 . Remove the special tool.



- 4 . Install the special tool.



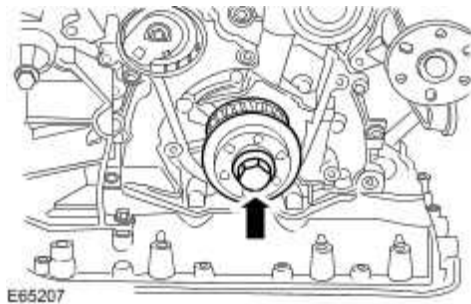
- 5 .



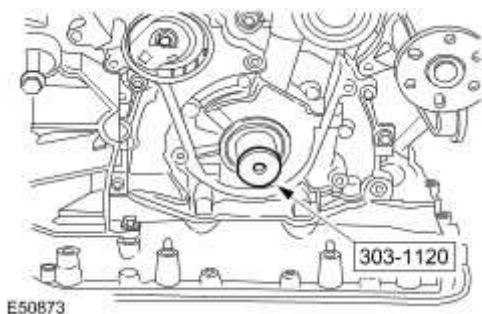
CAUTION: The crankshaft pulley retaining bolt must not be re-used.

Remove the crankshaft pulley.

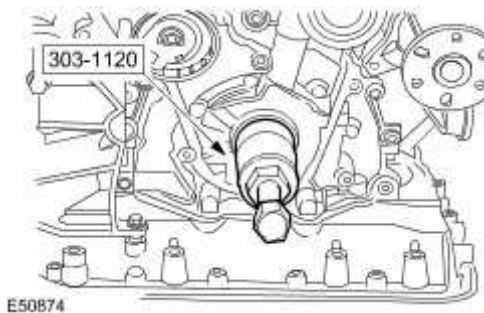
▶ Remove the retaining bolt.



6 . Install the special tool to the crankshaft.



7 . Using the special tool, remove the crankshaft front seal.



Installation

1

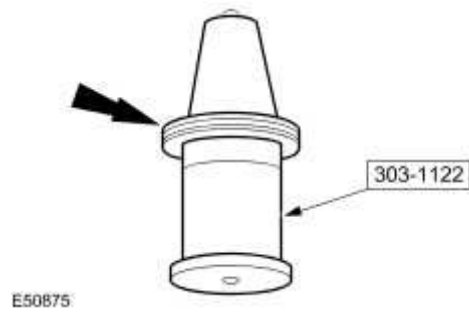


- CAUTION: Do not use any lubricant on the crankshaft front seal, the special tool or the crankshaft. Failure to follow this instruction may result in damage to the vehicle.

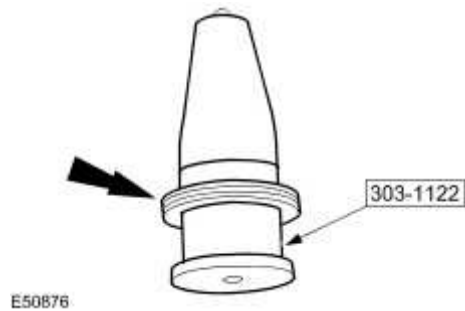
NOTE:

Make sure all components are clean and dry.

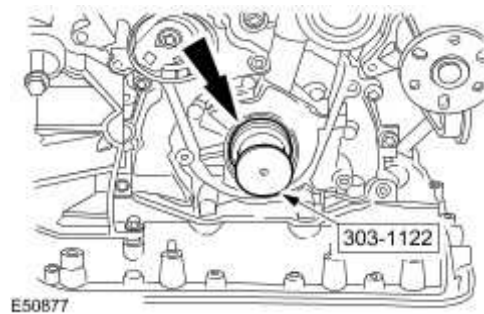
Install a new crankshaft front seal to the special tool.



2 . Reposition the crankshaft front seal along the special tool.

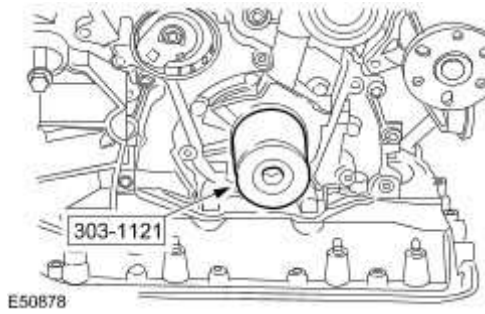


3 . Using the special tool, install the crankshaft front seal to the crankshaft.



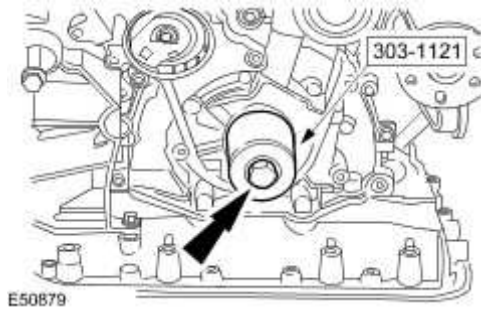
4 . Remove the special tool from the crankshaft.

5 . Install the special tool to the crankshaft.



6 . Using the special tool, fully install the crankshaft front seal.

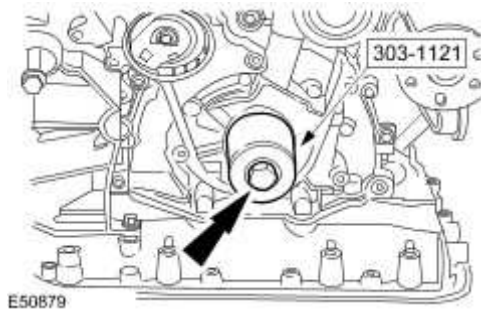
▶ Install the crankshaft pulley retaining bolt.



7 .  **CAUTION: The crankshaft pulley retaining bolt must not be re-used.**

Remove the special tool.

▶ Remove and discard the crankshaft pulley retaining bolt.



8 .



CAUTION: The crankshaft pulley retaining bolt must not be re-used.

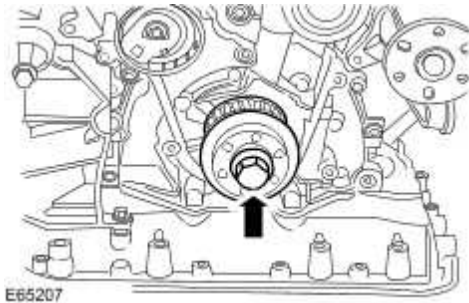


CAUTION: The crankshaft pulley retaining bolt must be tighten in two stages.

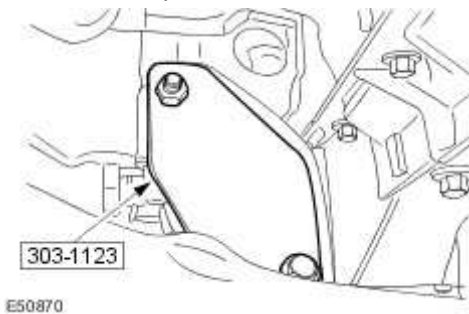
Install the new crankshaft pulley retaining bolt.

► Stage 1: Tighten to 100 Nm.

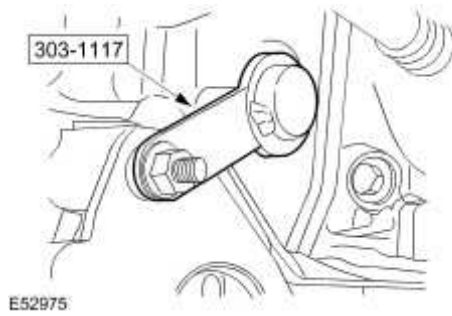
► Stage 2: Tighten to 90 degrees.



9 . Remove the special tool.



10 . Install the special tool.



11 . Install the starter motor.

For additional information, refer to Starter Motor - 2.7L Diesel (86.60.01)

12 . Install the timing belt.

For additional information, refer to Timing Belt

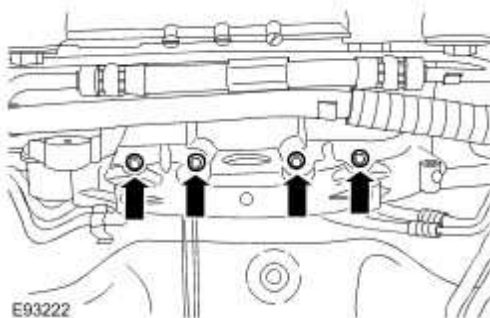
Crankshaft Rear Seal (12.21.20)

Removal

- 1 . Remove the crankshaft position (CKP) sensor ring.

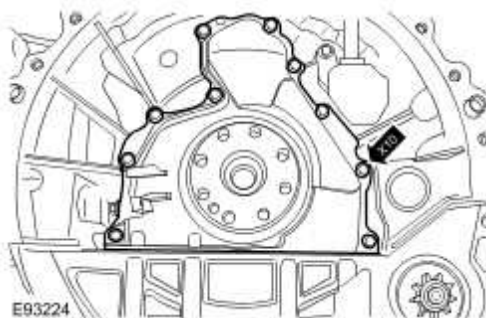
For additional information, refer to Crankshaft Position (CKP) Sensor Ring

- 2 . Remove the crankshaft rear seal retaining bolts.



- 3 . Remove the crankshaft rear seal.

▶ Remove the retaining bolts.



Installation

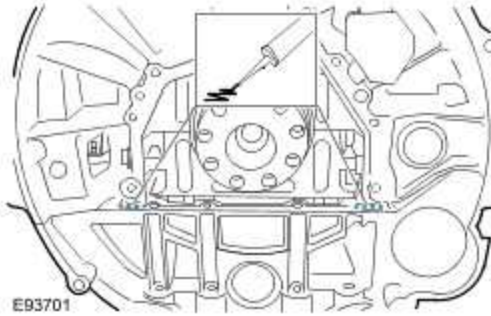


CAUTION: Make sure the crankshaft rear seal is installed correctly.

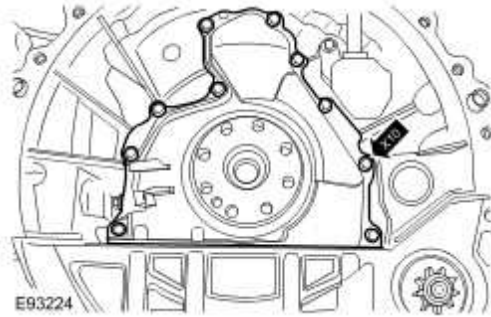
- 1 . **NOTE:**

Make sure the crankshaft rear seal mating faces are clean and dry.

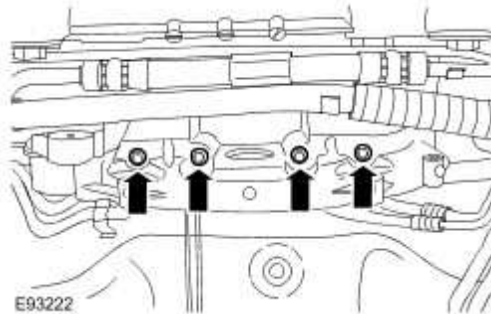
Apply a 8 mm bead of sealant to the cylinder block in the areas shown.
For additional information, refer to Specifications



2 . Tighten to 10 Nm (7 lb.ft).



3 . Tighten to 10 Nm (7 lb.ft).



4 . Install the CKP sensor ring.

For additional information, refer to Crankshaft Position (CKP) Sensor Ring

Crankshaft Vibration Damper (12.21.09)

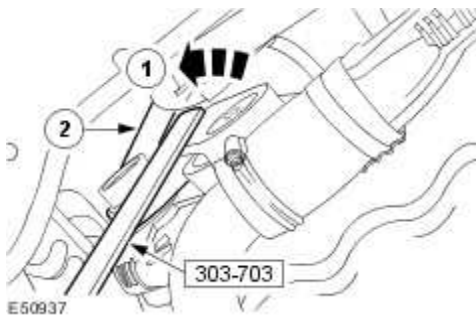
Special Service Tools



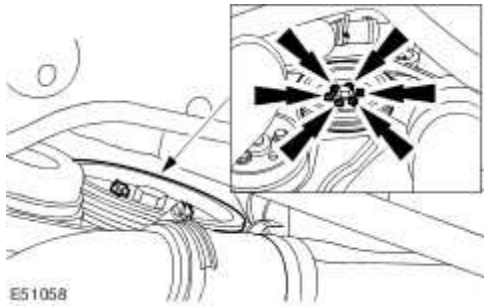
Accessory belt detensioner
303-703

Removal

- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)
- 3 . Detach the accessory drive belt.
 - 1) Using the special tool, rotate the belt tensioner counter clockwise.
 - 2) Detach the accessory drive belt.



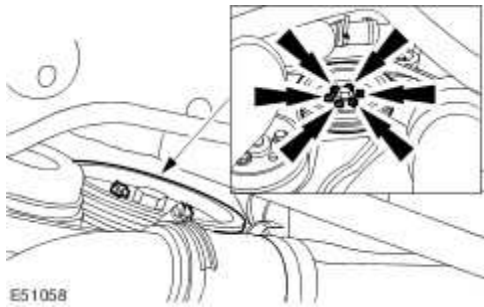
- 4 . Remove the crankshaft vibration damper.



Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 14 Nm.



Cylinder Head LH (12.29.02)

Removal

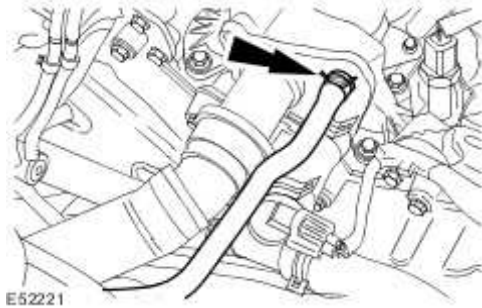
- 1 . Remove the left-hand camshafts.

For additional information, refer to Camshafts LH (12.13.19)

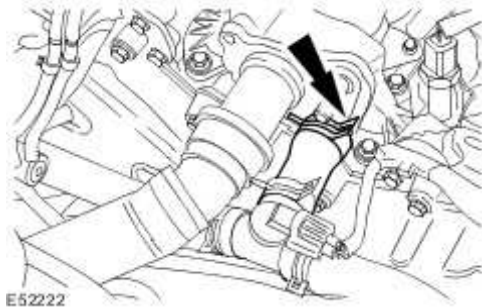
- 2 . Remove the exhaust manifold.

For additional information, refer to Exhaust Manifold LH (30.15.55)

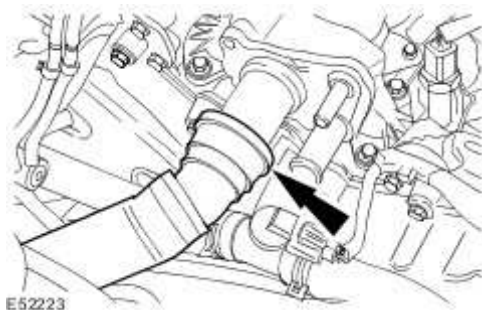
- 3 . Detach the expansion tank hose from the cylinder head coolant outlet assembly.



- 4 . Detach the engine coolant hose from the cylinder head coolant outlet assembly.



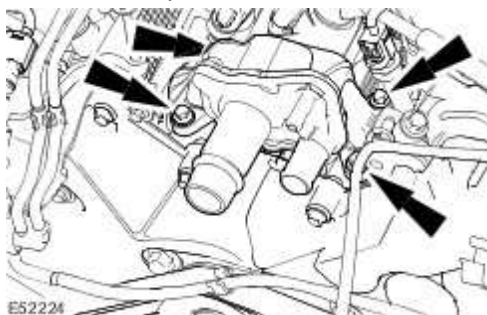
- 5 . Detach the radiator top hose from the cylinder head coolant outlet assembly.



6 . NOTE:

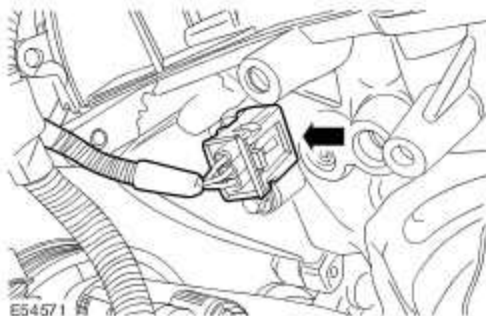
Discard the O-ring seals.

Remove the cylinder head coolant outlet assembly.

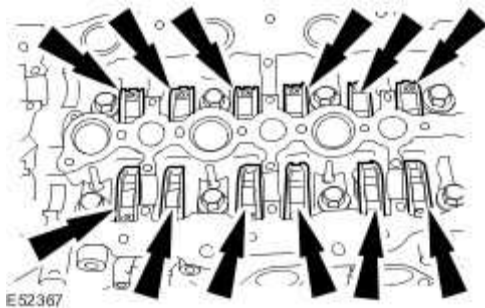


7 . Remove the left-hand cylinder head glow plugs.
For additional information, refer to Glow Plugs

8 . Disconnect the camshaft position sensor.



9 . Remove the hydraulic adjuster and rocker assemblies.



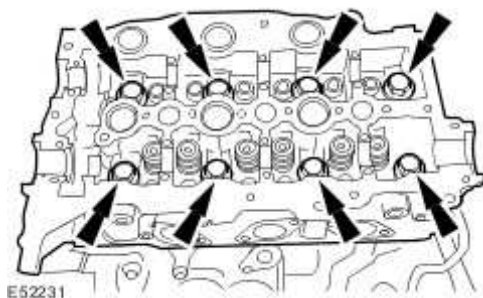
10 .



CAUTION: Only use a plastic scrapper to clean off the old gasket.

Remove the left-hand cylinder head assembly.

- ▶ Remove and discard the left-hand cylinder head retaining bolts.
- ▶ Remove and discard the left-hand cylinder head gasket.



Installation

1



CAUTION: Use care when installing the cylinder head. Damage to the cylinder block, cylinder head or the cylinder head gasket may result.

NOTE:

Install a new cylinder head gasket.

NOTE:

The head gaskets must be installed over the cylinder head to block dowels.

NOTE:

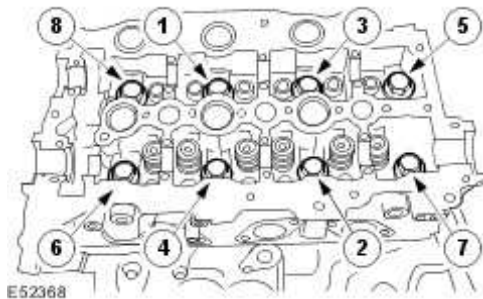
Make sure the cylinder head is installed in its original position.

NOTE:

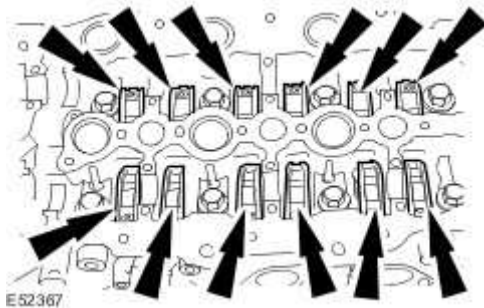
Tighten the retaining bolts in the indicated sequence in four stages.

Install the cylinder head and install new cylinder head retaining bolts.

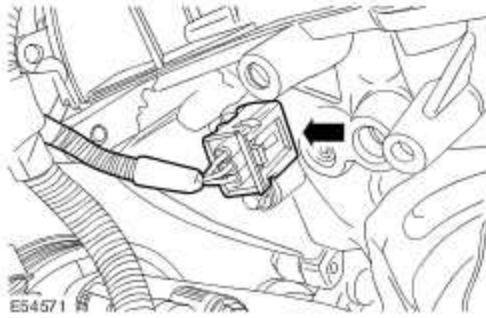
- ▶ Stage 1: Tighten to 20 Nm.
- ▶ Stage 2: Tighten to 40 Nm.
- ▶ Stage 3: Tighten to 80 Nm.
- ▶ Stage 4: Tighten to 180 degrees.



2 . Install the hydraulic adjuster and rocker assemblies.



- 3 . Connect the camshaft position sensor.



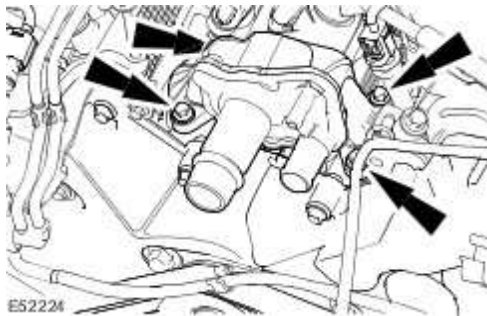
- 4 . Install the left-hand cylinder head glow plugs.
For additional information, refer to Glow Plugs

- 5 . **NOTE:**

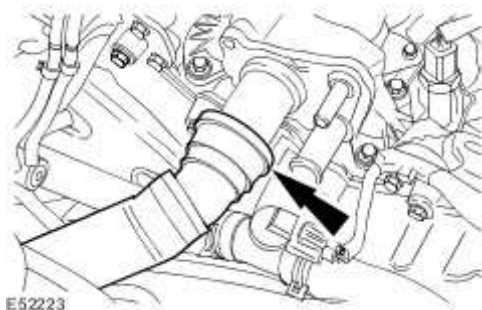
Install new O-ring seals.

Install the cylinder head coolant outlet assembly.

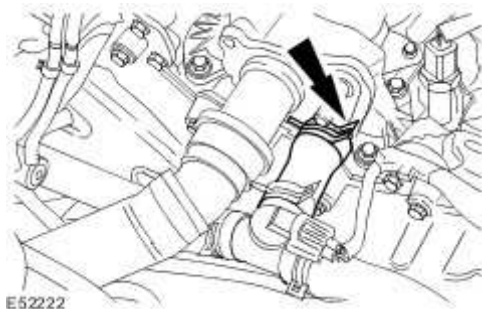
▶ Tighten to 10 Nm.



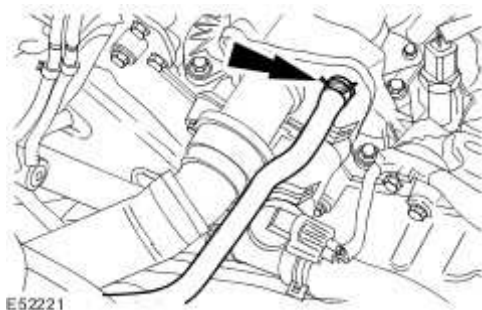
- 6 . Attach the radiator top hose onto the cylinder head coolant outlet assembly.



- 7 . Attach the engine coolant hose onto the cylinder head coolant outlet assembly.



- 8 . Attach the expansion tank hose onto cylinder head coolant outlet assembly.



- 9 . Install the exhaust manifold.

For additional information, refer to Exhaust Manifold LH (30.15.55)

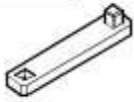
- 10 . Install the left-hand camshafts.

For additional information, refer to Camshafts LH (12.13.19)

Engine Mount LH (12.45.01)

Special Service Tools

303-1191



E67696

Engine mount retaining nut adaptor

303-1191



HTJ1200-02

Power train assembly jack

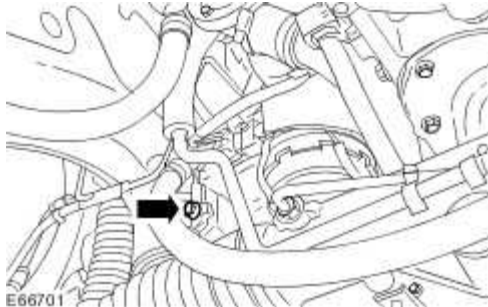
HTJ1200-02

Removal

- 1 . Remove the air deflector.

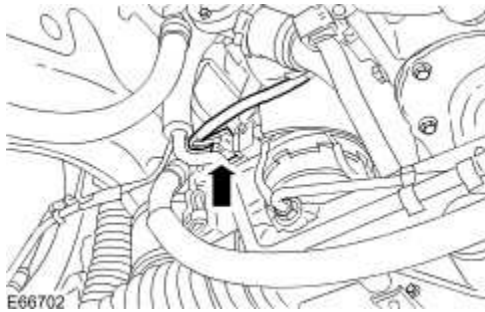
For additional information, refer to Air Deflector (76.11.41)

- 2 . Remove the power steering return line retaining bolt.

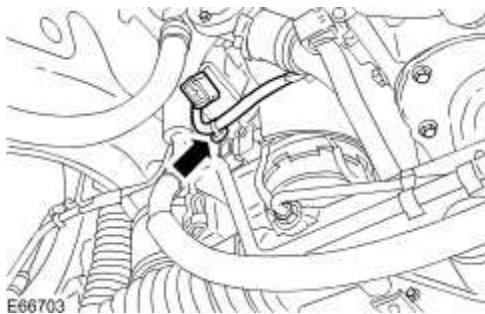


E66701

- 3 . Disconnect the engine mount electrical connector.



4 . Detach the engine mount wiring harness.



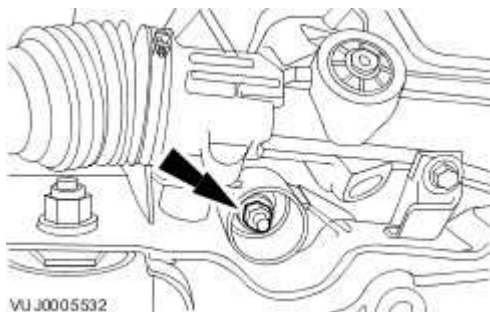
5 . Detach the turbocharger intake tube.



6 . **NOTE:**

Left-hand shown, right-hand similar.

Remove the engine mounts lower retaining nuts.



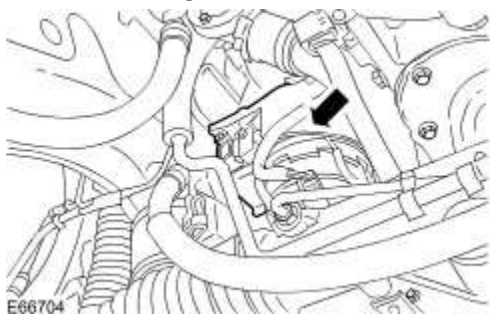
7 . Using the special tool, remove the engine mount upper retaining nut.



8 . Using the special tool, raise the engine to a suitable height.



9 . Remove the engine mount.



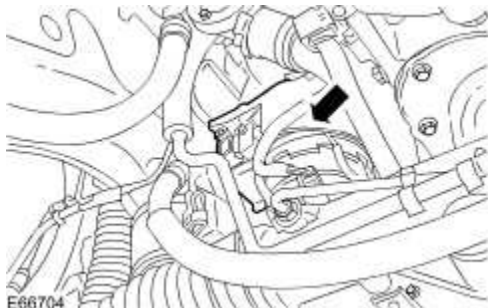
Installation

1



- CAUTION: Make sure that the engine mount location peg is correctly located into the engine mount bracket. Failure to follow this instruction may result in damage to the vehicle.

Install the engine mount.



2 . Using the special tool, lower the engine.



3

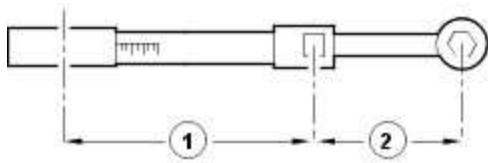


- CAUTION: Make sure the torque wrench setting procedure is followed correctly. Failure to follow this instruction may result in damage to the vehicle.

Calculate the setting for the torque wrench.

- ▶ Stage 1: Multiply the required torque by the effective length of the torque wrench (1).
- ▶ Stage 2: Add the effective length of the special tool (2) to the effective length of the torque wrench.
- ▶ Stage 3: Divide the total of stage 1 by the total of stage 2.

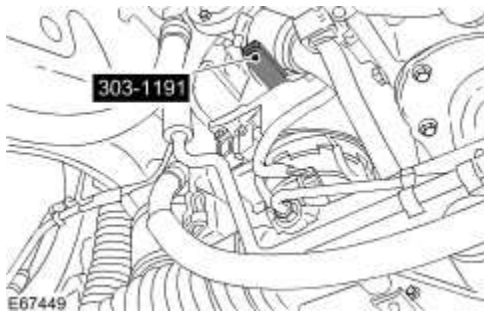
► Stage 4: Set the torque wrench to the figure arrived at in stage 3.



E37107

4 . Using the special tool, install the engine mount upper retaining nut.

► Tighten to 48 Nm.



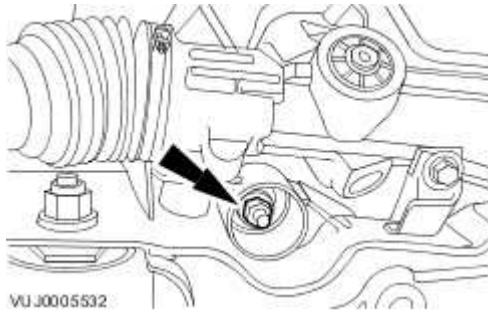
E67449

5 . **NOTE:**

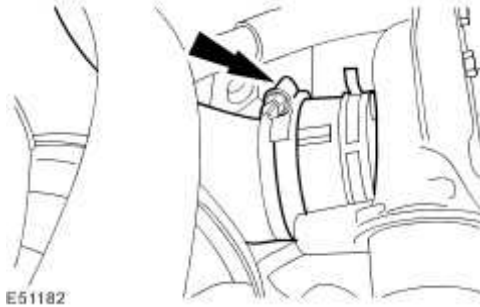
Left-hand shown, right-hand similar.

Install the engine mounts lower retaining nuts.

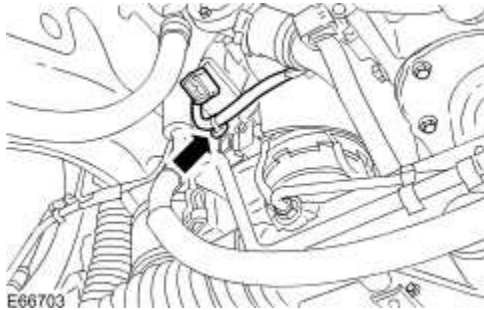
► Tighten to 63 Nm.



6 . Attach the turbocharger intake tube.



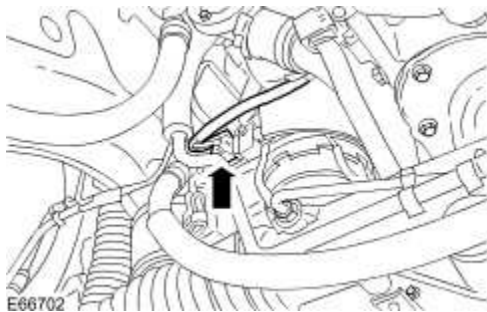
7 . Attach the engine mount wiring harness.



8 . **NOTE:**

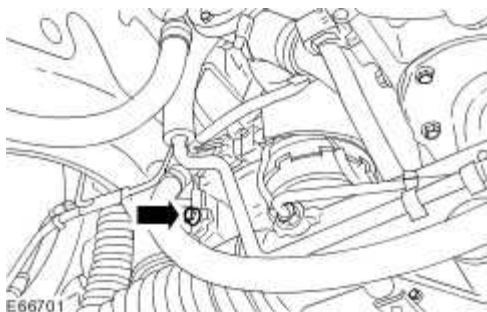
Make sure that the engine mount electrical connector is fully seated.

Connect the engine mount electrical connector.



9 . Install the power steering return line retaining bolt.

► Tighten to 10 Nm.



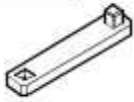
10 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

Engine Mount RH (12.45.03)

Special Service Tools

303-1191



E67696

Engine mount retaining nut adaptor

303-1191



HTJ1200-02

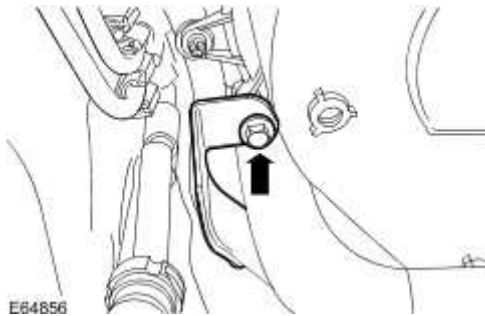
Power train assembly jack

HTJ1200-02

Removal

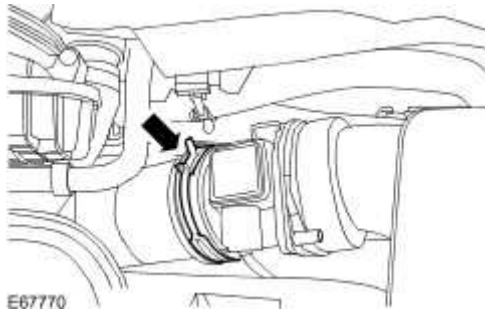
- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect

- 2 . Detach the exhaust gas recirculation (EGR) cooler coolant pipe.



E64856

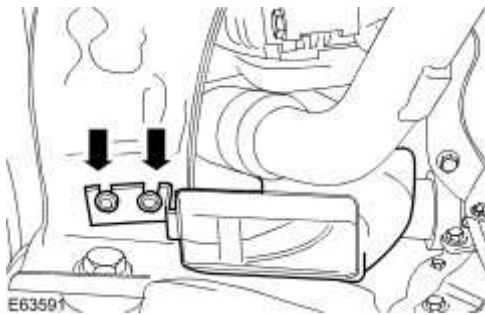
- 3 . Detach the upper mass air flow (MAF) sensor outlet pipe.



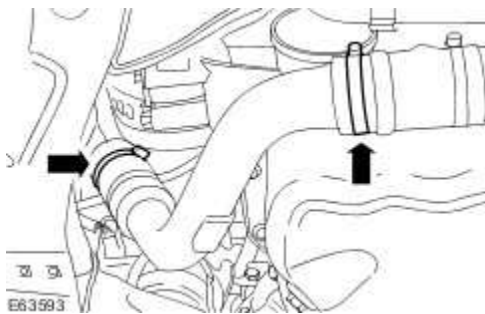
4 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

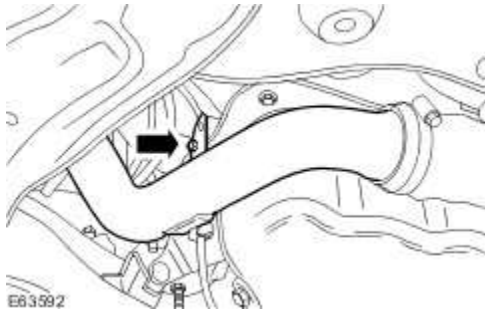
5 . Remove the generator cooling duct.



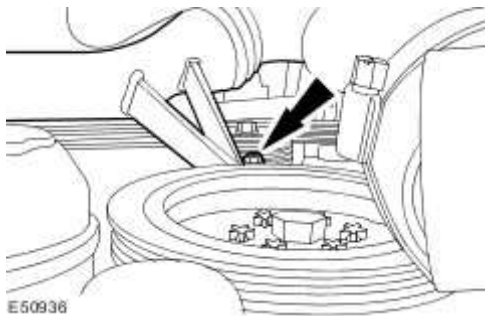
6 . Loosen the turbocharger outlet pipe retaining clips.



7 . Remove the turbocharger outlet pipe.



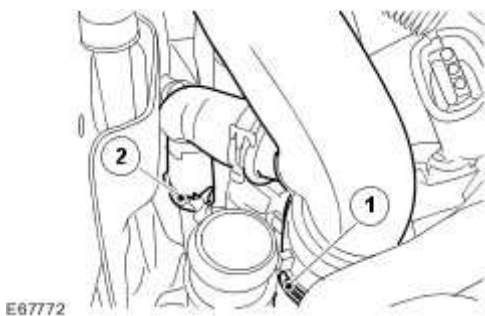
8 . Detach the air cleaner upper outlet tube from the timing cover.



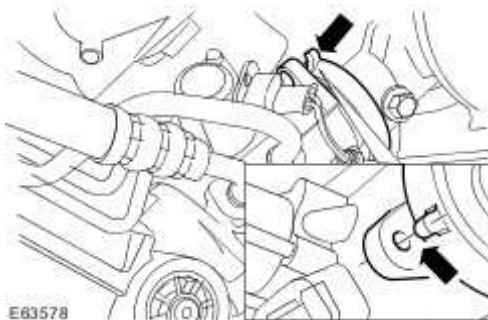
9 . Detach the air cleaner outlet tube.

1) Detach the air cleaner outlet tube to turbocharger retaining clip.

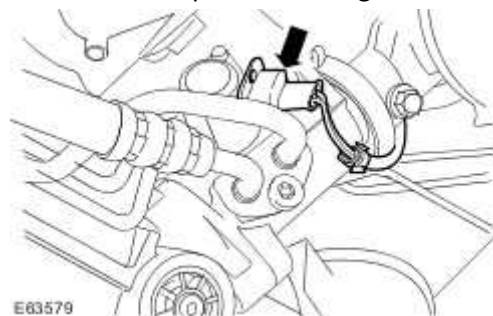
2) Detach the air cleaner outlet tube to breather tube retaining clip.



10 Make sure that the alignment mark on the steering gear pinion seal protection cover is
 . central to the steering gear pinion casting.

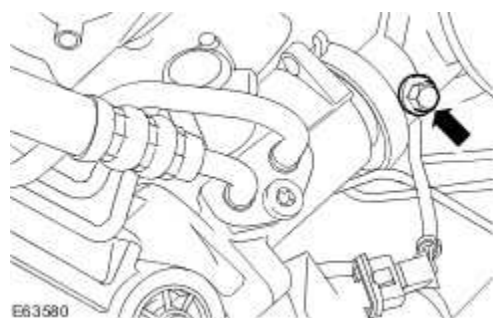


11 . Disconnect the power steering control valve actuator electrical connector.

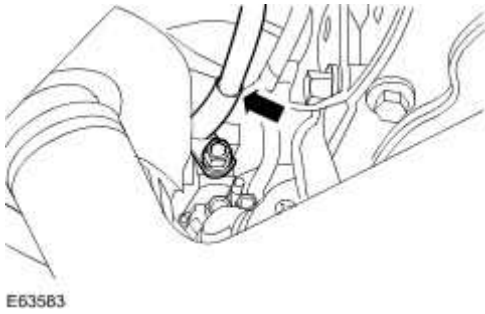


12 . Detach the lower steering column.

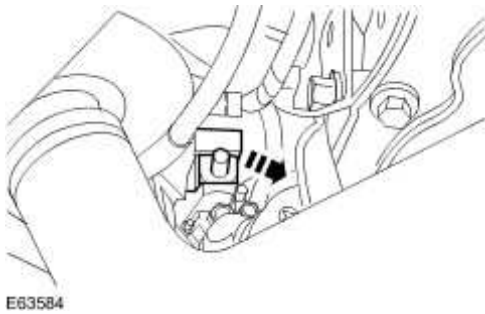
▶ Remove the steering gear shaft pinch bolt.



13 . Detach the starter motor positive cable.

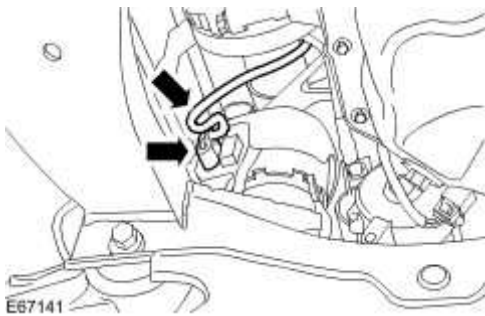


14 . Reposition the starter motor positive cable.



15 . Disconnect the engine mount electrical connector.

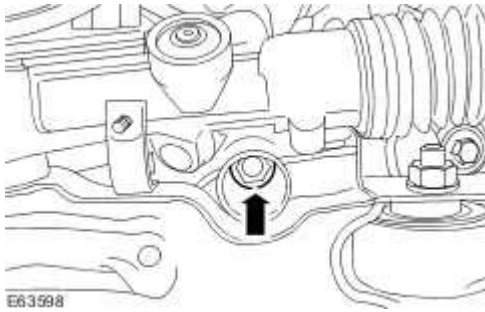
▶ Detach the engine mount wiring harness.



16 . **NOTE:**

Right-hand shown, left-hand similar.

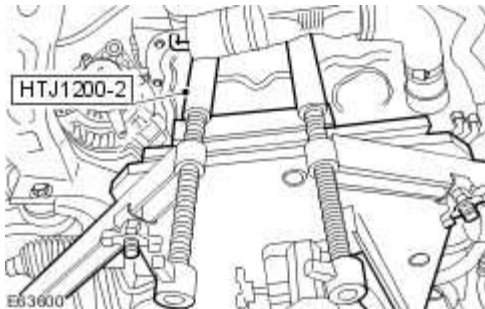
Remove the engine mounts retaining nuts.



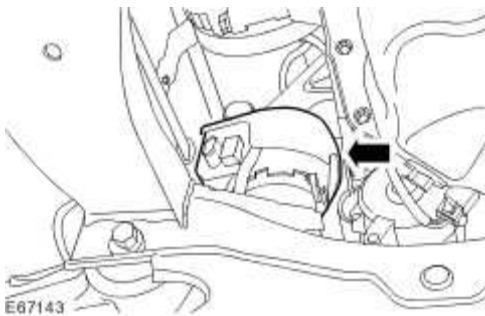
17 . Using the special tool, remove the engine mount upper retaining nut.



18 . Using the special tool, raise the engine.



19 . Remove the engine mount.



Installation

- 1 . Install the engine mount.



- 2 . Using the special tool, lower the engine.



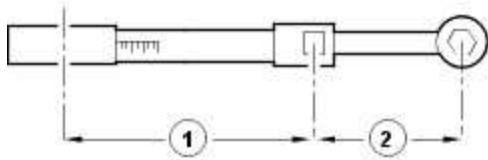
3



- **CAUTION: Make sure the torque wrench setting procedure is followed correctly. Failure to follow this instruction may result in damage to the vehicle.**

Calculate the setting for the torque wrench.

- ▶ Stage 1: Multiply the required torque by the effective length of the torque wrench (1).
- ▶ Stage 2: Add the effective length of the special tool (2) to the effective length of the torque wrench.
- ▶ Stage 3: Divide the total of stage 1 by the total of stage 2.
- ▶ Stage 4: Set the torque wrench to the figure arrived at in stage 3.



E37107

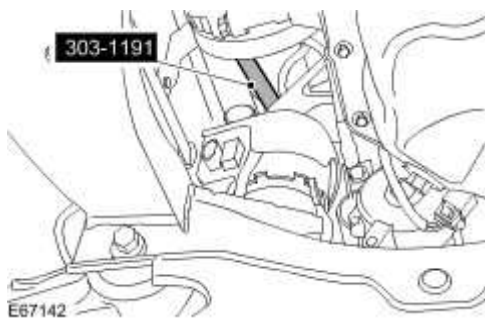
4



- CAUTION: Make sure the torque wrench setting procedure is followed correctly. Failure to follow this instruction may result in damage to the vehicle.

Using the special tool, install the engine mount upper retaining nut.

► Tighten to 48 Nm.



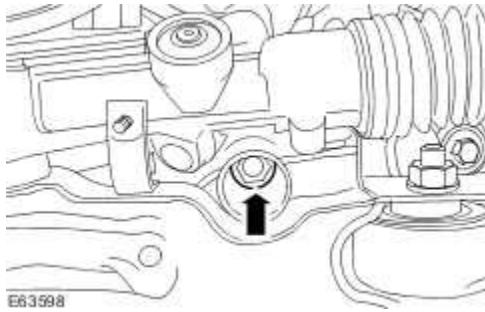
E67142

5 . NOTE:

Right-hand shown, left-hand similar.

Install the engine mountings retaining nuts.

► Tighten to 63 Nm.

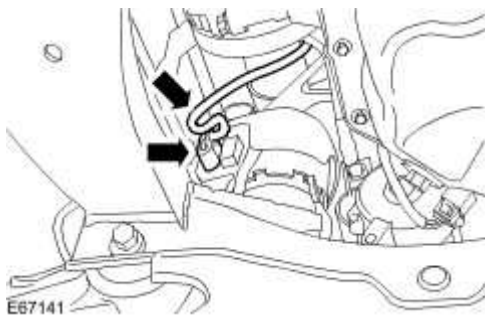


6 . NOTE:

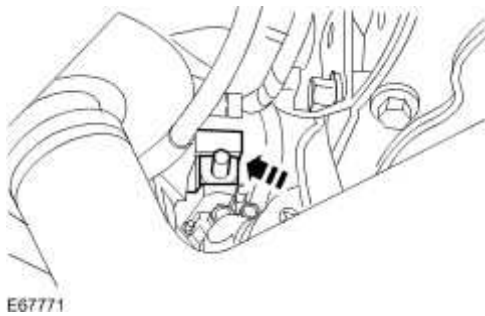
Make sure that the engine mount electrical connector is fully seated.

Connect the engine mount electrical connector.

▶ Attach the engine mount wiring harness.

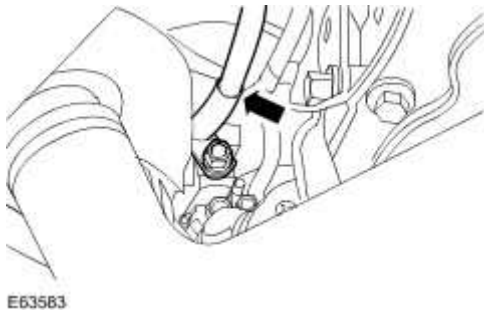


7 . Reposition the starter motor positive cable.



8 . Attach the starter motor positive cable.

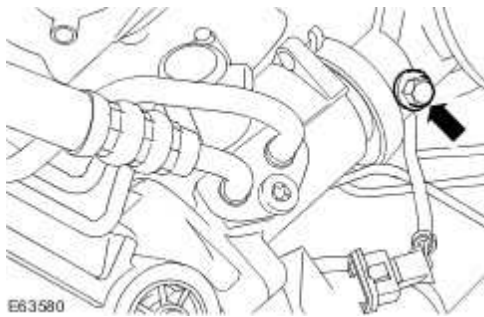
▶ Tighten to 10 Nm.



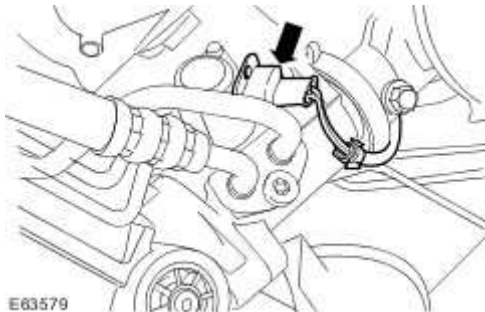
9 . Attach the lower steering column.

▶ Install the steering gear shaft pinch bolt.

▶ Tighten to 35 Nm.



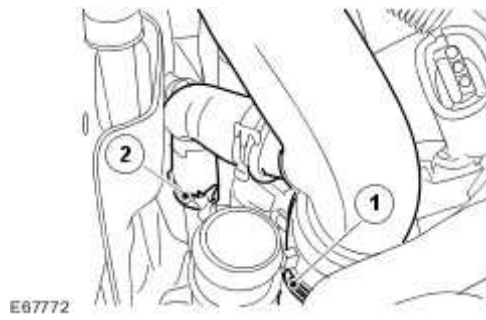
10 . Connect the power steering control valve actuator electrical connector.



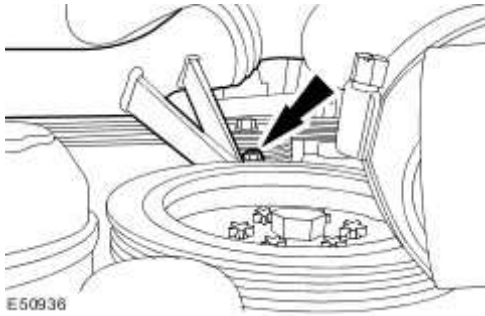
11 . Attach the air cleaner outlet tube.

1) Attach the air cleaner outlet tube to turbocharger retaining clip.

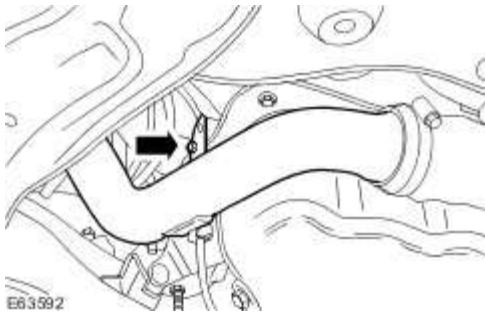
2) Attach the air cleaner outlet tube to breather tube retaining clip.



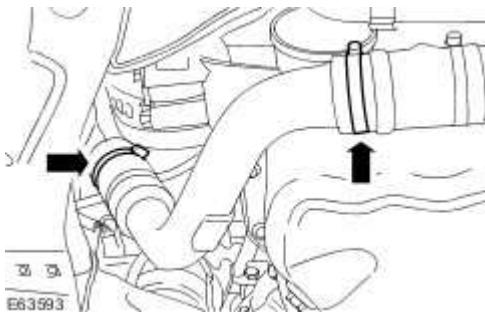
12 . Attach the air cleaner upper outlet tube to the timing cover.



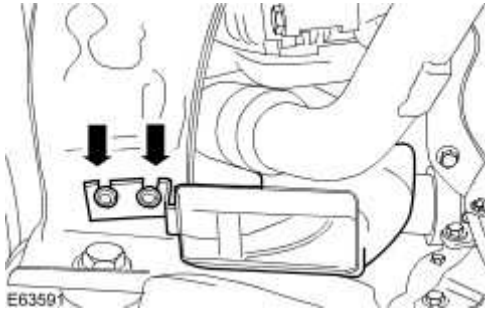
13 . Install the turbocharger outlet pipe.



14 . Tighten the turbocharger outlet pipe retaining clips.



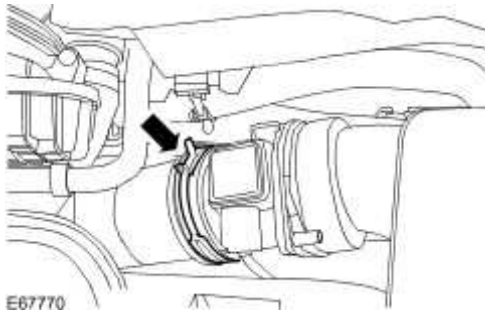
15 . Install the generator cooling duct.



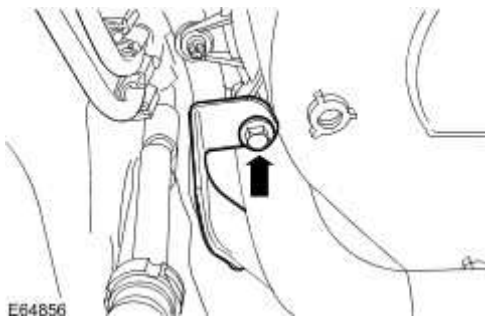
16 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

17 . Attach the upper MAF sensor outlet pipe.



18 . Attach the EGR cooler coolant pipe.



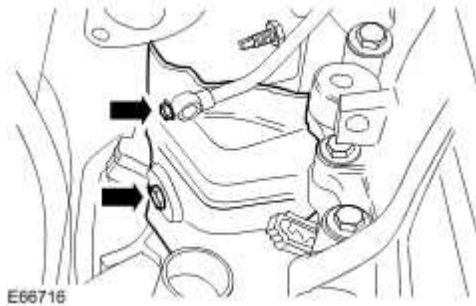
19 . Connect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)

Exhaust Manifold LH (30.15.55)

Removal

- 1 . Remove the left-hand exhaust gas recirculation (EGR) valve.
For additional information, refer to Exhaust Gas Recirculation (EGR) Valve LH
- 2 . Remove the left-hand turbocharger.
For additional information, refer to Turbocharger LH
- 3 . Remove the exhaust manifold heatshield.



- 4 . Lower the vehicle.

5 . **NOTE:**

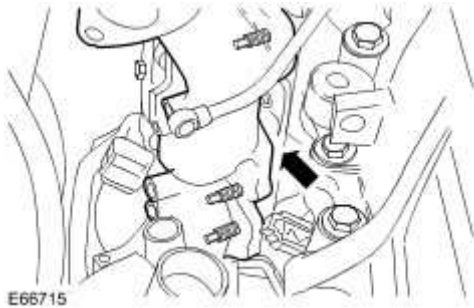
New exhaust manifold retaining studs must be fitted if the old studs are removed.

Remove and discard the exhaust manifold retaining nuts.

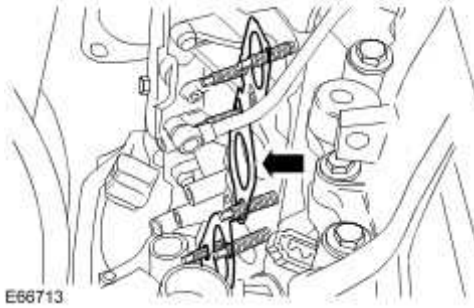


6 . Raise the vehicle.

7 . Remove the exhaust manifold.

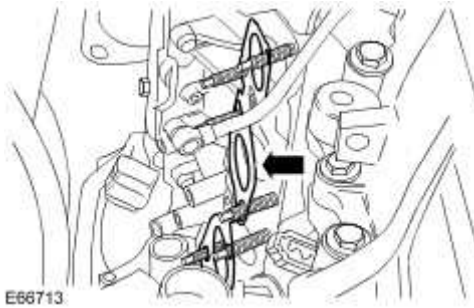


8 . Remove and discard the exhaust manifold gasket.



Installation

1 . Install a new exhaust manifold gasket.

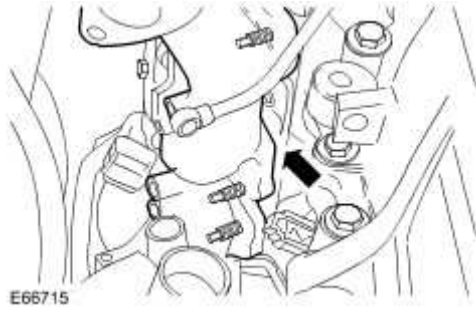


2



CAUTION: Make sure that the exhaust manifold and gasket are correctly aligned to the cylinder head and the exhaust manifold retaining studs.

Install the exhaust manifold.



3 . Lower the vehicle.

4 . Install new exhaust manifold retaining nuts.

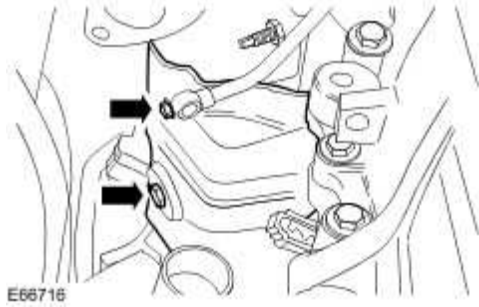
▶ Tighten to 23 Nm.



5 . Raise the vehicle.

6 . Install the exhaust manifold heatshield.

▶ Tighten to 10 Nm.



- 7 . Install the left-hand turbocharger.

For additional information, refer to Turbocharger LH

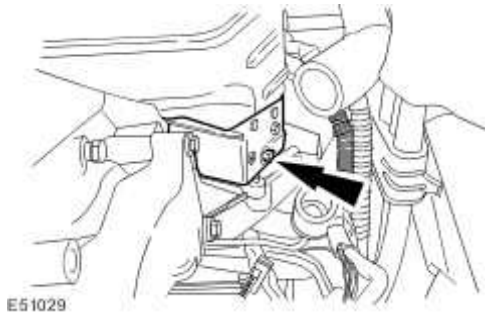
- 8 . Install the left-hand EGR valve.

For additional information, refer to Exhaust Gas Recirculation (EGR) Valve LH

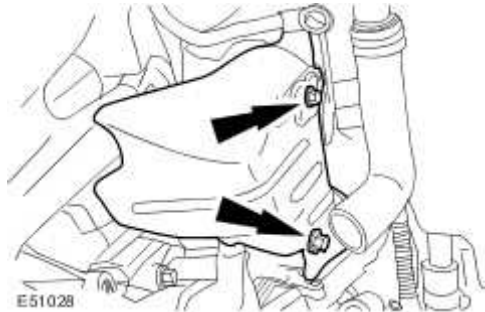
Exhaust Manifold RH (30.15.56)

Removal

- 1 . Remove the right-hand exhaust gas recirculation (EGR) valve.
For additional information, refer to Exhaust Gas Recirculation (EGR) Valve RH
- 2 . Remove the right-hand turbocharger.
For additional information, refer to Turbocharger RH
- 3 . Remove the exhaust manifold front heat shield.



- 4 . Remove the exhaust manifold rear heat shield.

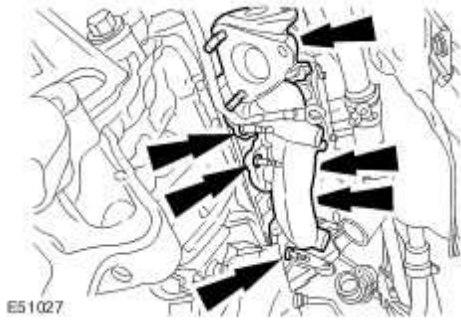


5 . NOTE:

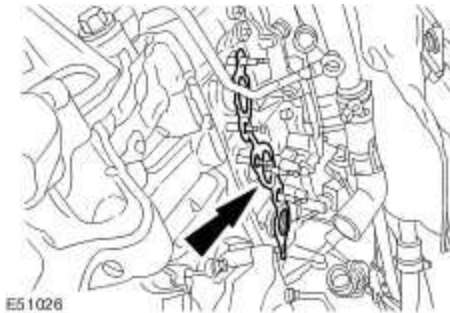
New exhaust manifold retaining studs must be fitted if the old studs are removed.

Remove the exhaust manifold.

▶ Remove and discard the retaining nuts.



6 . Remove and discard the exhaust manifold gasket.



Installation

1



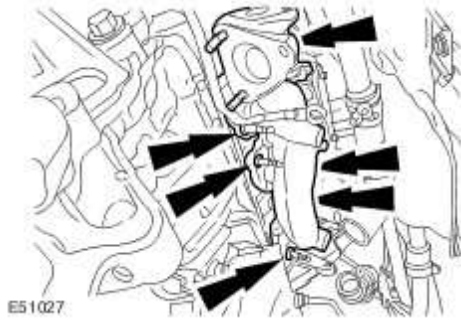
- **CAUTION:** Ensure the exhaust manifold and gasket are correctly aligned to the cylinder head and studs.

NOTE:

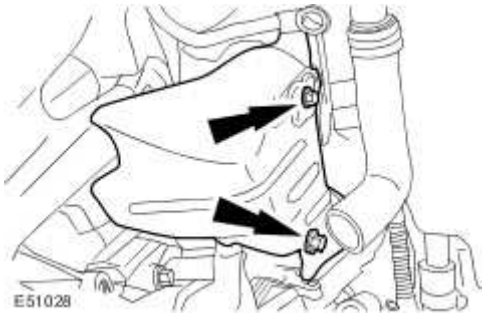
New exhaust manifold retaining studs must be fitted if the old studs are removed.

To install, reverse the removal procedure.

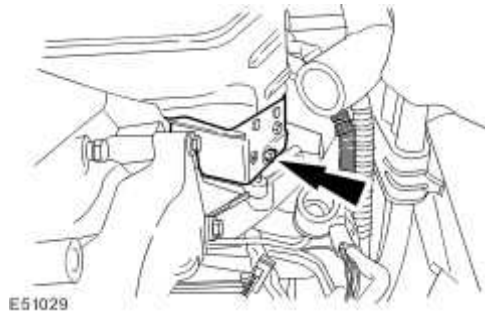
- ▶ Install a new exhaust manifold gasket.
- ▶ Install new exhaust manifold retaining nuts.
- ▶ Tighten to 23 Nm.



2 . Tighten to 10 Nm.



3 . Tighten to 10 Nm.



Flexplate (12.53.13)

Removal

- 1 . Remove the transmission.

For additional information, refer to

- 2 . **NOTE:**

Prevent the flexplate from rotating.

Remove the flexplate.



Installation

- 1 . **NOTE:**

Make sure the crankshaft and flexplate mating faces are clean before installation.

NOTE:

The flexplate will only locate in one position.

NOTE:

Install, but do not tighten, the flexplate retaining bolts.

Install the flexplate.

 Prevent the flexplate from rotating.



2 .



CAUTION: Tighten the flexplate securing bolts in three stages.

Tighten the flexplate securing bolts.

- ▶ Stage 1: Tighten to 50 Nm.
- ▶ Stage 2: Tighten to 45 degrees.
- ▶ Stage 3: Tighten to 45 degrees.



3 . Install the transmission.

For additional information, refer to

Oil Filter Element (12.60.02)

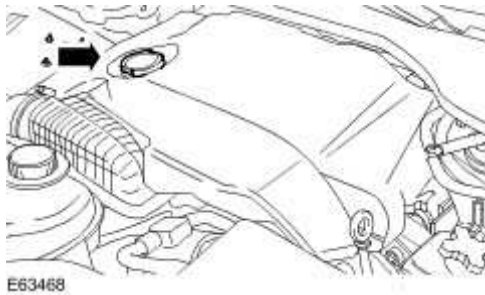
Special Service Tools



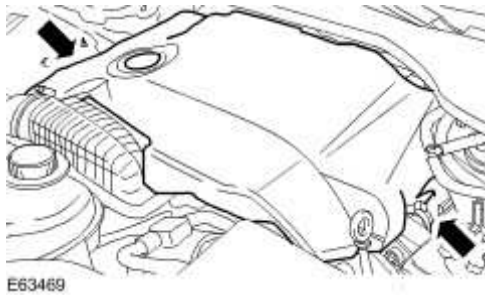
Remover - oil filter
303-1128

Removal

- 1 . Remove the oil filler cap.



- 2 . Remove the engine cover.



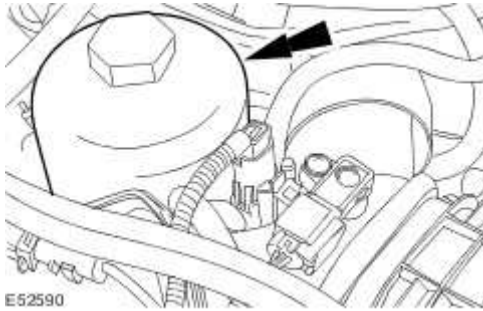
- 3 . Install the engine oil filler cap to prevent foreign material entering the valve cover.

4 NOTE:

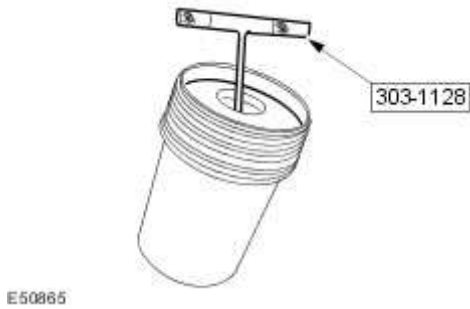
Remove and discard the O-ring seal.

Remove the oil filter element housing.

- ▶ Rotate the oil filter element housing five complete turns counter-clockwise.
- ▶ Allow the engine oil to drain from the oil filter element housing for two minutes.
- ▶ Remove the oil filter element housing.



5 . Using the special tool, remove the oil filter element.



Installation

1 . Install the oil filter element.

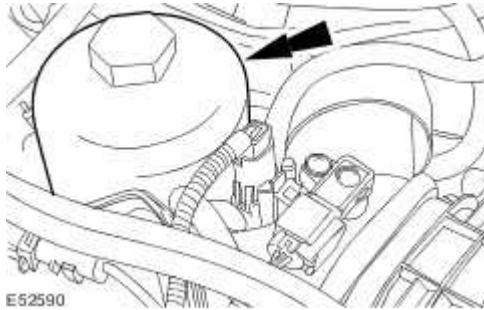


2 . **NOTE:**

Install a new O-ring seal.

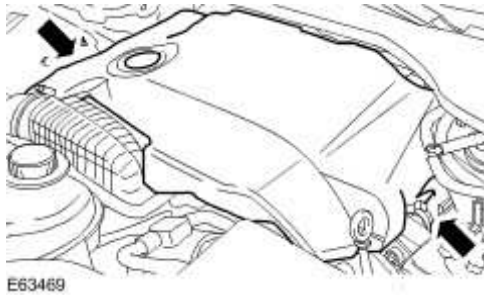
Install the oil filter element housing.

▶ Tighten to 25 Nm.

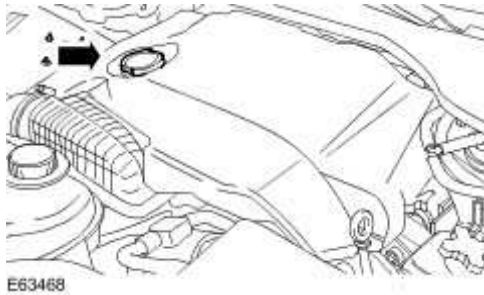


3 . Remove the engine oil filler cap.

4 . Install the engine cover.



5 . Install the oil filler cap.



6 . Check and top up the engine oil.

7 . Run the engine.

8 . Check and if necessary top up the engine oil.

Oil Pan (12.60.44)

Special Service Tools



Engine Lifting Bracket

303-1129

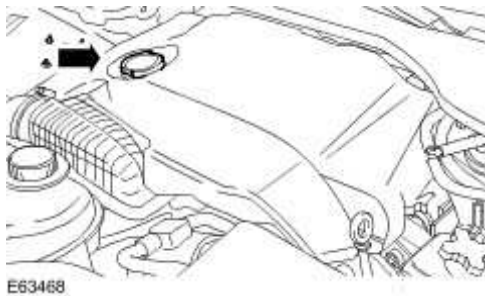


Engine Support Bracket

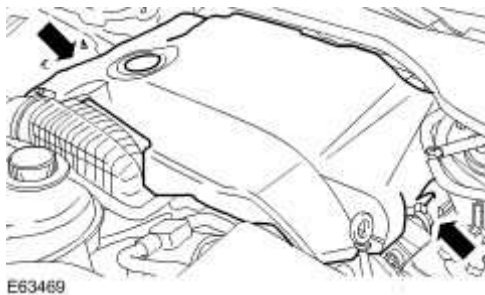
303-021

Removal

- 1 . Remove the oil filler cap.

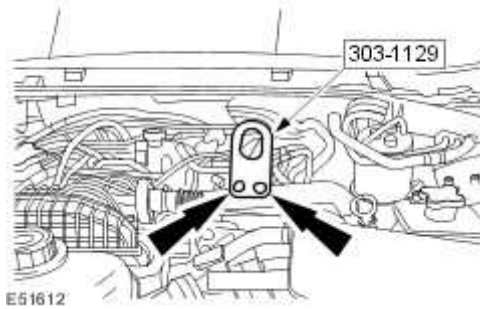


- 2 . Remove the engine cover.

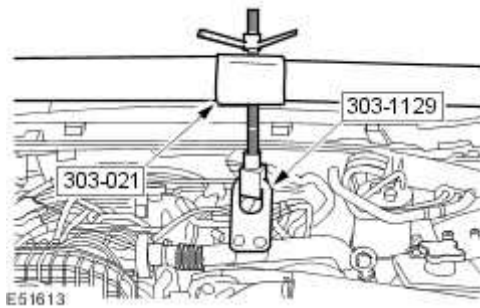


- 3 . Install the engine oil filler cap to prevent foreign material entering the valve cover.

4 . Install the engine lifting bracket.



5 . Install the engine support bracket.



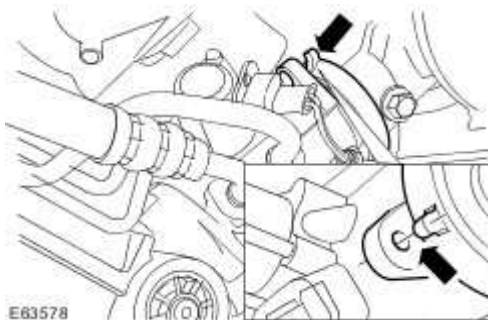
6 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

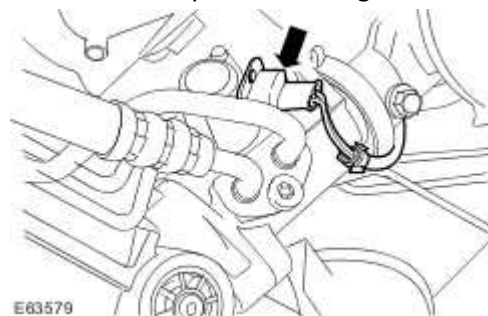
7 . Drain the engine oil.

- ▶ Place suitable container under the vehicle.
- ▶ Remove the drain plug and drain the engine oil.

8 Make sure the alignment mark on the steering gear pinion seal protection cover is central to
the steering gear pinion casting.

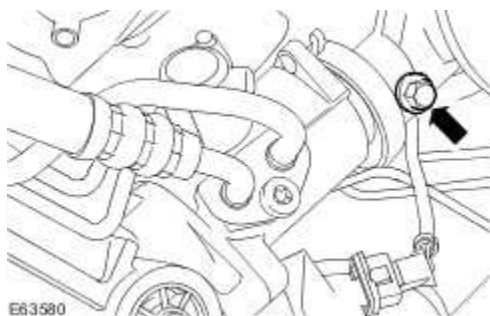


9 . Disconnect the power steering control valve actuator electrical connector.



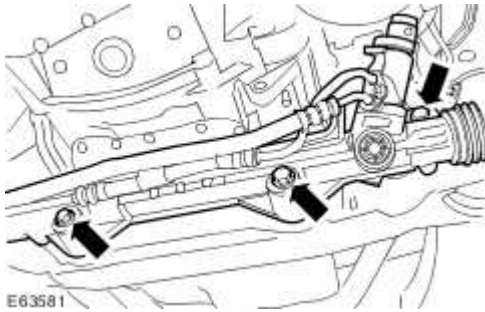
10 . Detach the lower steering column.

▶ Remove the steering gear shaft pinch bolt.

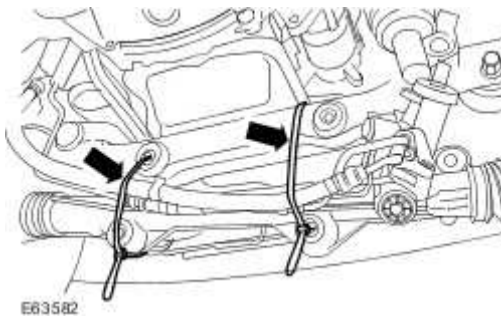


11 . Detach the steering gear.

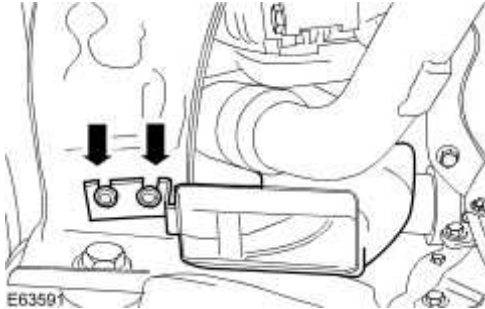
▶ Remove the steering gear retaining bolts.



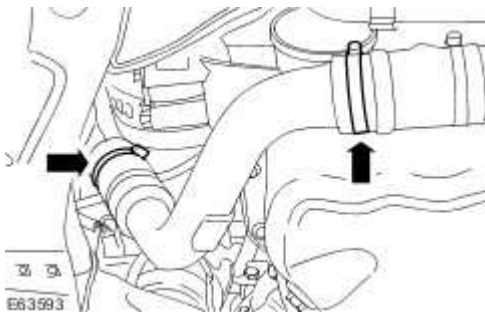
12 . Using a suitable piece of string secure the steering gear.



13 . Remove the generator cooling duct (if equipped).

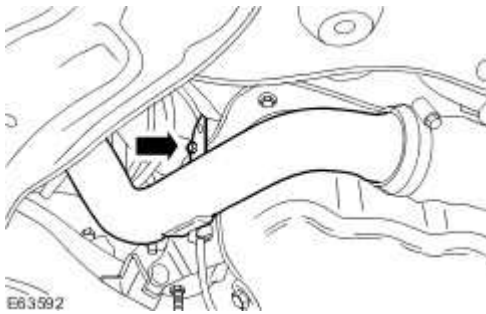


14 . Undo the right-hand turbocharger outlet tube securing clips.

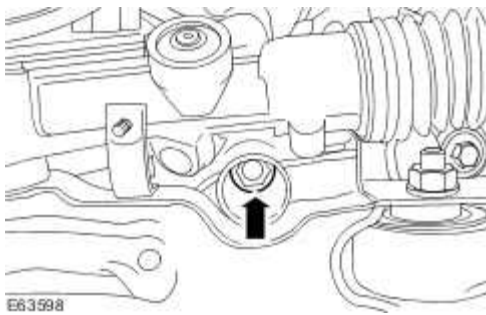


15 . Remove the right-hand turbocharger outlet tube.

▶ Remove the retaining bolt.

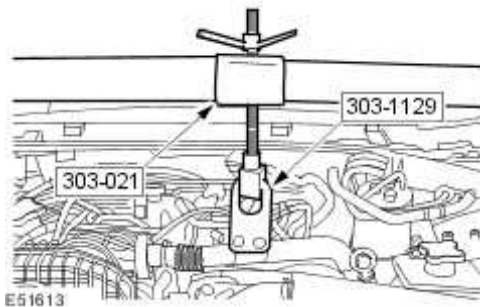


16 . Remove the left-hand engine mount retaining nut.



17 . Lower the vehicle.

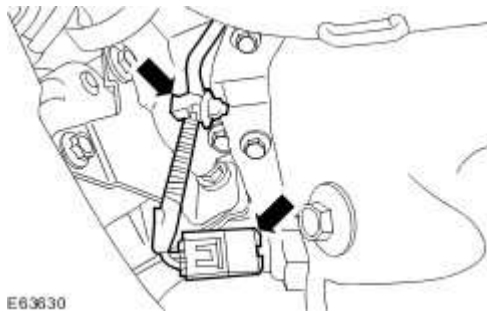
18 . Using special tool raise the left-hand side of the engine.



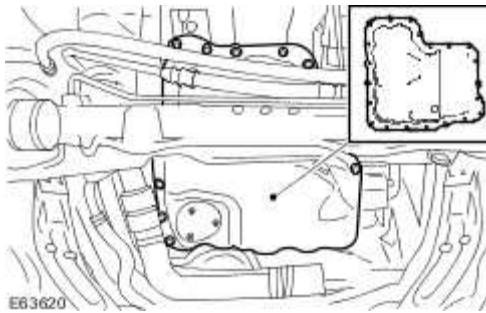
19 . Raise the vehicle.

20 . Disconnect the oil temperature sensor electrical connector.

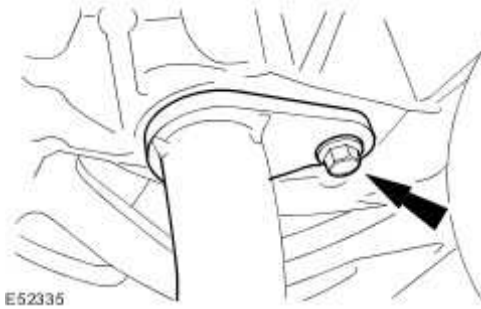
▶ Detach the oil temperature sensor wiring harness from the oil pan.



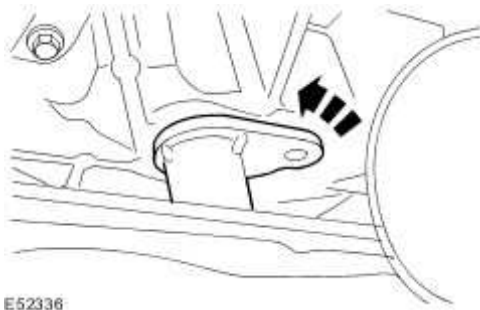
21 . Remove the oil pan retaining bolts.



22 . Remove the oil strainer retaining bolt.



23 . Reposition the oil strainer.



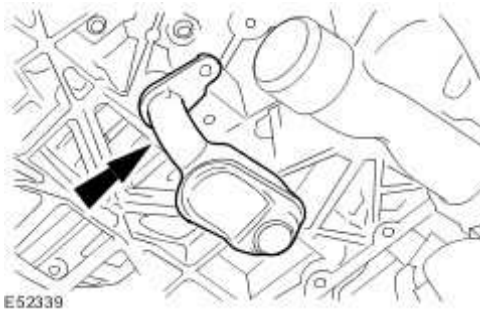
24 . Remove the oil pan.

▶ Remove and discard the gasket.



25 . Remove the oil strainer.

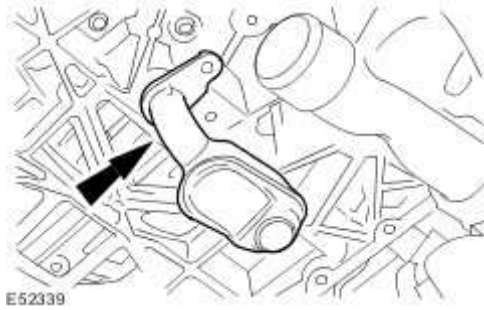
▶ Remove and discard the O-ring seal.



Installation

1 . Install the oil strainer.

▶ Install a new O-ring seal.



2 . Loosely install the oil pan.

▶ Install a new oil pan gasket.

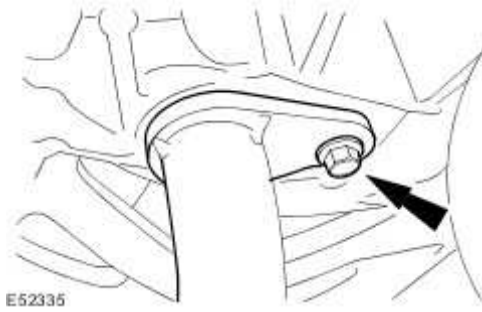


3 . Reposition the oil strainer.



4 . Install the oil strainer retaining bolt.

▶ Tighten to 10 Nm.

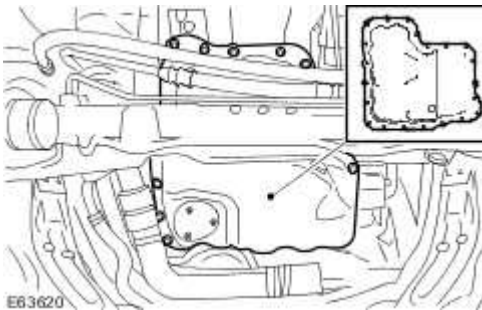


5 NOTE:

A new oil pan is supplied with the drain plug installed. Check that the drain plug is tightened to 25 Nm.

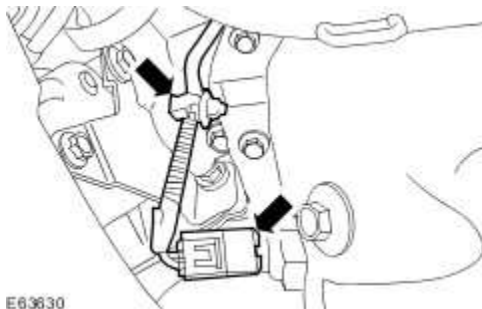
Install the oil pan.

▶ Tighten to 10 Nm.



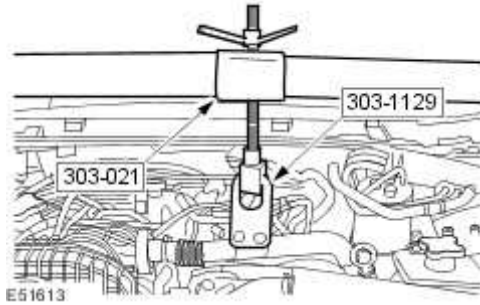
6 . Connect the oil temperature sensor electrical connector.

▶ Attach the oil temperature sensor wiring harness to the oil pan.



7 . Lower the vehicle.

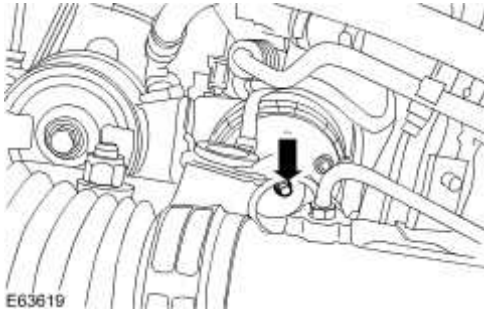
8 . Using special tool lower the left-hand side of the engine.



9 . Raise the vehicle.

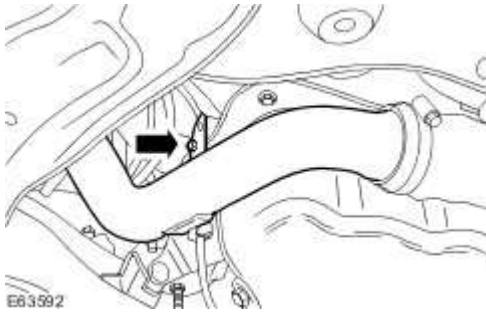
10 . Install the left-hand engine mounting retaining nut.

► Tighten to 63 Nm.

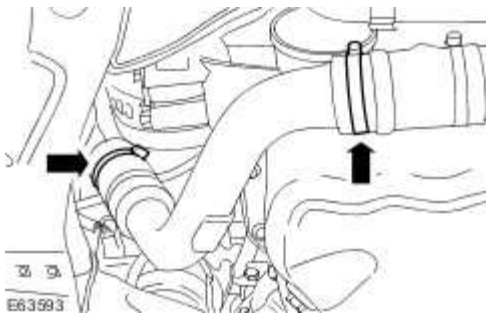


11 . Install the right-hand turbocharger outlet tube retaining bolt.

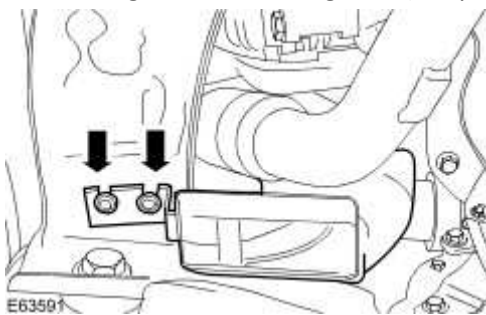
► Tighten to 10 Nm.



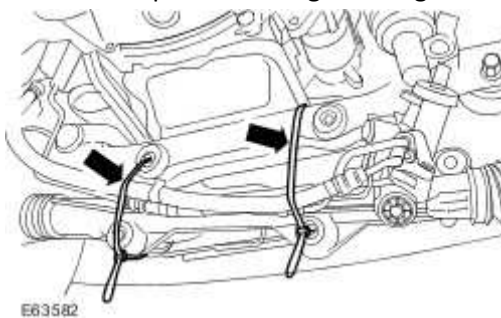
12 . Install the right-hand turbocharger outlet tube.



13 . Install the generator cooling duct (if equipped).

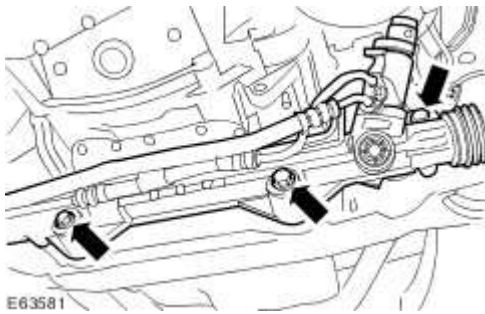


14 . Remove the piece of string securing the steering gear.



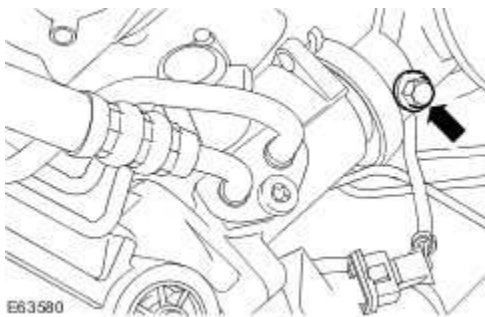
15 . Install the steering gear.

▶ Tighten to 100 Nm.

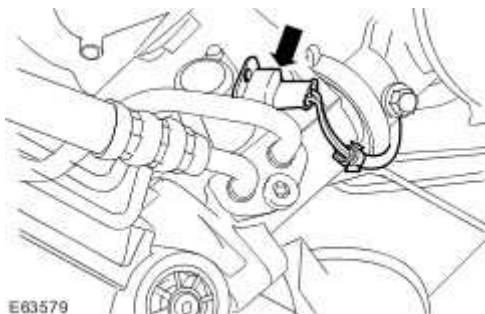


16 . Install the steering gear shaft pinch bolt.

▶ Tighten to 35 Nm.



17 . Connect the power steering control valve actuator electrical connector.

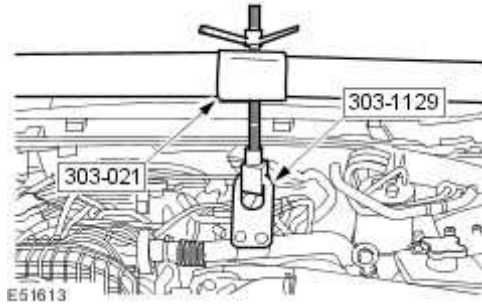


18 . Install the air deflector.

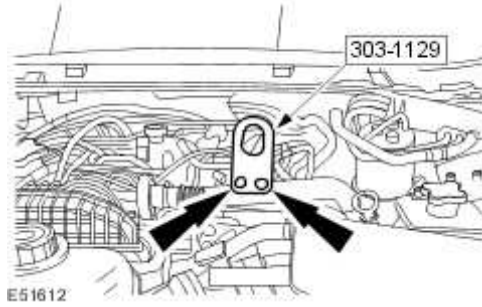
For additional information, refer to Air Deflector (76.11.41)

19 . Lower the vehicle.

20 . Remove the engine support bracket.

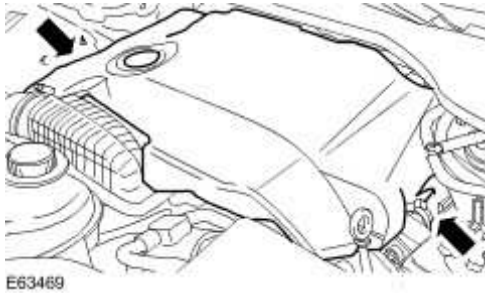


21 . Remove the engine lifting bracket.



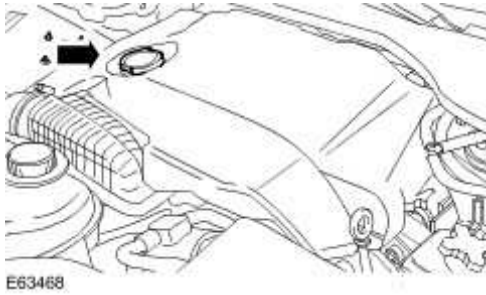
22 . Remove the engine oil filler cap.

23 . Install the engine cover.



24 . Check and top-up the engine oil.

25 . Install the oil filler cap.



Oil Pan Extension (12.60.48)

Removal

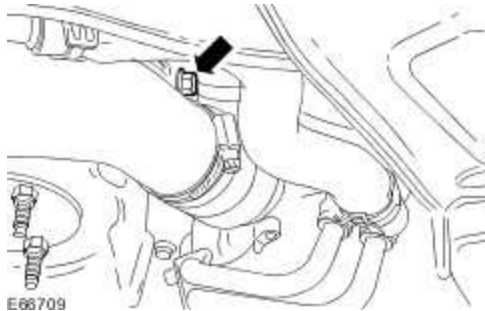
- 1 . Remove the transmission.

For additional information, refer to Transmission - 2.7L Diesel (44.20.01)

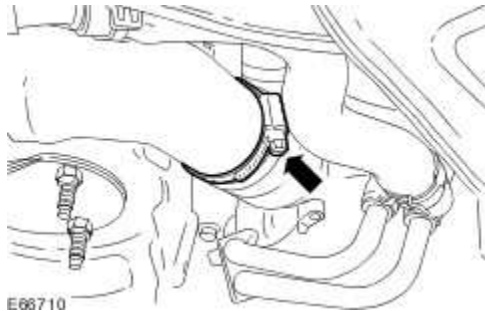
- 2 . Remove the oil pan.

For additional information, refer to Oil Pan (12.60.44)

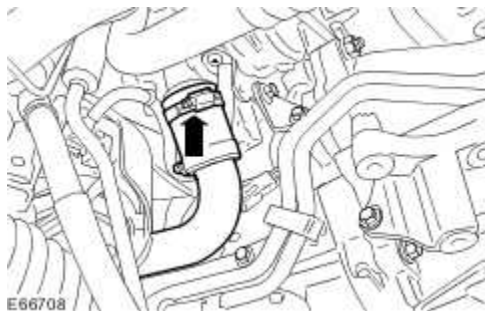
- 3 . Remove the left-hand turbocharger outlet pipe retaining bolt.



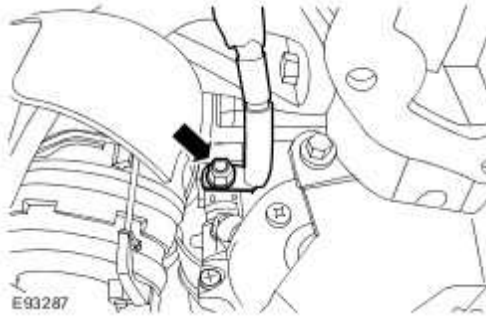
- 4 . Disconnect the left-hand turbocharger outlet pipe.



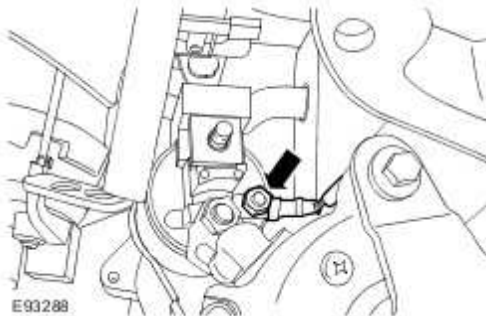
- 5 . Remove the left-hand turbocharger outlet pipe from the turbocharger.



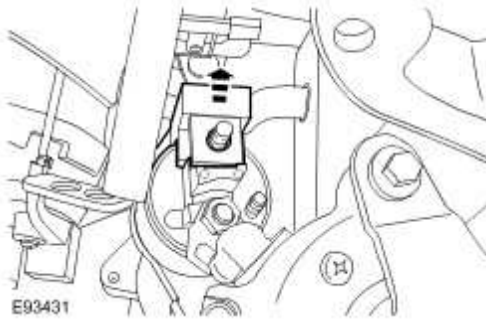
6 . Detach the starter motor positive cable.



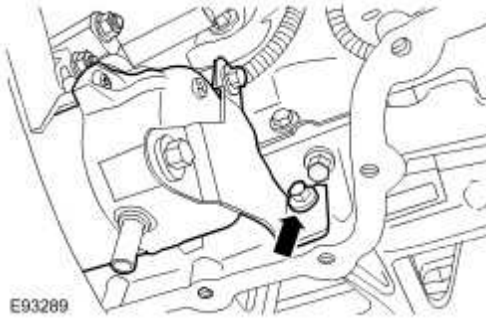
7 . Detach the starter motor solenoid harness.



8 . Reposition the starter motor positive cable.



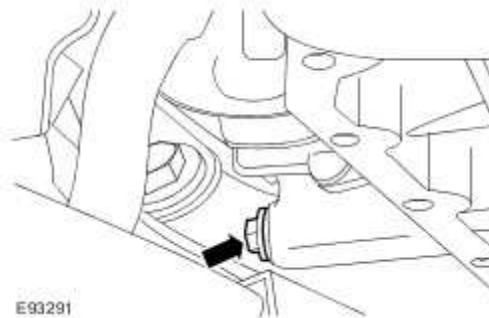
9 . Remove the starter motor.



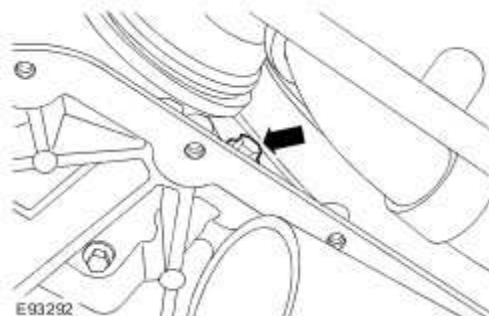
10 . Detach the oil temperature sensor harness from the cylinder block.



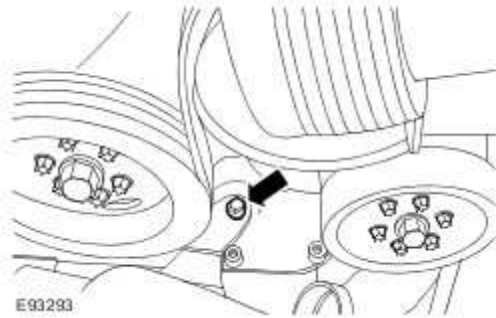
11 . Remove the air conditioning (A/C) compressor lower retaining bolt.



12 . Remove the accessory drive belt tensioner bracket retaining bolt.

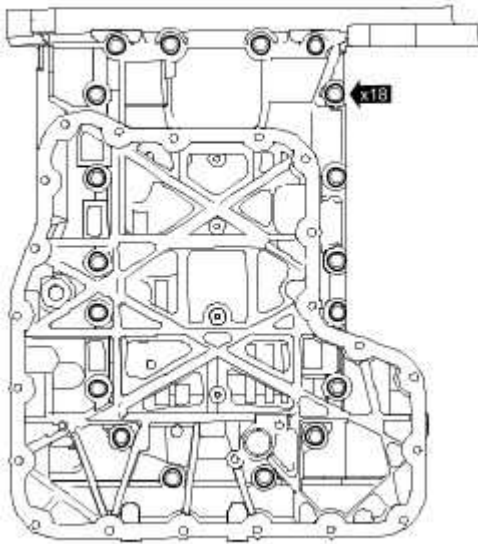


13 . Remove the charge air cooler pipe retaining bolt.



14 . Remove the oil pan extension.

▶ Remove and discard the gasket.



Installation

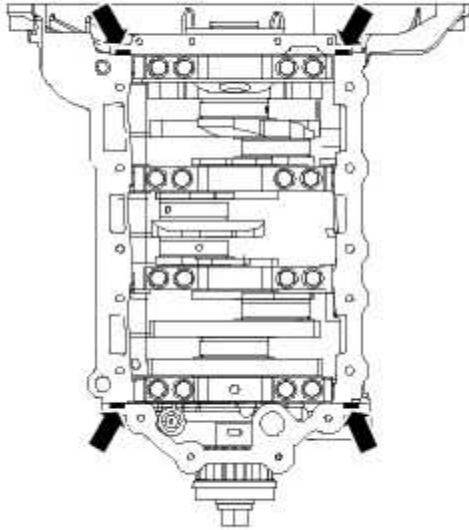
NOTE:

Make sure the oil pan extension mating faces are clean and dry.

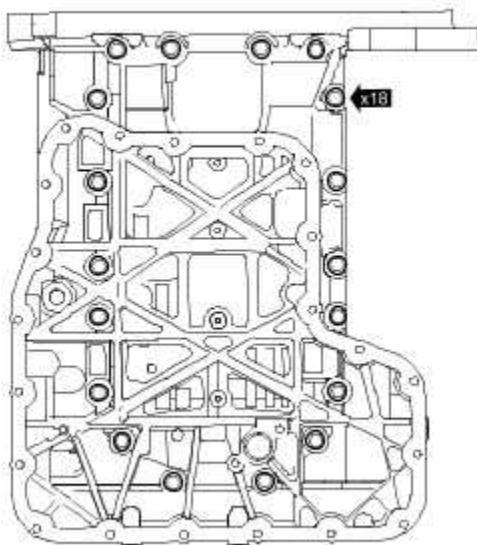
NOTE:

Install a new oil pan extension gasket.

- 1 . Apply a 8 mm bead of sealant to the cylinder block in the areas shown.
For additional information, refer to Specifications



- 2 . Loosely install all oil pan extension retaining bolts.



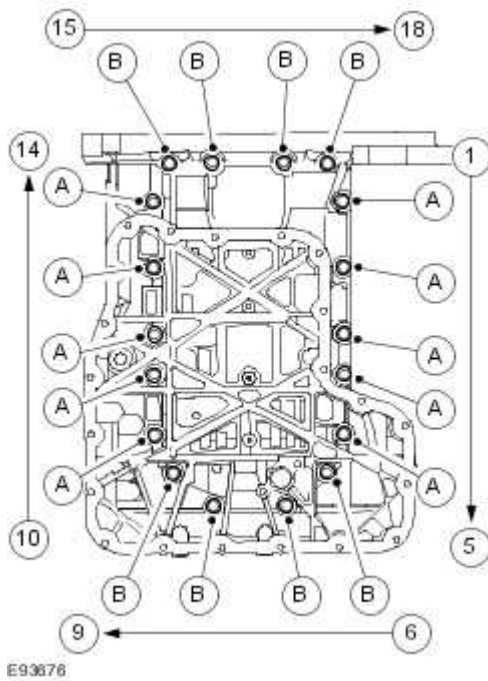
3 . NOTE:

The retaining bolts must be tightened within twenty minutes of applying the sealant.

Tighten the oil pan extension retaining bolts in the sequence shown.

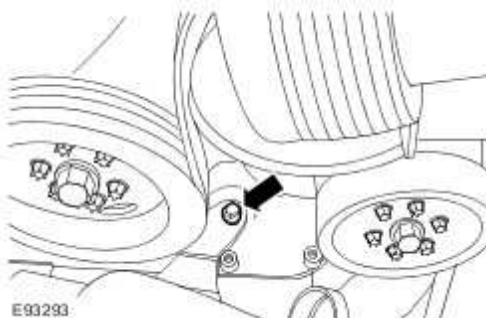
1) Tighten bolts A to 10 Nm (7 lb.ft). Tighten bolts B to 4 Nm (2 lb.ft).

2) Tighten bolts A to 24 Nm (18 lb.ft). Tighten bolts B to 10 Nm (7 lb.ft).



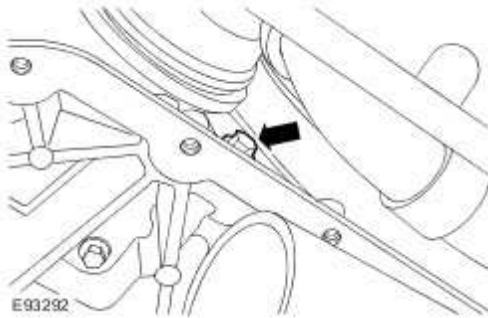
4 . Install the charge air cooler pipe retaining bolt.

▶ Tighten to 10 Nm (7 lb.ft).



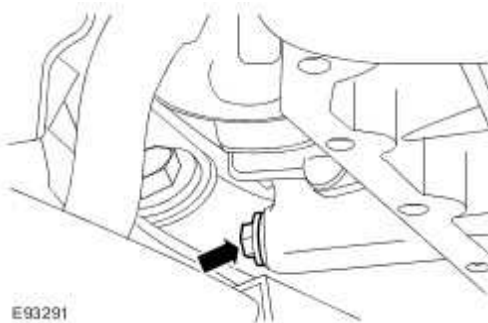
5 . Install the accessory drive belt tensioner bracket retaining bolt.

▶ Tighten to 24 Nm (18 lb.ft).



6 . Install the A/C compressor lower retaining bolt.

▶ Tighten to 24 Nm (18 lb.ft).

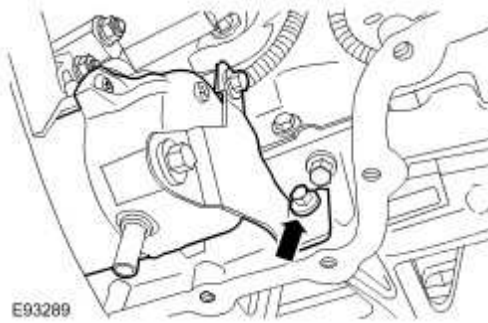


7 . Attach the oil temperature sensor harness to the cylinder block.

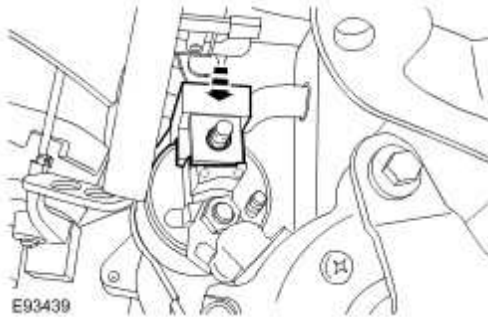


8 . Install the starter motor.

► Tighten to 24 Nm (18 lb.ft).

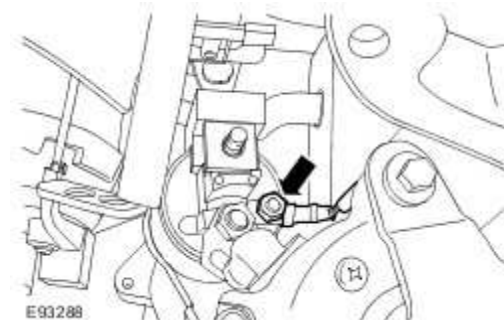


9 . Reposition the starter motor positive cable.



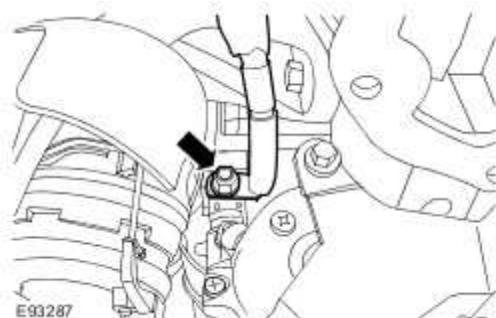
10 . Attach the starter motor solenoid harness.

► Tighten to 7 Nm (5 lb.ft).



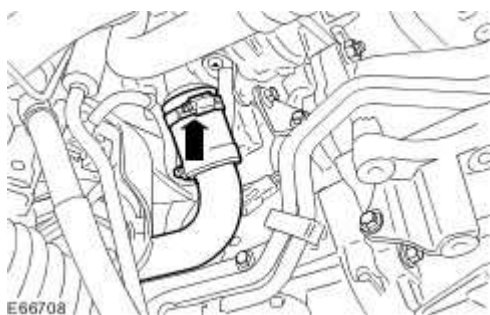
11 . Attach the starter motor positive cable.

► Tighten to 10 Nm (7 lb.ft).



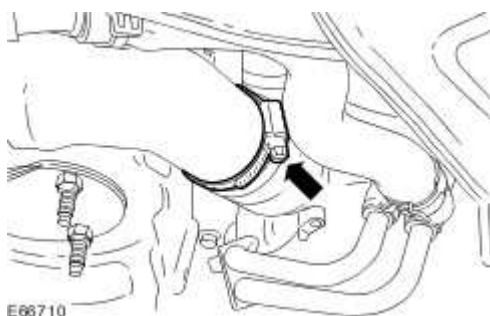
12 . Install the left-hand turbocharger outlet pipe to the turbocharger.

▶ Tighten to 5 Nm (4 lb.ft).



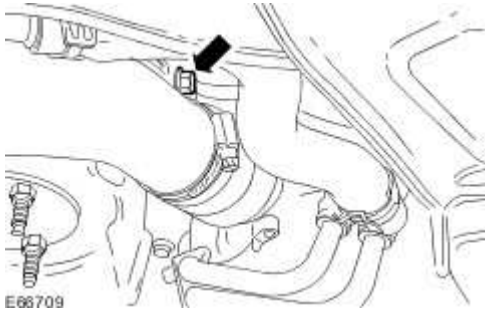
13 . Connect the left-hand turbocharger outlet pipe.

▶ Tighten to 5 Nm (4 lb.ft).



14 . Install the left-hand turbocharger outlet pipe retaining bolt.

► Tighten to 24 Nm (18 lb.ft).



15 . Install the oil pan.

For additional information, refer to Oil Pan (12.60.44)

16 . Install the transmission.

For additional information, refer to Transmission - 2.7L Diesel (44.20.01)

Oil Pump (12.60.26)

Removal

- 1 . Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

- 2 . Remove the crankshaft front oil seal.

For additional information, refer to Crankshaft Front Seal (12.21.14)

3




WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

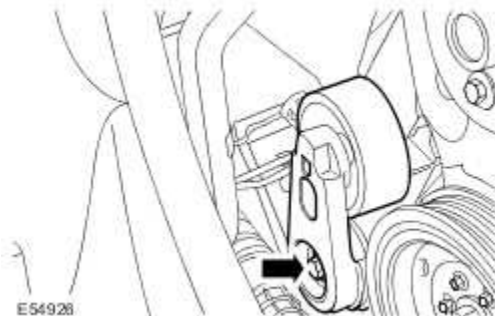
Raise and support the vehicle.

- 4 . Remove the oil pan extension.

For additional information, refer to Oil Pan Extension (12.60.48)

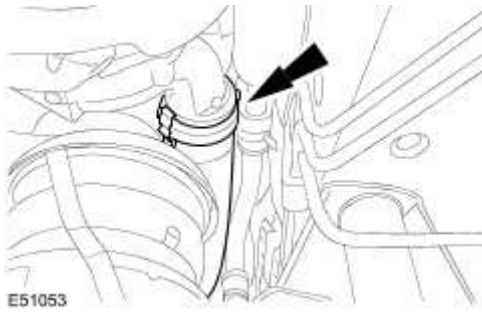
- 5 . Remove the accessory drive belt tensioner.

 Remove the bolt.



- 6 . Release the right hand turbocharger outlet pipe from the turbocharger.

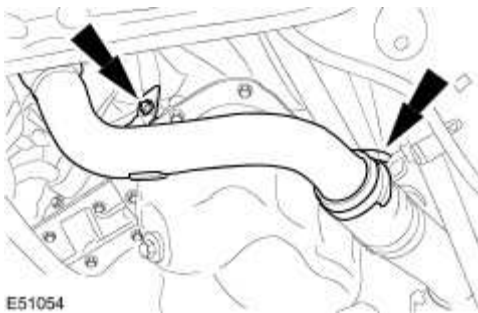
▶ Release the clip.



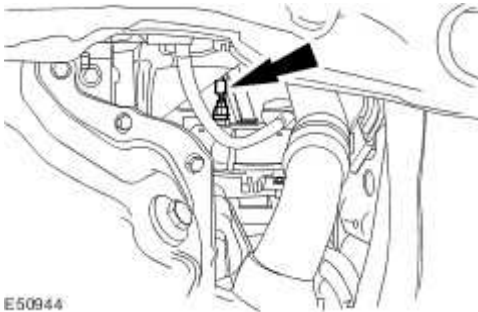
7 . Remove the right hand turbocharger outlet pipe.

▶ Remove the bolt.

▶ Release the clip.



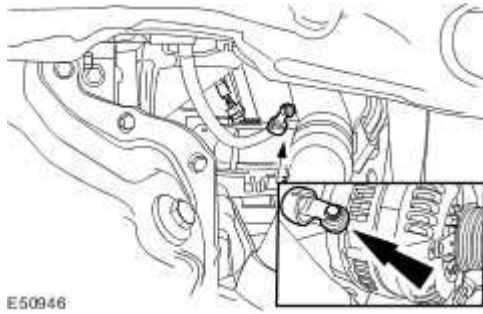
8 . Disconnect the generator electrical connector.



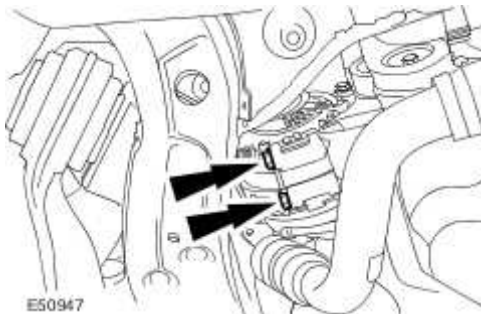
9 . Disconnect the battery positive cable from the generator.

▶ Reposition the battery positive cable connector cover.

- ▶ Remove the nut.

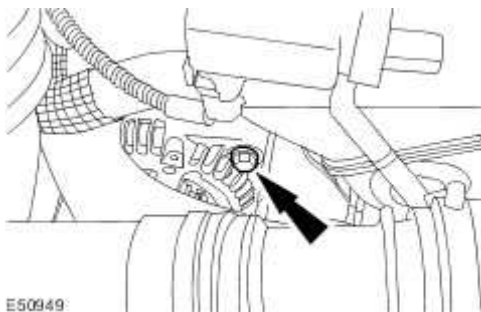


- 10 . Remove the 2 generator lower bolts.



- 11 . Release the generator.

- ▶ Remove the generator upper bolt.
- ▶ Reposition the generator.
- ▶ Using a suitable tie strap, secure the generator to the front subframe.

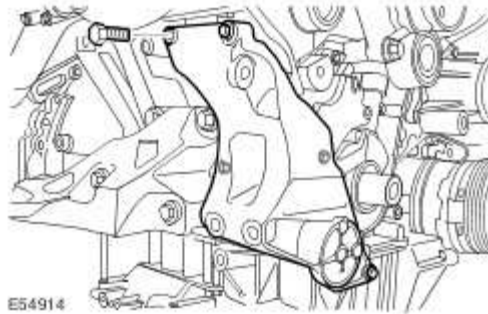


12 NOTE:

The generator mounting bracket upper rear bolt cannot be fully removed until the generator mounting bracket has been detached from the engine.

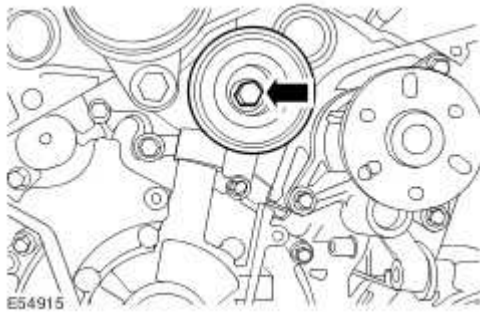
Remove the generator mounting bracket.

▶ Remove the 4 bolts.



13 . Remove the timing belt idler pulley.

▶ Remove the bolt.



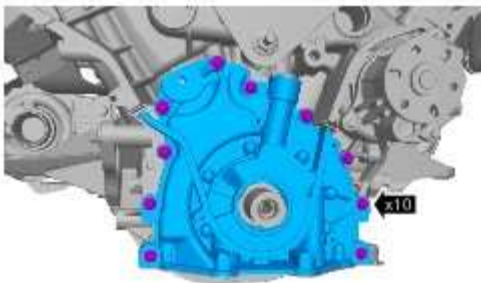
14 . Remove the 2 timing belt cover sealing strips.



E118536

15 . Remove the oil pump.

- ▶ Remove the 10 bolts.
- ▶ Remove and discard the gasket.



E118537


Installation

1 . Prime the oil pump.




- 1) Fill the orifice shown with 20 ml of engine oil.
For additional information, refer to Specifications
- 2) Rotate the oil pump drive 2 complete turns.



2.  **CAUTION:** Make sure that the mating faces are clean and free of foreign material.

 **CAUTION:** Make sure the gasket is installed correctly.

Install the oil pump.

-  Clean the component mating faces.
-  Install a new gasket.
-  Lightly tighten the bolts in the positions shown.



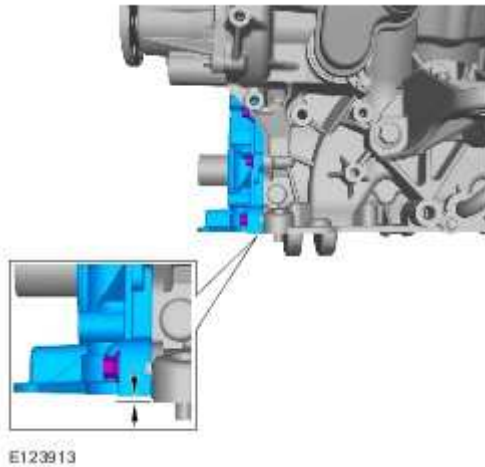
3.  **CAUTION:** Make sure the base of the oil pump is aligned within 0.2 mm of the base

of the engine block. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

Vehicles fitted with oil pumps without dowels.

Check the oil pump to engine block alignment.

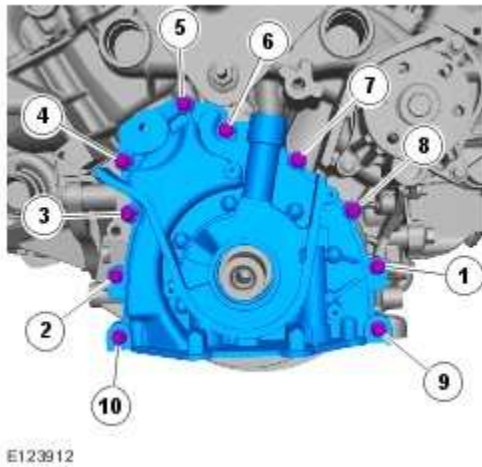


4 . NOTE:

All vehicles.

Secure the oil pump.

▶ Tighten the 10 bolts to 10 Nm in the sequence shown.



5 . Install the timing belt cover sealing strips.

6 . Install the timing belt idler pulley.

▶ Tighten the bolt to 45 Nm.

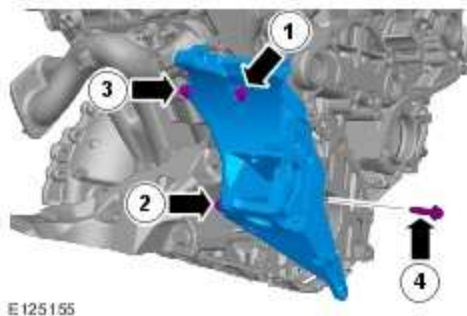
7 NOTE:

The generator mounting bracket upper rear bolt must be installed to the generator mounting bracket before the generator bracket is installed to the engine.

Install the generator mounting bracket.

▶ Loosely install the 4 bolts.

▶ Tighten the 4 bolts in the sequence shown to 23 Nm.



8 . Install the generator.

▶ Tighten the 3 bolts to 47 Nm.

9 . Connect the generator electrical connections.

▶ Attach the battery positive cable and tighten the nut to 12 Nm.

▶ Reposition the battery positive cable connector cover.

▶ Connect the electrical connection.

10 . Install the RH turbocharger outlet pipe.

▶ Secure the 2 clips.

11 . Install the accessory drive belt tensioner.

▶ Tighten the bolt to 47 Nm.

12 . Install the oil pan extension.

For additional information, refer to Oil Pan Extension (12.60.48)

13 . Install the crankshaft front oil seal.

For additional information, refer to Oil Pan Extension (12.60.48)

14 . Connect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

Timing Belt

Special Service Tools



Check pin - camshaft pulleys
303-1132



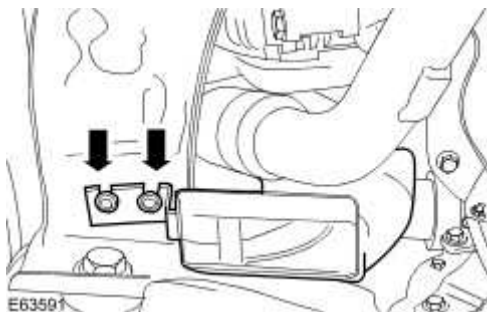
Timing pin - camshaft pulleys
303-1126



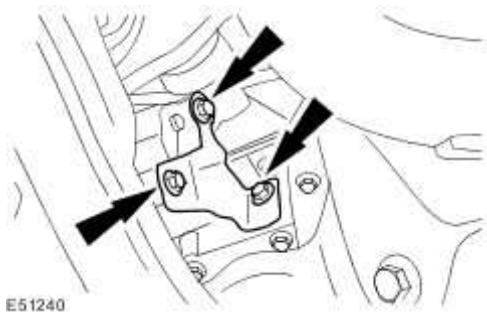
Timing pin - flexplate automatic transmission
303-1117

Removal

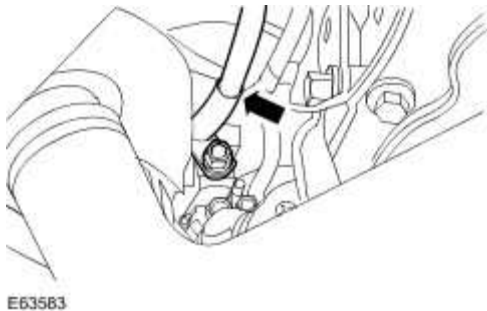
- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Remove the timing belt cover.
For additional information, refer to Timing Belt Cover
- 3 . Remove the generator cooling duct (if equipped).



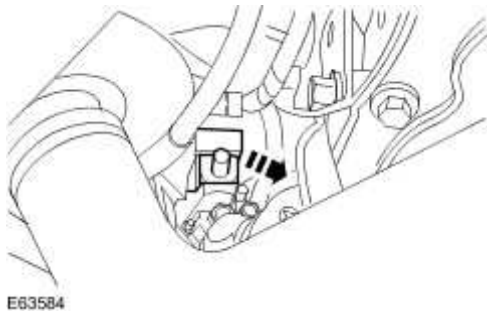
4 . Remove the starter motor retaining bracket.



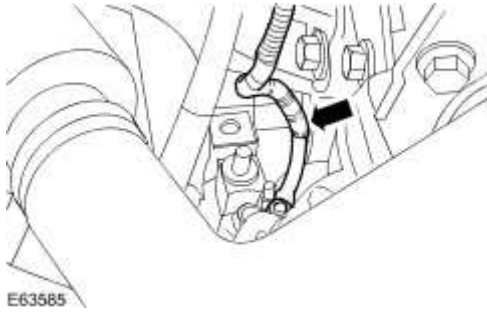
5 . Detach the starter motor positive cable.



6 . Reposition the starter motor positive cable.



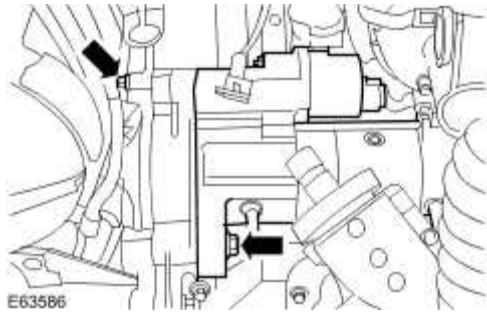
7 . Detach the starter motor solenoid harness.



8 . **NOTE:**

Steering shaft shown removed for clarity.

Detach and reposition the starter motor.



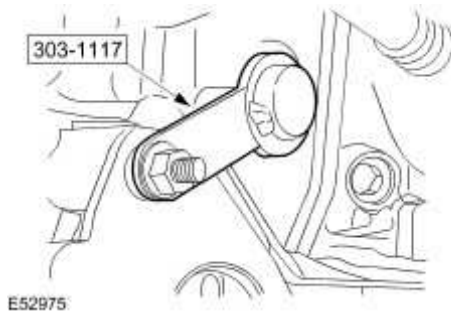
9 . **NOTE:**

Remove the locking pin access grommet.

Align the timing pin hole.

▶ Rotate the crankshaft clockwise.

10 . Using the special tool, lock the flexplate.



11 . Lower the vehicle.

12



CAUTION: If the camshafts are not aligned to the correct position, remove the special tool (303-1117) and rotate the crankshaft 180 degrees.

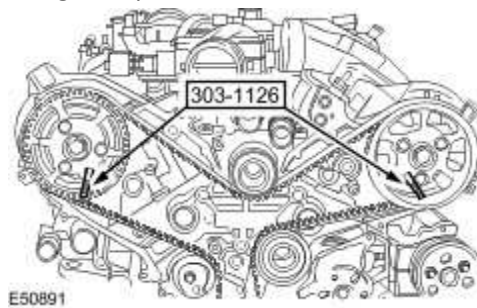
NOTE:

Check that the left-hand camshaft alignment hole is at the 7 o'clock position and that the right-hand camshaft alignment hole is at the 5 o'clock position.

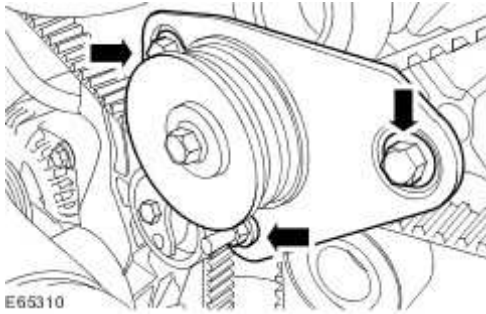
NOTE:

Engine shown removed for clarity.

Using the special tools, lock the camshaft pulleys.



13 . Remove the accessory drive belt pulley and bracket assembly.



14



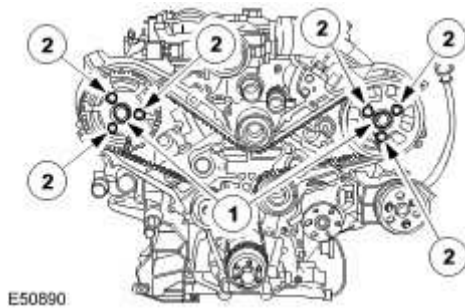
- **CAUTION:** The camshaft pulley hub must be counter held while undoing the camshaft pulley hub retaining bolts. Failure to follow this instruction may result in damage to the special tools and the engine.

NOTE:

Engine shown removed for clarity.

Undo but do not remove the camshaft pulley securing bolts.

- 1) Counter hold the camshaft pulley hub.
- 2) Undo but do not remove the camshaft pulley retaining bolts.



15 . Remove and discard the timing belt tensioner.



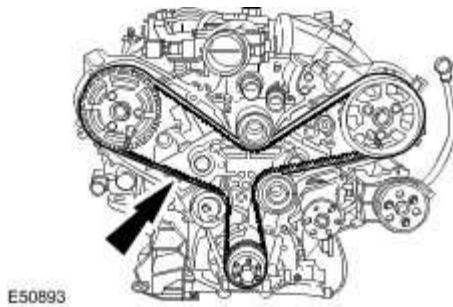
Release the timing belt tensioner.



16 . NOTE:

Engine shown removed for clarity.

Remove and discard the timing belt.



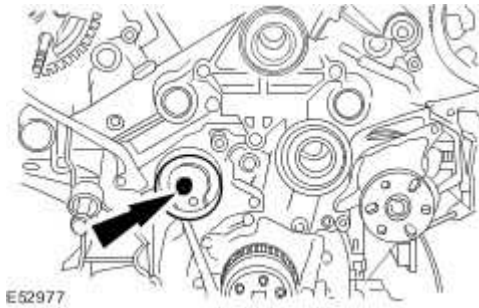
Installation

1 . Rotate both camshaft pulleys fully clockwise.



2 . Install a new timing belt tensioner.

▶ Do not fully tighten the retaining bolt.



3



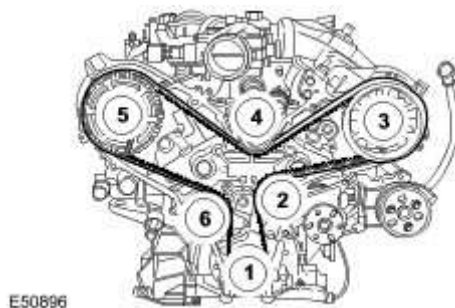
CAUTION: Make sure that the timing belt slack is at the timing belt tensioner. Failure to follow this instruction may result in damage to the engine.

NOTE:

Engine shown removed for clarity.

Install the timing belt in the sequence shown.

- 1) Install the timing belt to the crankshaft pulley.
- 2) Attach the timing belt to the idler pulley.
- 3) Attach the timing belt to the left-hand camshaft pulley.
- 4) Attach the timing belt to the idler pulley.
- 5) Attach the timing belt to the right-hand camshaft pulley.
- 6) Attach the timing belt to the timing belt tensioner.



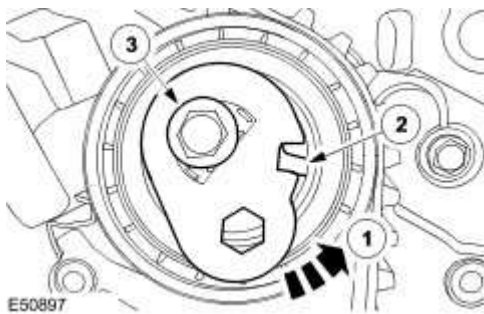
4



CAUTION: Make sure the timing belt tensioner window is correctly aligned. Failure to follow this instruction may result in damage to the engine.

Tension the timing belt.

- 1) Rotate the tensioner.
- 2) Make sure the tensioner window is aligned.
- 3) Tighten to 24 Nm.



5



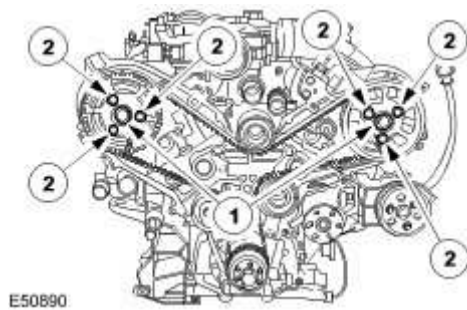
CAUTION: The camshaft pulley hub must be counter held while tightening the camshaft pulley hub retaining bolts. Failure to follow this instruction may result in damage to the special tools and the engine.

NOTE:

Engine shown removed for clarity.

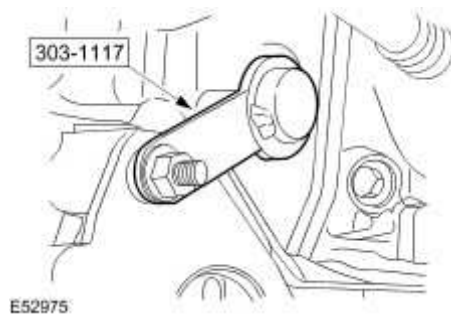
Fully tighten the camshaft pulley retaining bolts.

- 1) Counter hold the camshaft pulley hub.
- 2) Tighten to 23 Nm.



6 . Raise the vehicle.

7 . Remove the special tool.

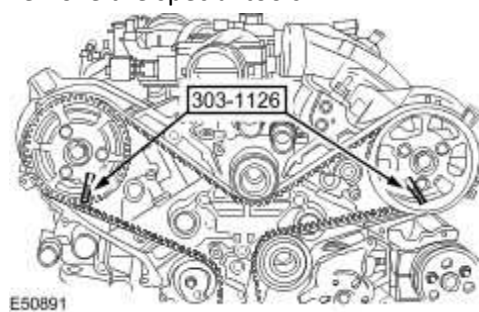


8 . Lower the vehicle.

9 . **NOTE:**

Engine shown removed for clarity.

Remove the special tools.



10

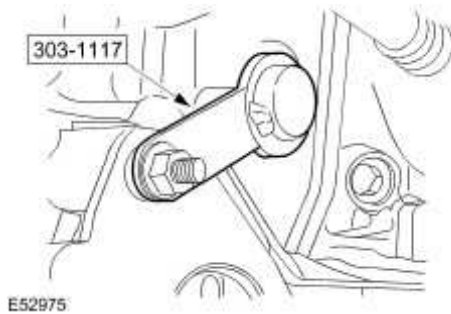


- **CAUTION: Do not rotate the crankshaft counter clockwise. Failure to follow this instruction may result in damage to the engine.**

Rotate the crankshaft clockwise two complete turns.

11 . Raise the vehicle.

12 . Using the special tool, lock the flexplate.



13 . Lower the vehicle.

14

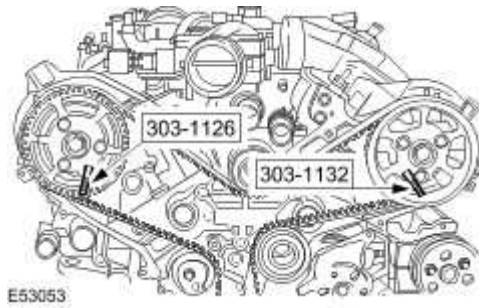


- **CAUTION: If the camshafts are misaligned repeat the timing belt installation procedure. Failure to follow this instruction may result in damage to the engine.**

NOTE:

Engine shown removed for clarity.

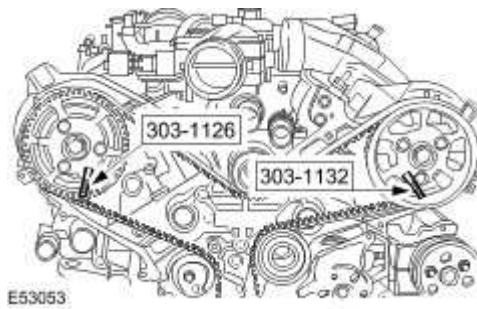
Using the special tools, make sure the camshafts are aligned.



15 . **NOTE:**

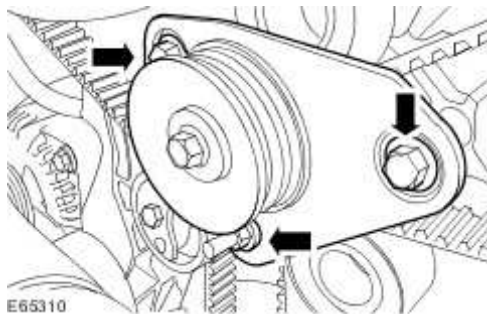
Engine shown removed for clarity.

Remove the special tools.



16 . Install the accessory drive belt pulley and bracket assembly.

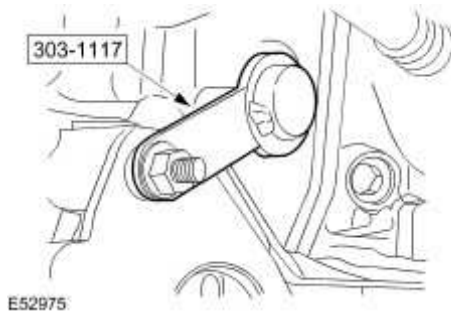
► Tighten to 80 Nm.



17 . Raise the vehicle.

18 . Remove the special tool.

▶ Install the grommet.

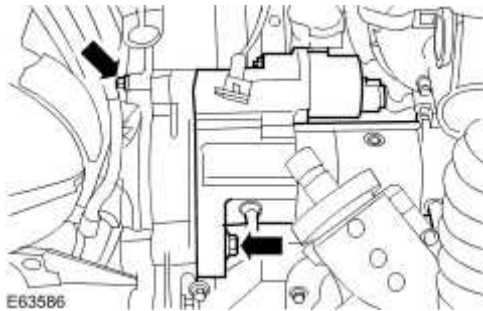


19 . **NOTE:**

Steering shaft shown removed for clarity.

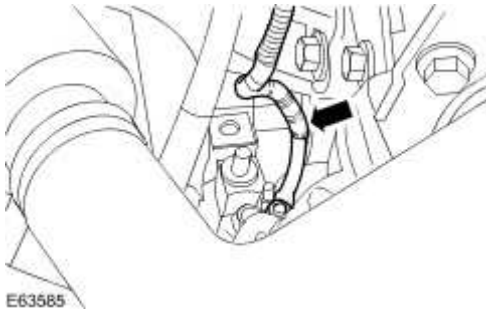
Install the starter motor.

▶ Tighten to 48 Nm.



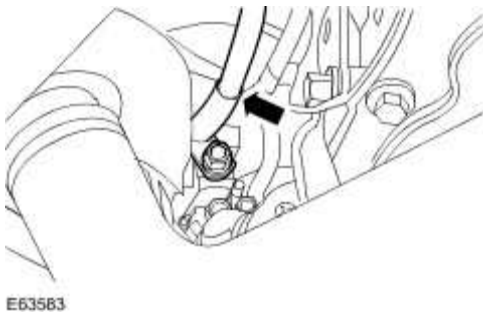
20 . Attach the starter motor solenoid harness.

▶ Tighten to 7 Nm.



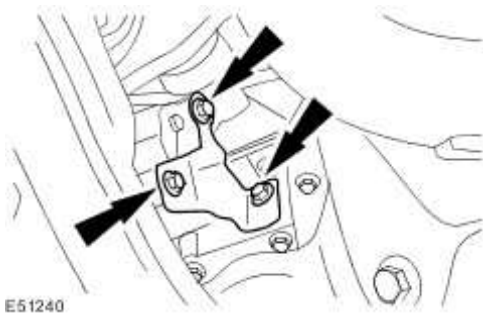
21 . Attach the starter motor positive cables.

► Tighten to 10 Nm.

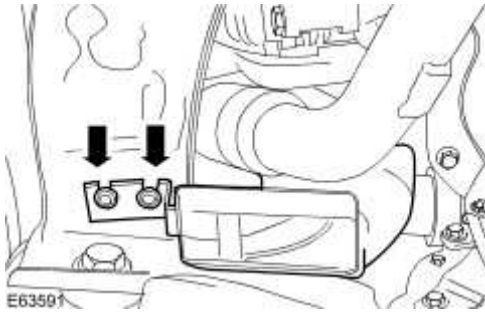


22 . Install the starter motor retaining bracket.

► Tighten to 23 Nm.



23 . Install the generator cooling duct (if equipped).



- 24 . Install the timing belt cover.
For additional information, refer to Timing Belt Cover

- 25 . Connect the battery ground cable.
For additional information, refer to Battery Connect (86.15.15)

Timing Belt Cover

Special Service Tools



303-703

Accessory belt detensioner

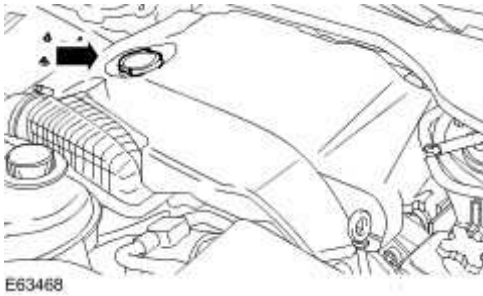
303-703

Removal

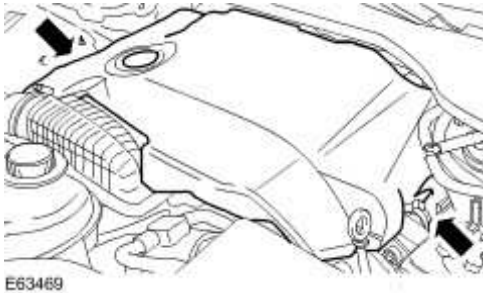
- 1 . Remove the air cleaner.

For additional information, refer to Air Cleaner (19.10.05)

- 2 . Remove the oil filler cap.



- 3 . Remove the engine cover.



- 4 . Install the engine oil filler cap to prevent foreign material entering the valve cover.

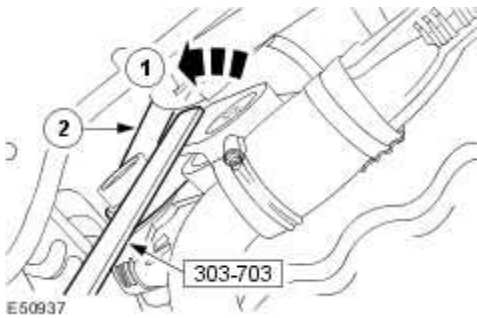
- 5 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

6 Detach the accessory drive belt.

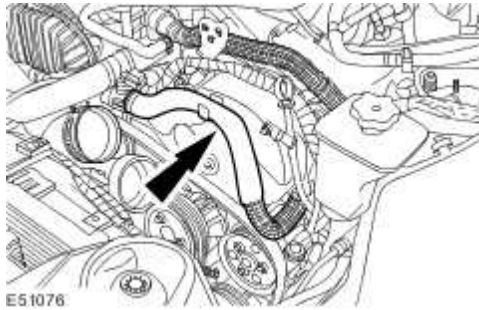
1) Using the special tool, rotate the accessory drive belt tensioner counter clockwise.

2) Remove the accessory drive belt.

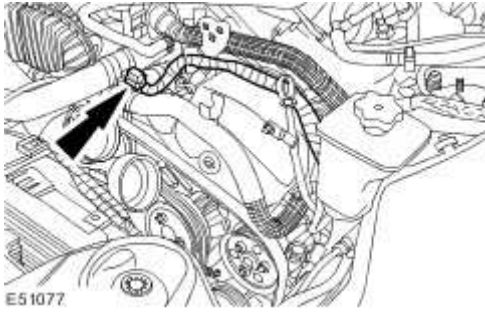


7 . Lower the vehicle.

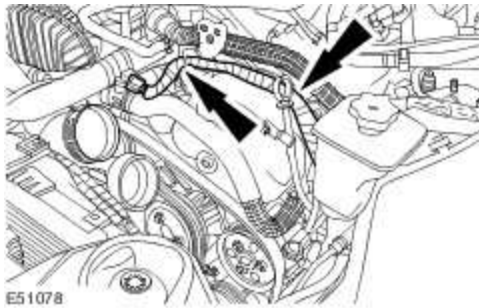
8 . Detach the coolant hose.



9 . Disconnect the coolant temperature sensor electrical connector.

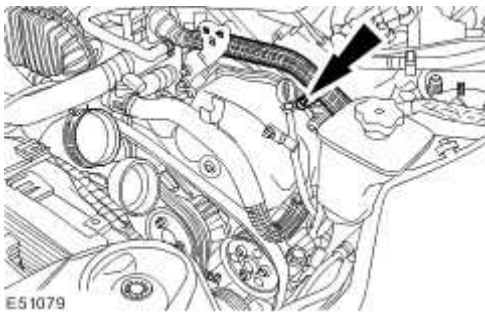


10 . Detach the coolant temperature sensor wiring harness.



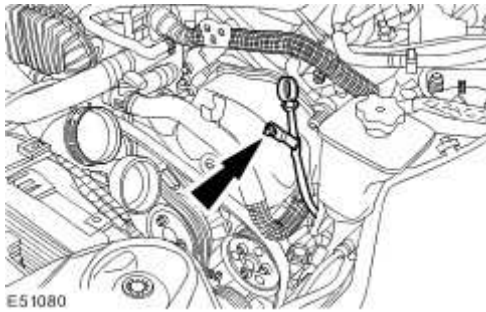
11 . Detach the exhaust gas recirculation (EGR) valve tube.

► Remove the retaining bolt.

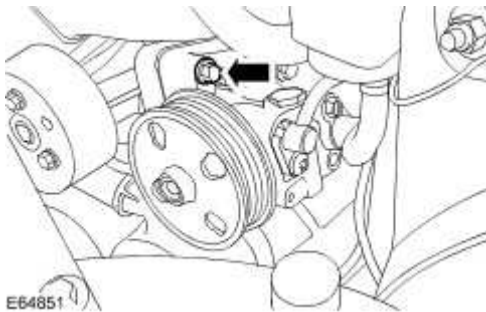


12 . Detach the oil level indicator tube.

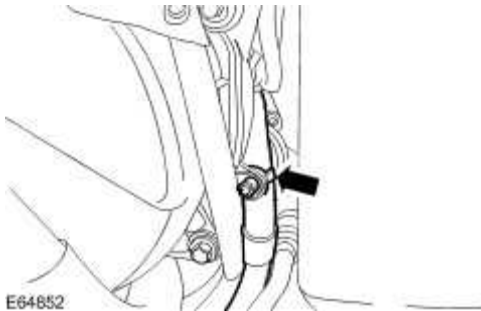
► Remove the retaining bolt.



13 . Loosen the power steering pump retaining bolt.

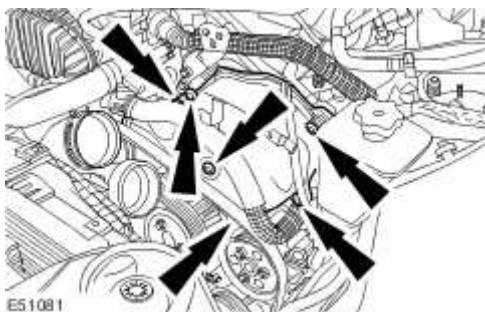


14 . Detach the wiring harness.

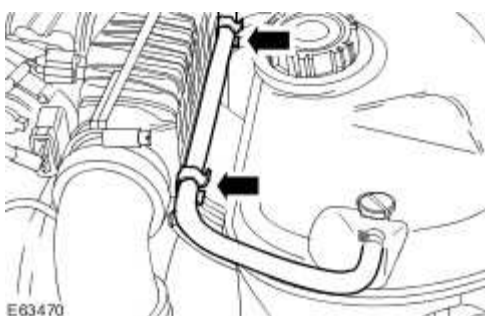


15 . Remove the left-hand timing cover.

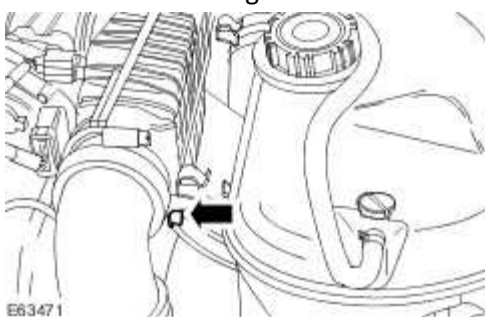
➤ Remove and discard the gasket.



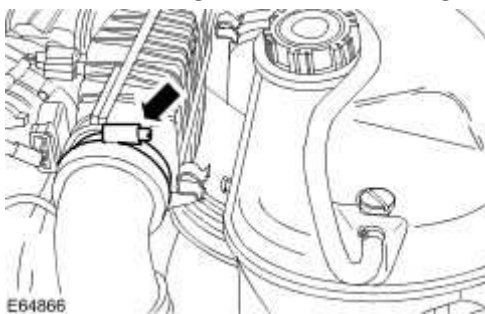
16 . Detach the coolant hose.



17 . Remove the retaining bolt.



18 . Loosen the charge air cooler retaining clip.

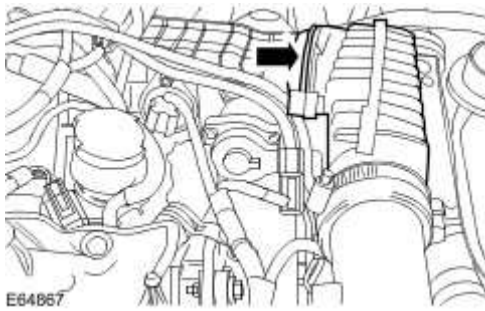


19 . Disconnect the electrical connectors.

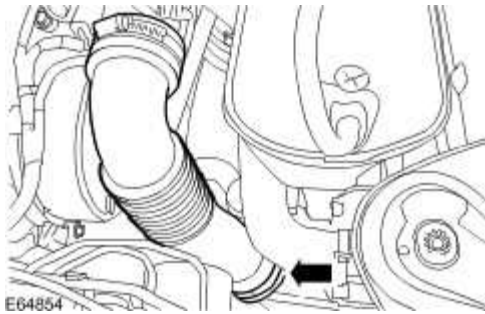


20 . Remove the intake air shutoff throttle elbow.

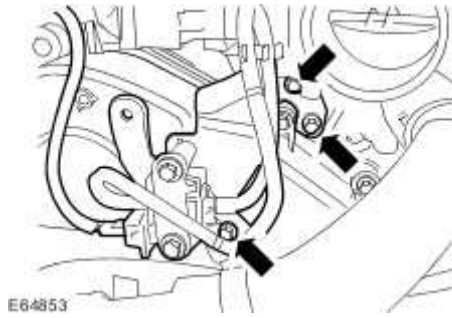
► Release the retaining clip.



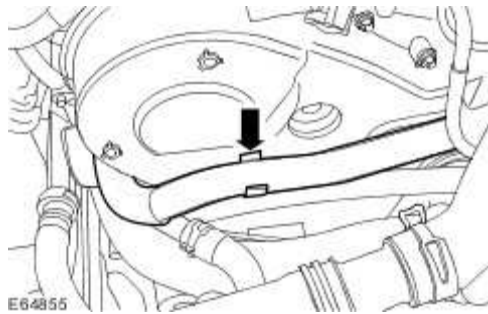
21 . Remove the charge air cooler pipe.



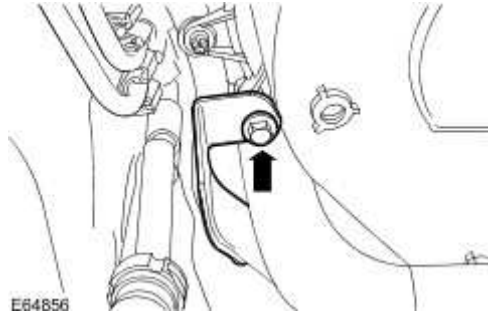
22 . Detach the port deactivation valve retaining bracket.



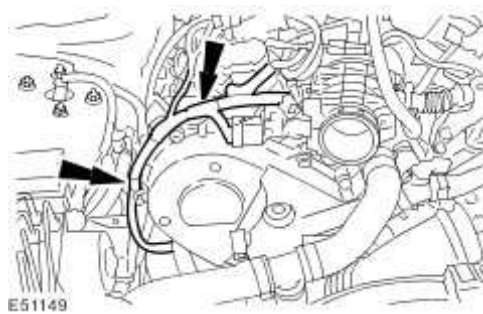
23 . Detach the coolant hose.



24 . Detach the EGR cooler pipe.



25 . Detach the air temperature sensor wiring harness.



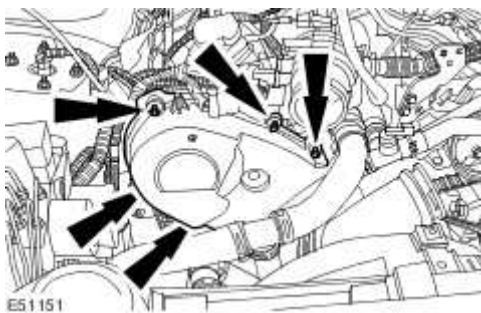
26 . Detach the EGR valve tube.

▶ Remove the retaining bolt.



27 . Remove the right-hand timing cover.

▶ Remove and discard the gaskets



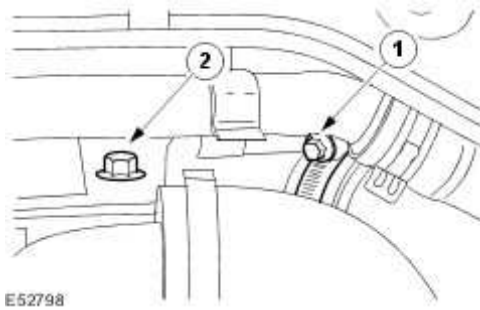
28 . Remove the crankshaft vibration damper.

For additional information, refer to Crankshaft Vibration Damper (12.21.09)

29 . Detach the charge air cooler hose.

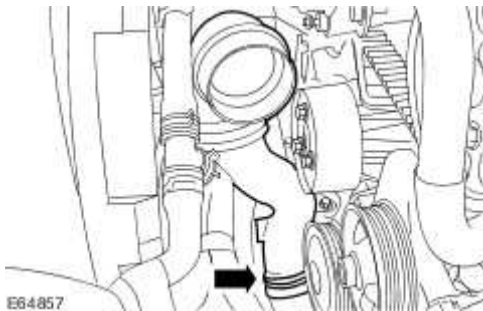
1) Remove the hose clamp.

2) Remove the retaining bolt.



30 . Lower the vehicle.

31 . Remove the charge air cooler pipe.



32 . Detach the turbocharger inlet pipe.

▶ Remove the retaining nut.



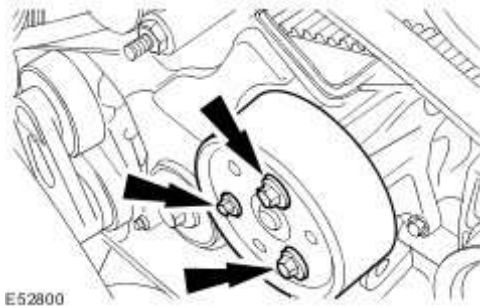
33 . **NOTE:**

Lock the water pump pulley with suitable 6 mm bar.

NOTE:

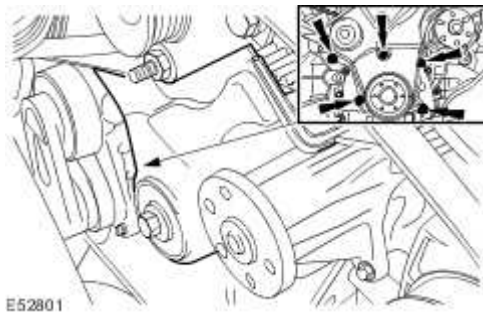
Discard the water pump pulley retaining bolts.

Remove the water pump pulley.



34 . Remove the lower timing cover.

▶ Remove and discard the gasket.



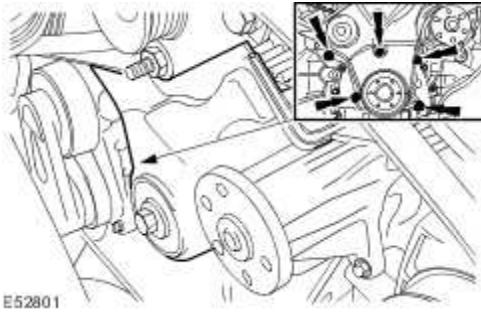
Installation

1 . **NOTE:**

Install a new gasket.

Install the lower timing cover.

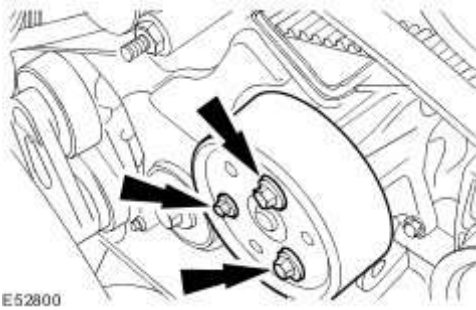
▶ Tighten to 10 Nm.



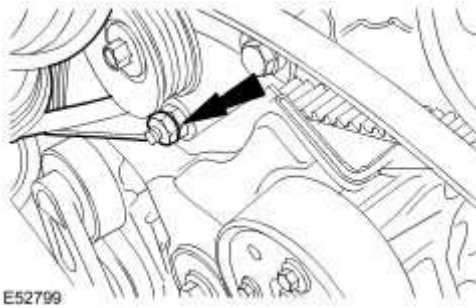
2 . Install the water pump pulley.

▶ Install new water pump pulley retaining bolts.

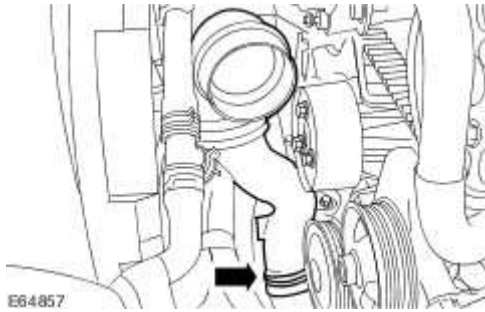
▶ Tighten to 24 Nm.



3 . Attach the turbocharger inlet pipe.



4 . Attach the charge air cooler pipe.

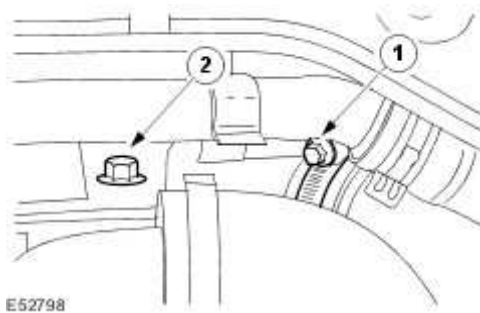


5 . Raise the vehicle.

6 . Attach the charge air cooler hose.

1) Tighten to 4 Nm.

2) Tighten to 8 Nm.



7 . Install the crankshaft vibration damper.

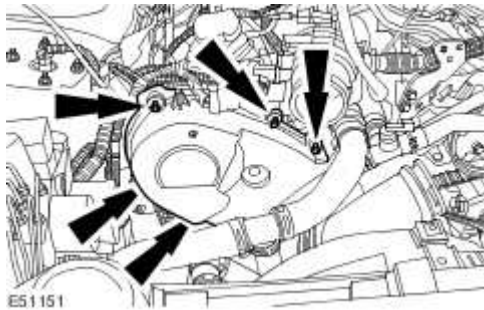
For additional information, refer to Crankshaft Vibration Damper (12.21.09)

8 . **NOTE:**

Install a new gasket.

Install the right-hand timing cover.

▶ Tighten to 10 Nm.



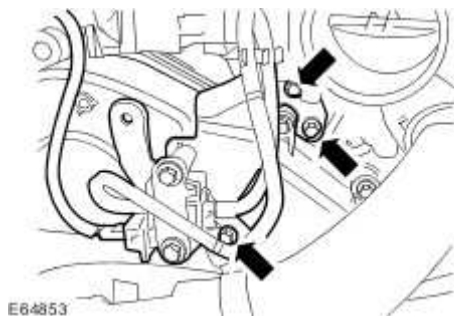
9 . Attach the EGR valve tube.

▶ Tighten to 3 Nm.

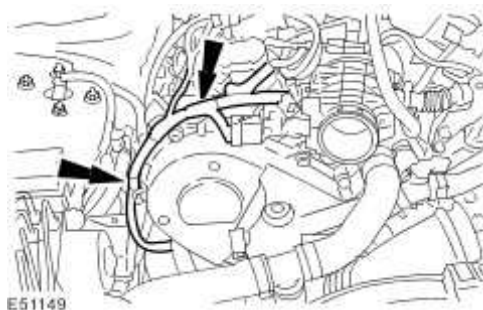


10 . Attach the port deactivation valve retaining bracket.

▶ Tighten to 8 Nm.

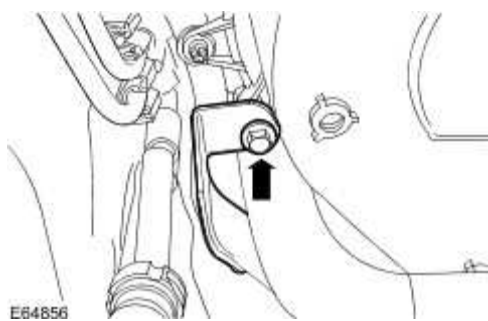


11 . Attach the air temperature sensor wiring harness.

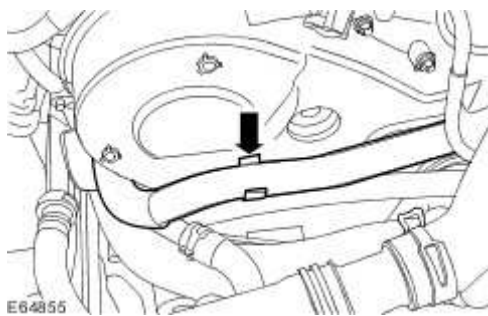


12 . Attach the EGR cooler pipe.

► Tighten to 10 Nm.

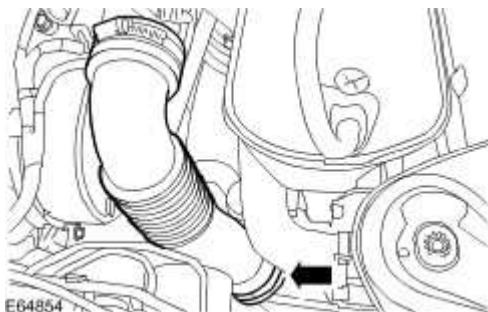


13 . Attach the coolant hose.



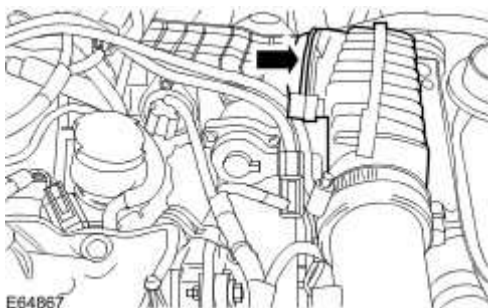
14 . Install the charge air cooler pipe.

► Tighten to 8 Nm.



15 . Install the intake air shutoff throttle elbow.

► Release the retaining clip.

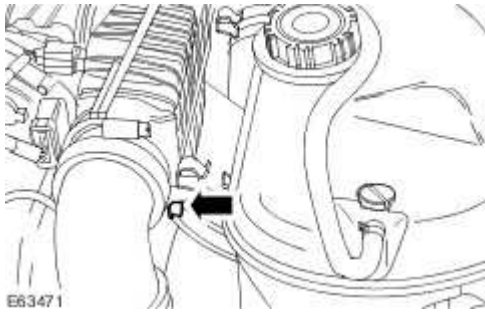


16 . Connect the electrical connectors.

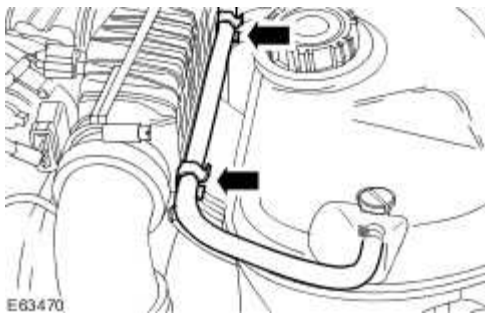


17 . Install the retaining bolt.

► Tighten to 10 Nm.



18 . Attach the coolant hose.

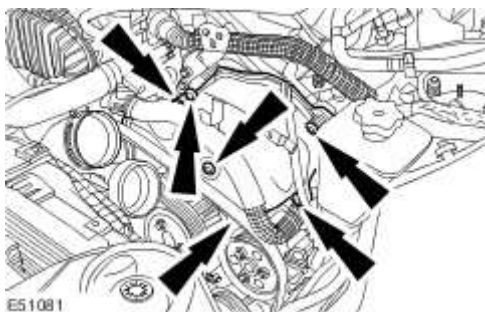


19 . **NOTE:**

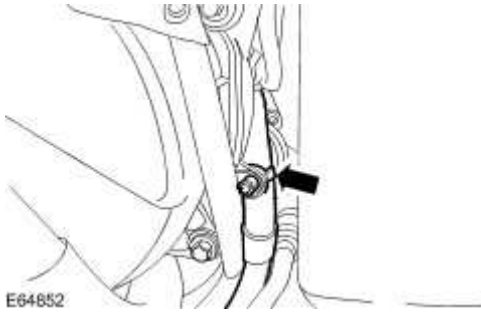
Install a new gasket.

Install the left-hand timing cover.

► Tighten to 10 Nm.

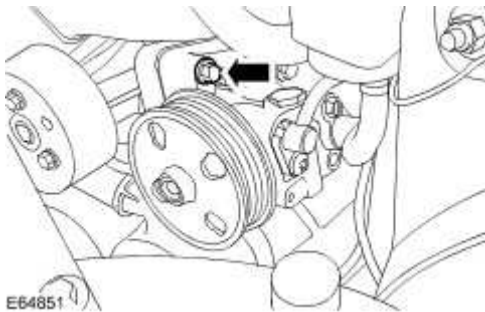


20 . Attach the wiring harness.



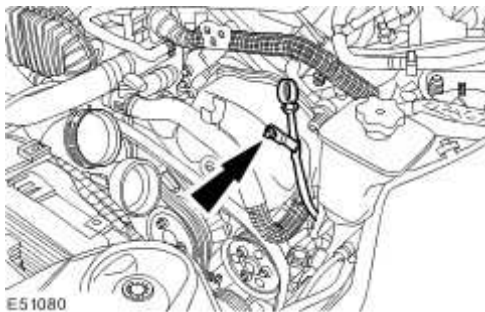
21 . Install the power steering pump bolt.

▶ Tighten to 22 Nm.



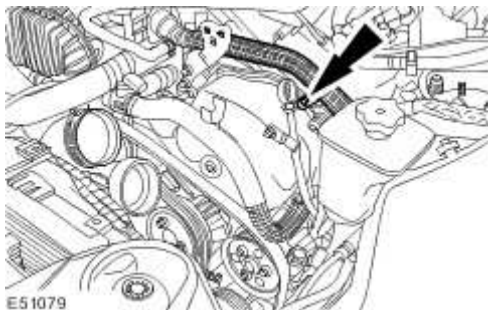
22 . Attach the oil level indicator tube.

▶ Tighten to 3 Nm.

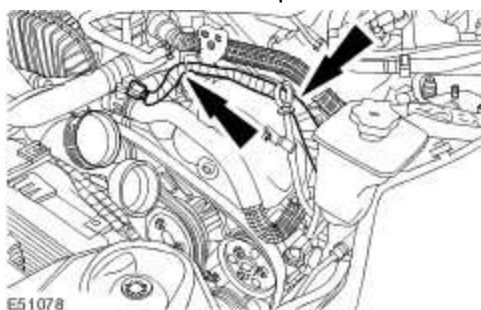


23 . Attach the EGR valve tube.

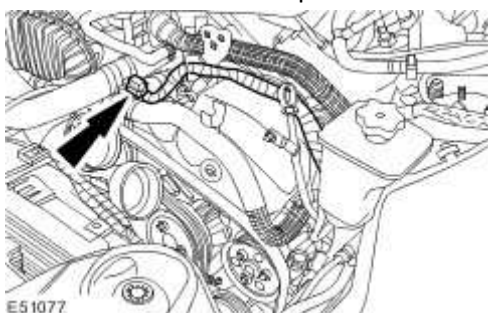
▶ Tighten to 3 Nm.



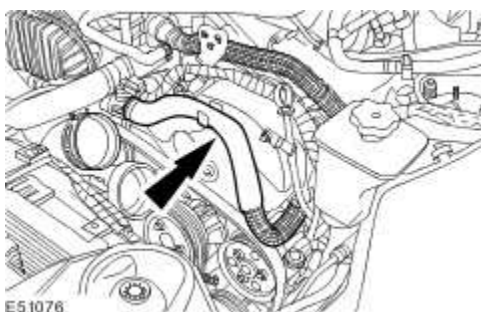
24 . Attach the coolant temperature sensor wiring harness.



25 . Connect the coolant temperature sensor electrical connector.

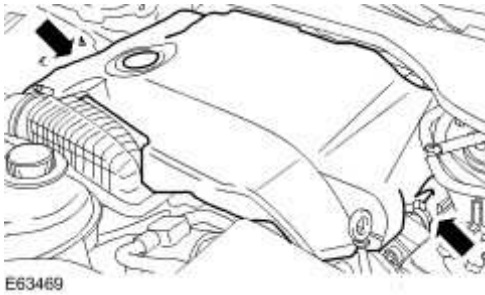


26 . Attach the coolant hose.

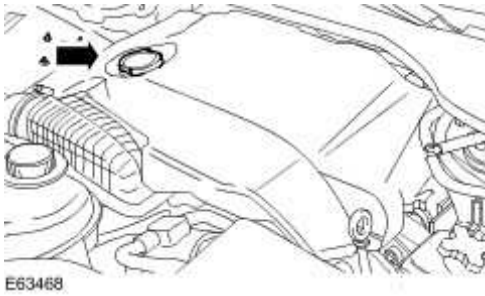


27 . Remove the engine oil filler cap.

28 . Install the engine cover.



29 . Install the oil filler cap.

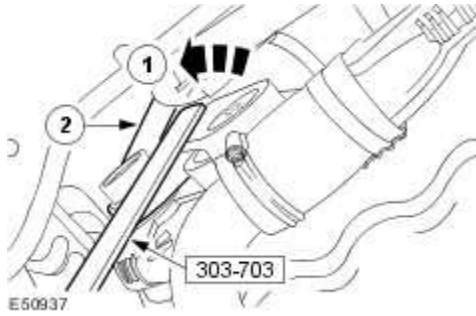


30 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

31 Attach the accessory drive belt.

- 1) Using the special tool, rotate the accessory drive belt tensioner counter clockwise.
- 2) Install the accessory drive belt.



32 . Lower the vehicle.

33 . Install the air cleaner.

For additional information, refer to Air Cleaner (19.10.05)

Valve Cover LH (12.29.43)

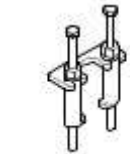
Special Service Tools



303-703

Accessory belt detensioner

303-703



E52726

Fuel injector remover

303-1127

Removal



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high-pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow this instruction may result in personal injury.



WARNING: Do not carry out any repairs to the fuel injection system with the engine running. The fuel pressure within the system can be as high as 1650 bar. Failure to follow this

instruction may result in personal injury.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Do not disconnect the fuel injector electrical connectors with the engine running. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any exposed ports.

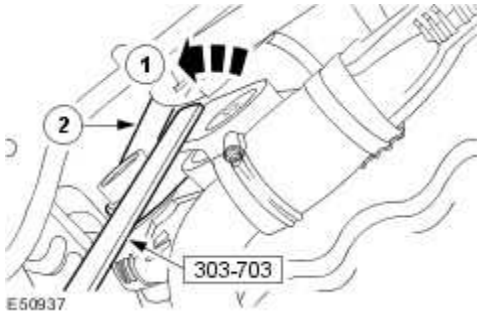
- 1 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

- 2 Detach the accessory drive belt.

- 1) Using the special tool, rotate the accessory drive belt tensioner counter clockwise.

- 2) Remove the accessory drive belt.

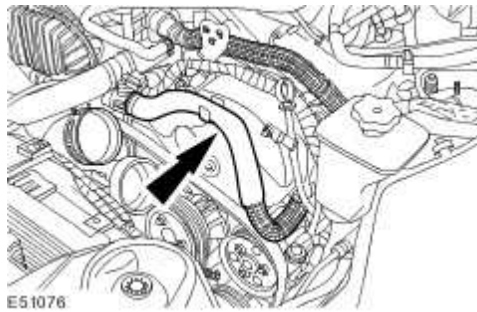


3 . Lower the vehicle.

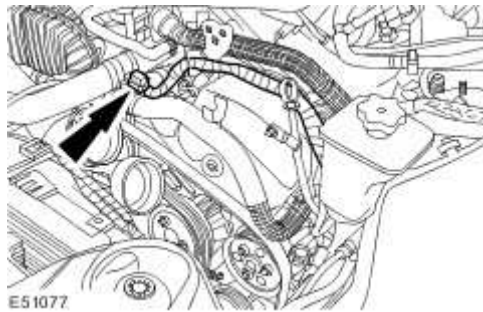
4 . Remove the air cleaner.

For additional information, refer to Air Cleaner (19.10.05)

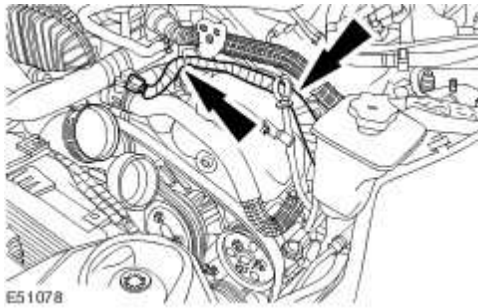
5 . Detach the coolant hose.



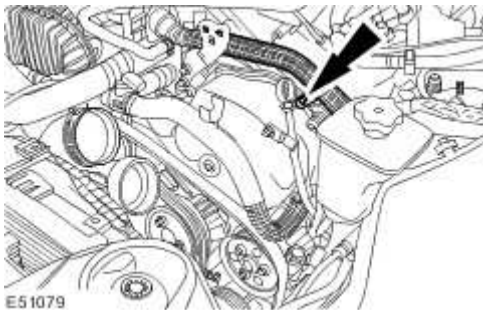
6 . Disconnect the engine coolant temperature (ECT) sensor electrical connector.



7 . Detach the ECT sensor wiring harness.

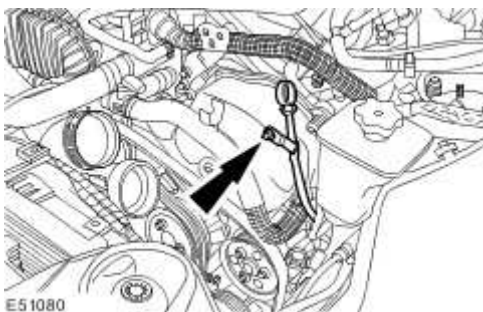


8 . Detach the exhaust gas recirculation (EGR) valve tube.

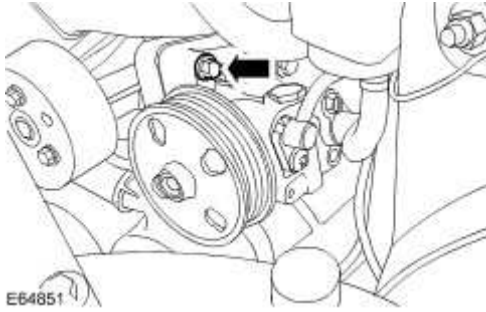


9 . Detach the oil level indicator tube.

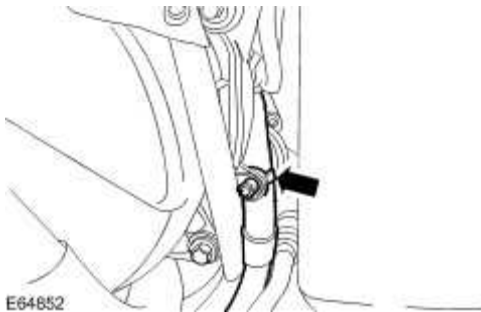
▶ Remove the retaining bolt.



10 . Loosen the power steering pump retaining bolt.

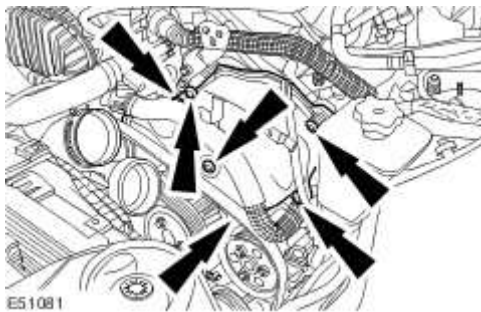


11 . Detach the wiring harness.



12 . Remove the left-hand timing cover.

▶ Remove and discard the gasket.



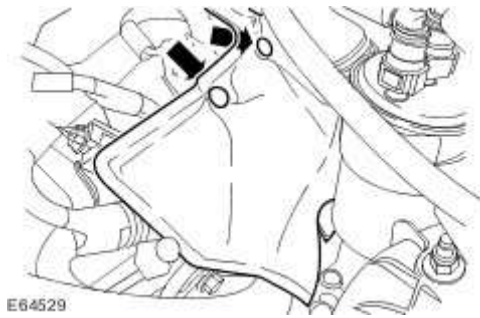
13 . Remove the cowl vent screen.

For additional information, refer to Cowl Vent Screen (76.10.01)

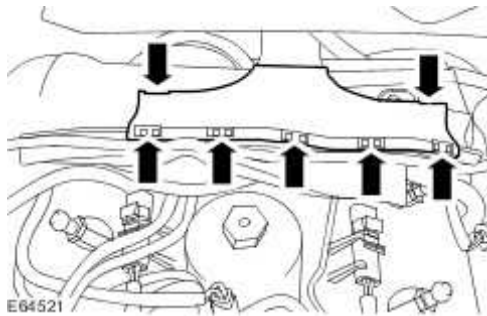
14 Remove the exhaust gas recirculation (EGR) valve outlet tubes.

. For additional information, refer to Exhaust Gas Recirculation (EGR) Valve Outlet Tube (17.45.11)

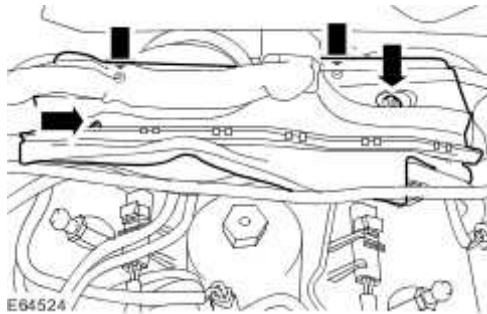
- 15 . Remove the injector sound proofing.



- 16 . Remove the engine harness cover.



- 17 . Remove the engine harness casing.



- 18

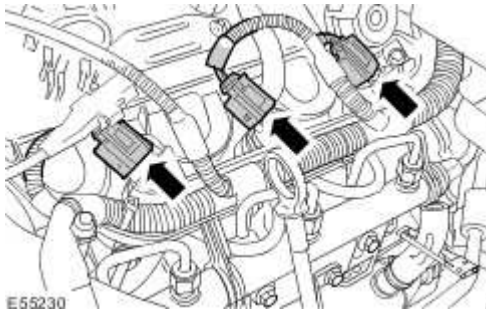


CAUTION: Protect the fuel injector electrical connectors with lint-free material to prevent contamination from the cleaning fluid. Failure to follow this instruction may result in serious damage to the vehicle.

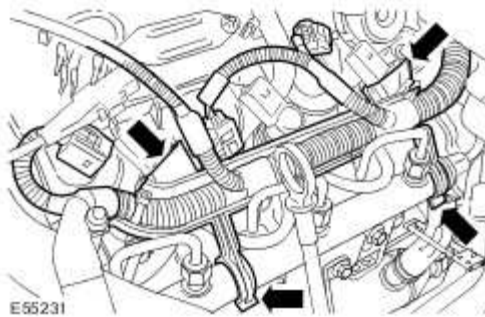
Using the pneumatic vacuum gun, vacuum foreign material from the fuel injectors, high-pressure fuel supply lines and surrounding areas.

For additional information, refer to Fuel Injection Component Cleaning

- 19 . Disconnect the fuel injector electrical connectors.





- 20 . Detach the fuel injection wiring harness.



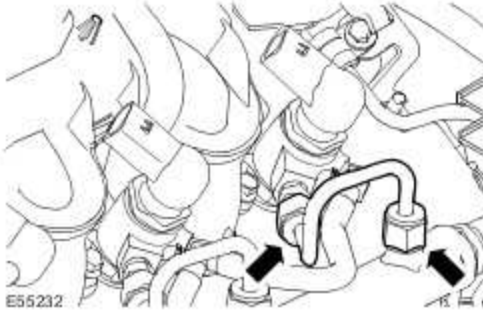
- 21 Using the pneumatic vacuum gun, vacuum foreign material from the fuel injectors, high-pressure fuel supply lines and surrounding areas.

For additional information, refer to Fuel Injection Component Cleaning

- 22  **CAUTION:** Make sure that the high-pressure fuel supply line remains in contact with both the fuel injector and the fuel rail until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

 **CAUTION:** Make sure that the fuel injector adaptor union does not move when loosening the high-pressure fuel supply lines. Failure to follow this instruction may result in damage to the fuel injector or the fuel injector adaptor union.

Loosen the high-pressure fuel supply lines from the fuel injectors and fuel rail.



23



CAUTION: Make sure that the high-pressure fuel supply line remains in contact with both the fuel injector and the fuel rail until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

Using the pneumatic vacuum gun, vacuum foreign material from the high-pressure fuel supply lines, the fuel injectors and the fuel rail.

For additional information, refer to Fuel Injection Component Cleaning

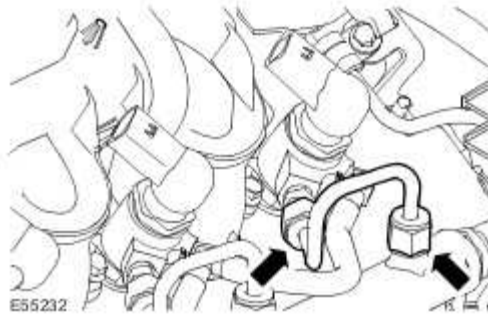
24 **NOTE:**

While maintaining the pressure on the high-pressure fuel supply line, clean and vacuum foreign material from the line and unions.

Remove and discard the high-pressure fuel supply lines.



Install suitable blanking caps to the open threaded ports on the fuel injectors and the fuel rail.



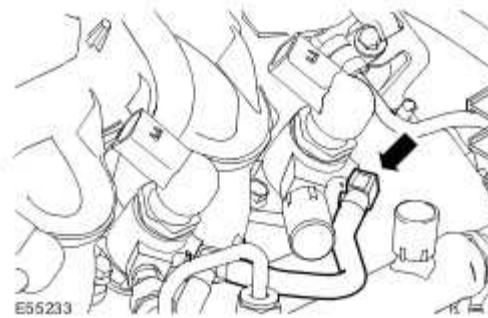
- 25 Using the pneumatic vacuum gun, vacuum foreign material from the fuel injectors and the fuel rail.

For additional information, refer to Fuel Injection Component Cleaning

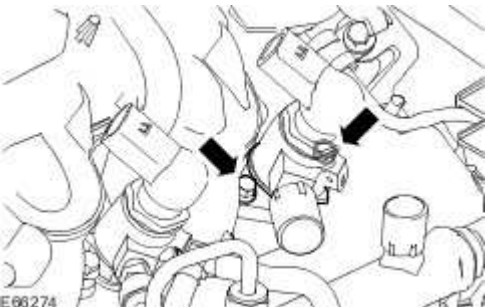
- 26 Disconnect the fuel return line from the fuel injectors.

▶ Remove and discard the fuel return line retaining clips from the fuel injectors.

▶ Disconnect the fuel return line from the fuel injectors.



- 27 . Remove the fuel injectors retaining bolts.



28 . Install the special tool studs.

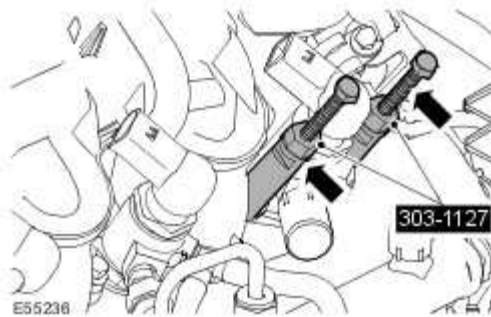


29



- **CAUTION: Make sure the fuel injector remover legs are correctly engaged to the fuel injector. Failure to follow this instruction may result in damage to the component.**

Install the special tool puller legs to the studs.



30

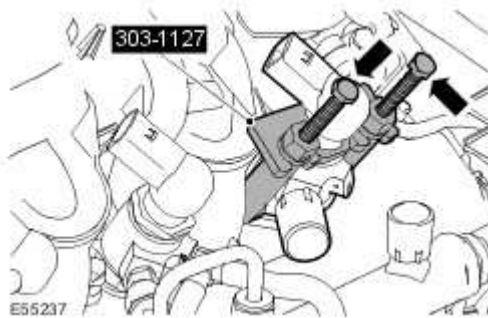


- **CAUTION: Make sure the special tool puller bolts are rotated evenly. Failure to follow this instruction may result in damage to the special tool or fuel injectors.**

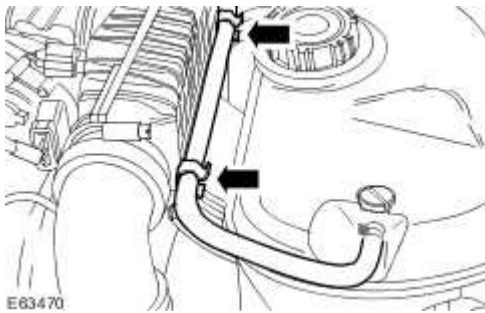
Using the special tool, remove the fuel injectors.

- ▶ Install the special tool locking plate to the puller legs.
- ▶ Rotate the bolts evenly, in a clockwise direction.
- ▶ Remove the fuel injectors.
- ▶ Remove the special tool.

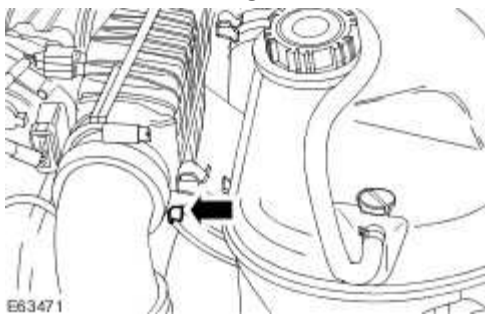
- ▶ Remove and discard the fuel injectors retaining clamps.
- ▶ Remove and discard the fuel injectors sealing washers.



31 . Detach the coolant hose.



32 . Remove the retaining bolt.

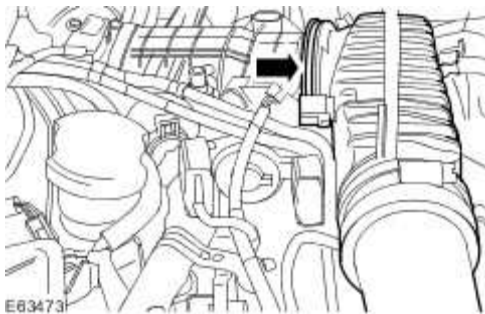


33 . Disconnect the electrical connectors.

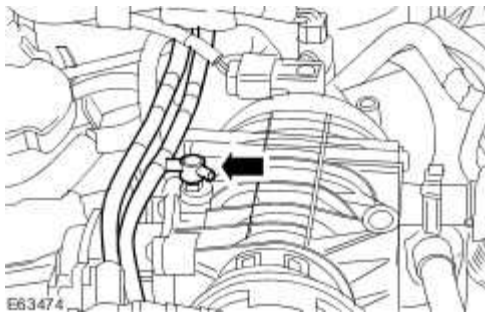


34 . Detach the intake air shutoff throttle elbow.

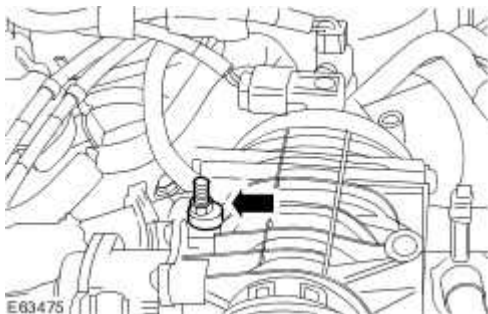
▶ Release the retaining clip.



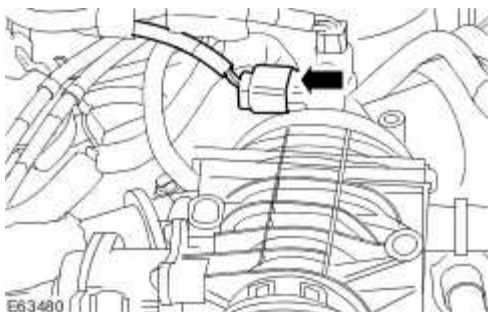
35 . Detach the vacuum hoses.



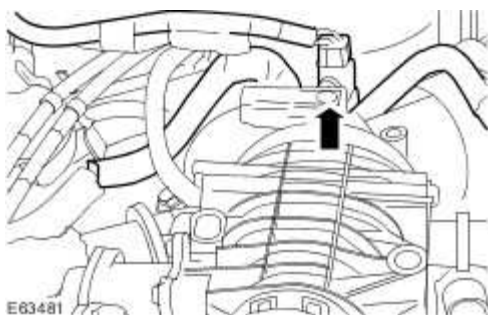
36 . Remove the retaining bolt.



37 . Disconnect the electrical connector.



38 . Detach the fuel return line valve from the intake air shutoff throttle.

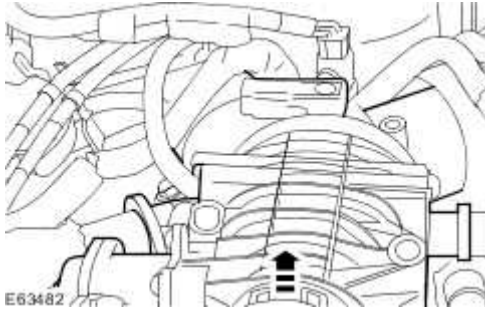


39



- **CAUTION:** Make sure the fuel return line valve retaining clip is not damaged. Failure to follow this instruction may result in damage to the vehicle.

Reposition the intake air shutoff throttle.

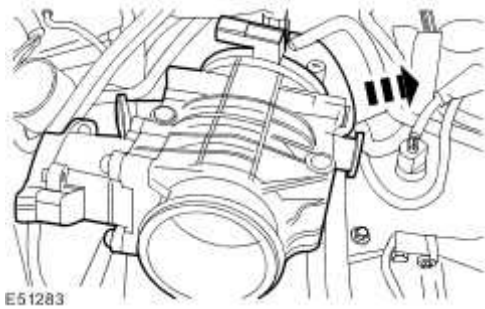


40



CAUTION: Make sure the fuel return line valve retaining clip is not damaged.
Failure to follow this instruction may result in damage to the vehicle.

Reposition the intake air shutoff throttle.

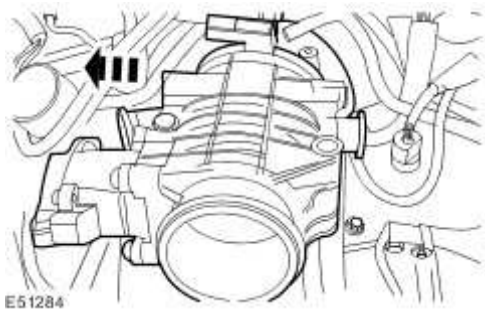


41

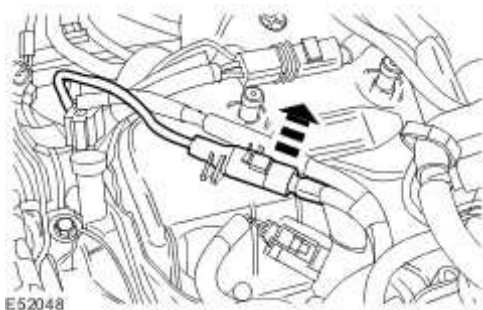


CAUTION: Make sure the fuel return line valve retaining clip is not damaged.
Failure to follow this instruction may result in damage to the vehicle.

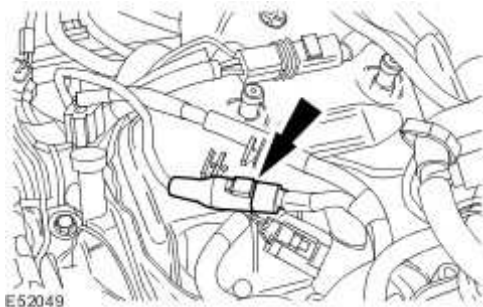
Remove the intake air shutoff throttle.



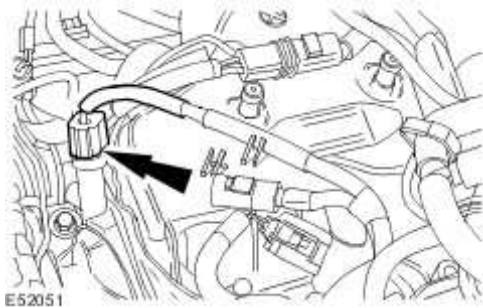
42 . Detach the knock sensor (KS) electrical connector.



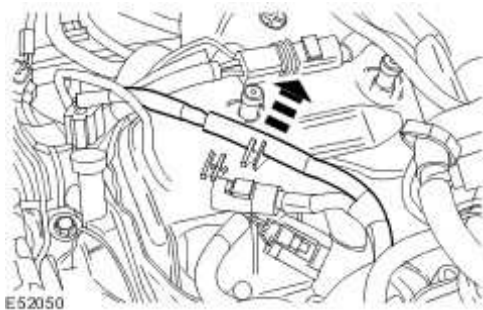
43 . Disconnect the KS electrical connector.



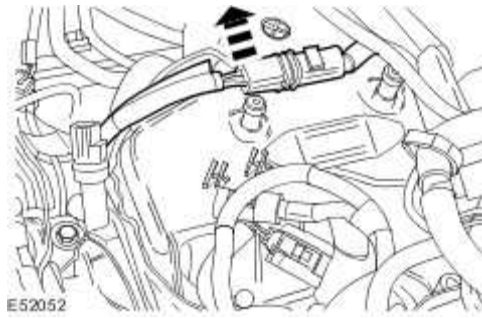
44 . Disconnect the engine oil pressure (EOP) sensor electrical connector.



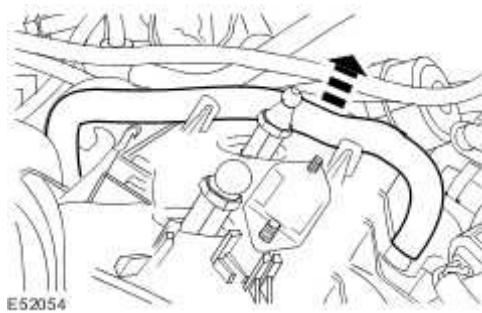
45 . Detach the engine harness.



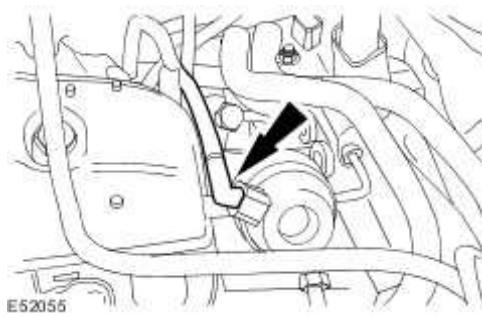
46 . Detach the glow plug harness.



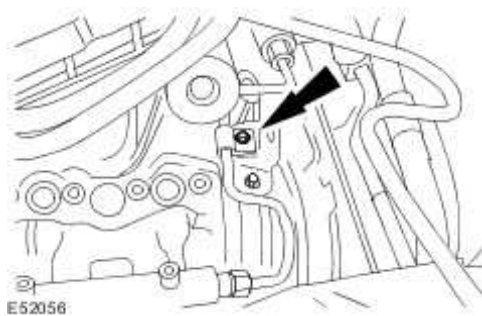
47 . Detach the engine breather pipe.




48 . Disconnect the vacuum pipe.




49 . Remove the high-pressure fuel supply line retaining bolt.



- 50 Using the pneumatic vacuum gun, vacuum foreign material from the fuel injection pump,
· high-pressure fuel supply line and surrounding areas.
For additional information, refer to Fuel Injection Component Cleaning

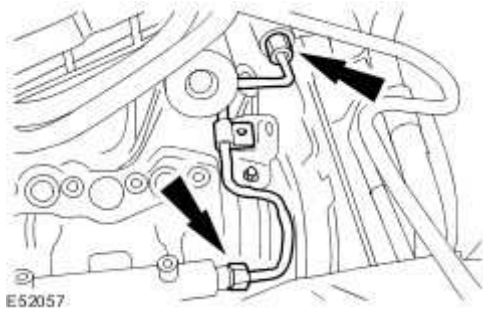
- 51  **CAUTION:** Make sure that the tool used to loosen the high-pressure fuel supply line union is used at the top of the union as this is where there is most material. Failure to follow this instruction may result in damage to the union.

 **CAUTION:** Make sure that the high-pressure fuel supply line remains in contact with both the fuel injection pump and the fuel rail until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

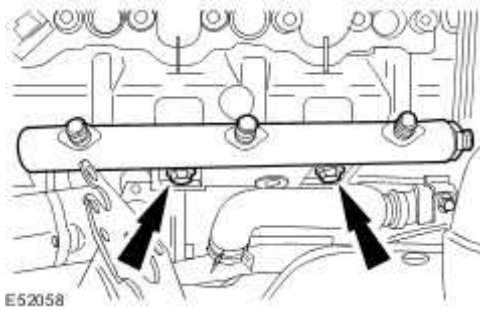
NOTE:

While maintaining the pressure on the high-pressure fuel supply line, clean and vacuum foreign material from the line and unions.

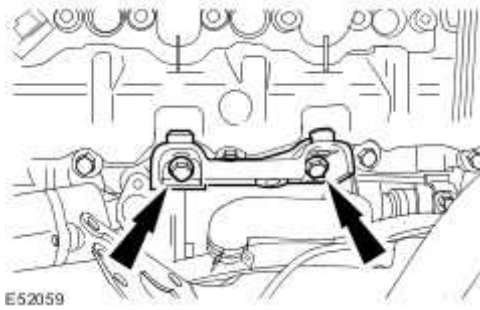
Remove the high-pressure fuel supply line.



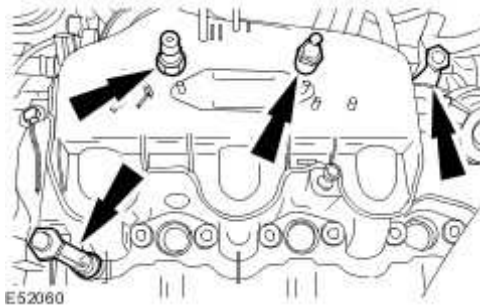
- 52 . Remove the fuel rail.



53 . Remove the fuel rail securing bracket .

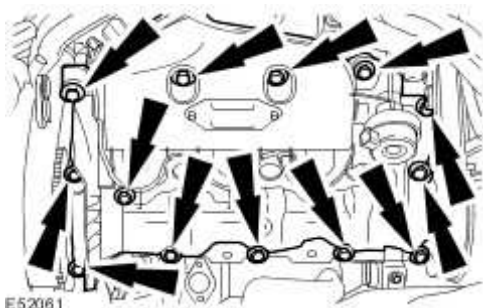


54 . Remove the engine cover and wiring harness retainers.



55 . Remove the valve cover.

▶ Remove and discard the valve cover gasket.



Installation



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high-pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow this instruction may result in personal injury.



WARNING: Do not carry out any repairs to the fuel injection system with the engine running. The fuel pressure within the system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Do not disconnect the fuel injector electrical connectors with the engine running. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

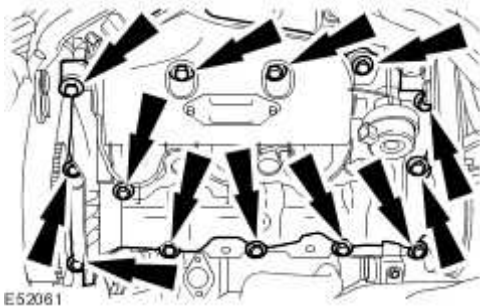


CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any exposed ports.

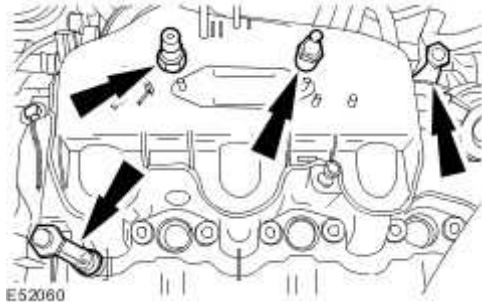
1 . Install the valve cover.

▶ Install a new valve cover gasket.

▶ Tighten to 10 Nm.

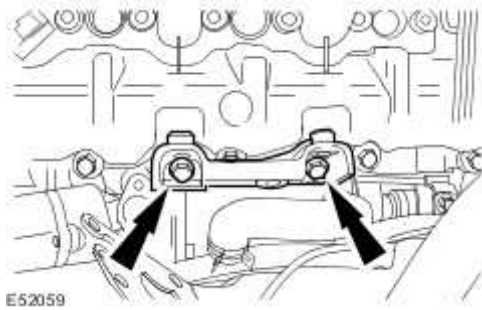


2 . Install the engine cover and wiring harness retainers.



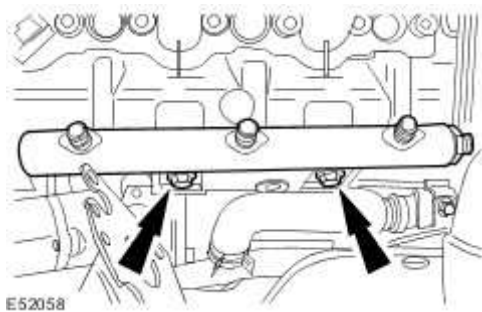
3 . Install the fuel rail securing bracket.

▶ Tighten to 24 Nm.



4 . Install the fuel rail.

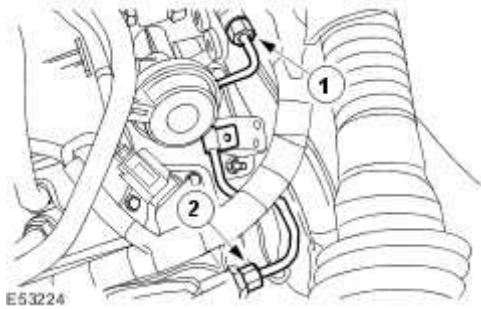
▶ Tighten to 24 Nm.



5 Install new a high-pressure fuel supply line.

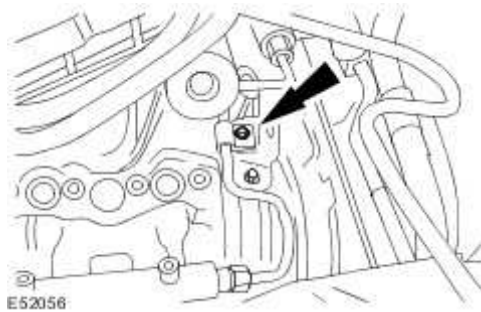
▶ Tighten the high-pressure fuel supply line in the sequence shown:

- ▶ Tighten the high-pressure fuel supply line union 1 to fuel diverter rail to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 2 to fuel rail to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 1 to fuel diverter rail to 30 Nm.
- ▶ Tighten the high-pressure fuel supply line union 2 to fuel rail to 30 Nm.

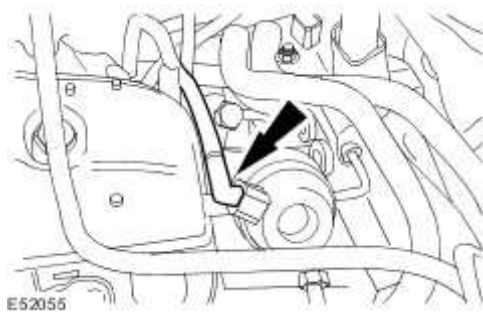


6 . Install the high-pressure fuel supply line retaining bolt.

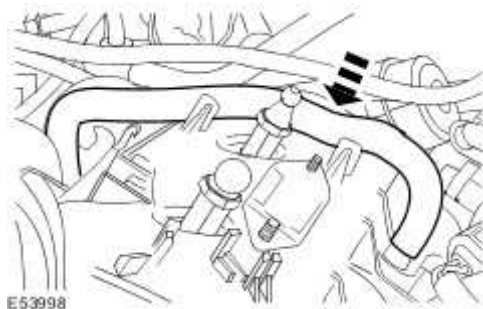
- ▶ Tighten to 10 Nm.



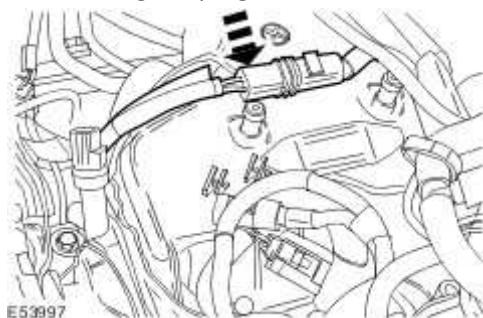
7 . Connect the vacuum pipe.



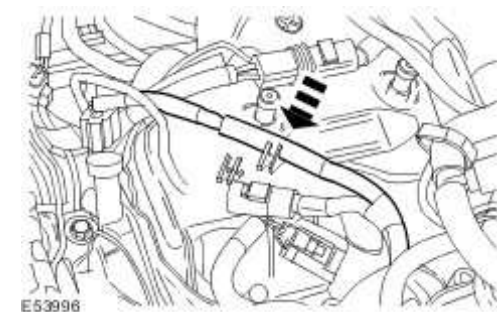
8 . Attach the engine breather pipe.



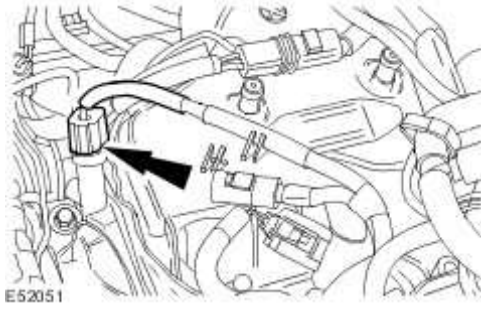
9 . Attach the glow plug harness.



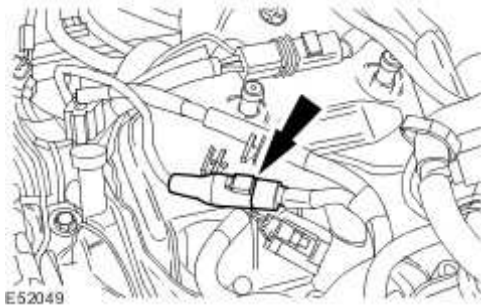
10 . Attach the engine harness.



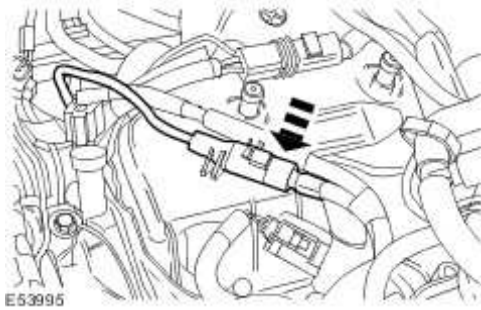
11 . Connect the EOP sensor electrical connector.



12 . Connect the KS electrical connector.



13 . Attach the KS electrical connector.

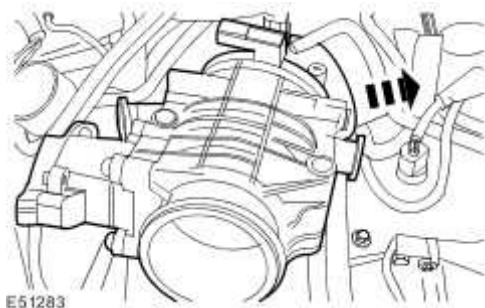


14

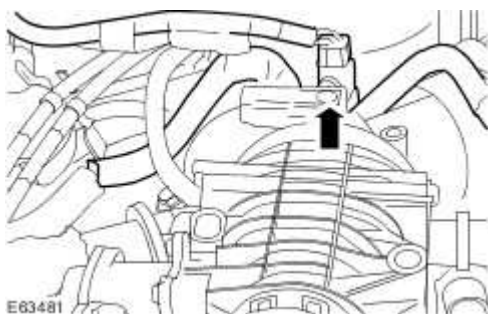


- **CAUTION:** Make sure the fuel return line valve retaining clip is not damaged. Failure to follow this instruction may result in damage to the vehicle.

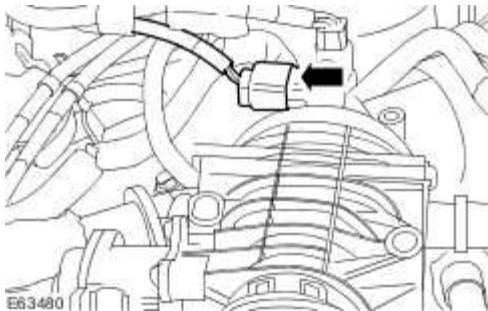
Install the intake air shutoff throttle.




15 . Attach the fuel return line valve onto the intake air shutoff throttle.

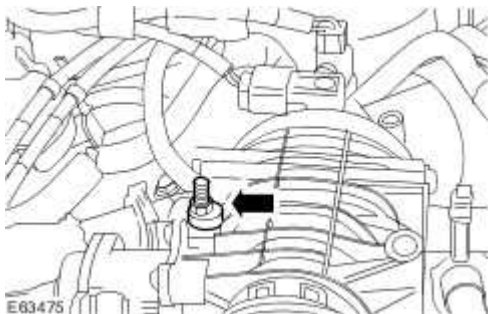


16 . Connect the electrical connector.

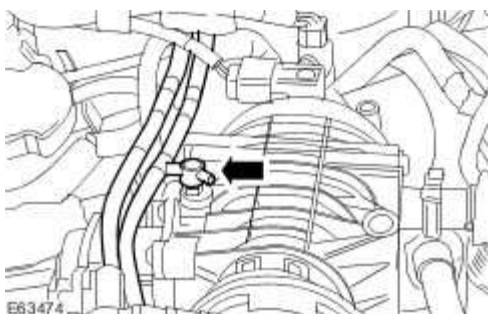


17 . Install the retaining bolt.

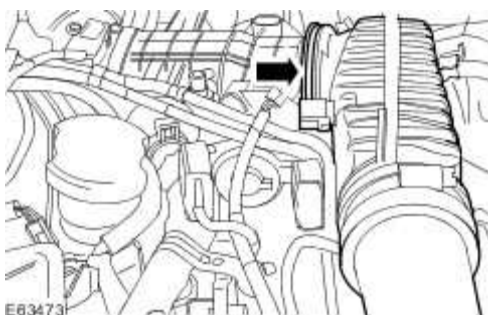
 Tighten to 10 Nm.



18 . Attach the vacuum hoses.



19 . Attach the inake air shutoff throttle elbow.

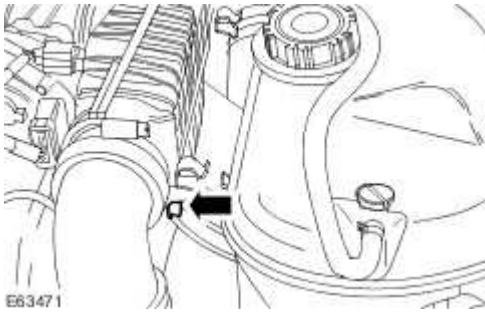


20 . Connect the electrical connectors.

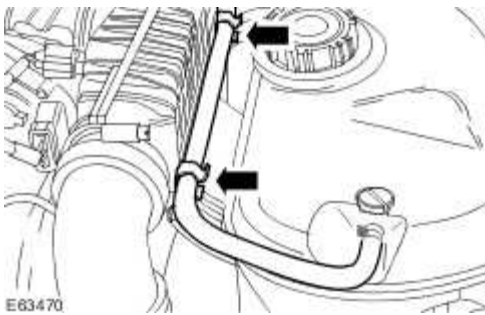


21 . Install the retaining bolt.

▶ Tighten to 10 Nm.



22 . Attach the coolant hose.



23



CAUTION: Do not use tools to install the new fuel return line retaining clips. Failure to follow this instruction may result in damage to the retaining clips.

NOTE:

Install new fuel return line retaining clips.

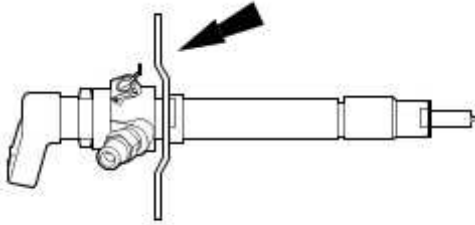
NOTE:

Install new fuel injector sealing washers.

NOTE:

Install new fuel injector retaining clamps.

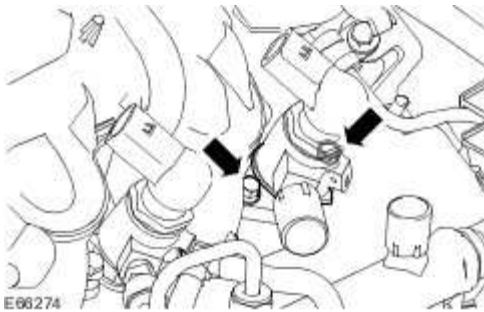
Install new fuel injector retaining clamps.



E52071

24 . Install the fuel injectors.

▶ Tighten to 10 Nm.



E66274

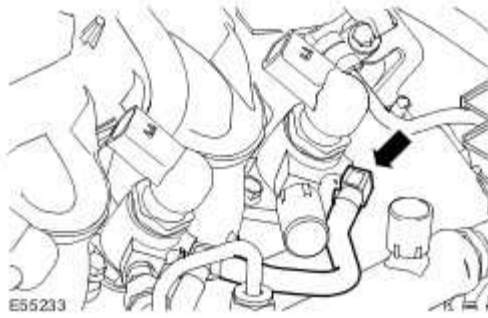
25



- **CAUTION:** Make sure the fuel return line retaining clips are correctly installed to the fuel injectors before installing the fuel return line.

Connect the fuel return line to the fuel injectors.

- ▶ Visually inspect the fuel return line O-ring seals for damage.
- ▶ Apply a light coating of petroleum jelly to the fuel line return line O-ring seals.
- ▶ Connect the fuel return line to the fuel injectors.



26



CAUTION: Do not allow the unions to hit the olive ends of the high-pressure fuel supply lines as this may damage the ends of the lines and allow foreign matter enter the fuel injection system.

Position the high-pressure fuel supply lines as near to the final installation position as possible and then remove and discard the blanking plugs from the high-pressure fuel supply lines.

27



CAUTION: Maintain pressure on the high-pressure fuel supply lines to keep the olives in contact with the fuel injectors and the fuel rail cones while installing the unions.

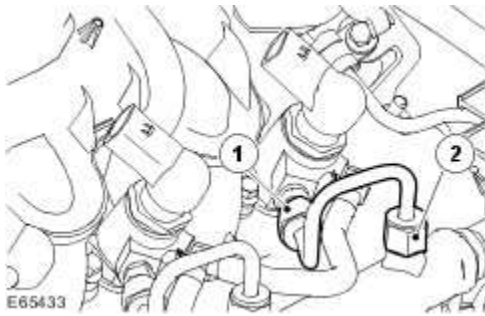
NOTE:

Install the high-pressure fuel supply lines to the fuel rail end first followed by the fuel injector end.

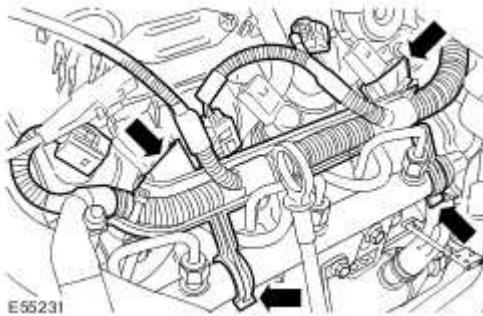
Install new high-pressure fuel supply lines.

- ▶ Tighten the high-pressure fuel supply line in the sequence shown:
- ▶ Tighten the high-pressure fuel supply line union 1 to fuel injector to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 2 to fuel rail to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 1 to fuel injector to 30 Nm.

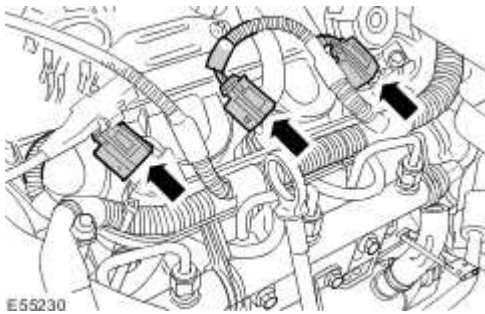
- Tighten the high-pressure fuel supply line union 2 to fuel rail to 30 Nm.



- 28 . Attach the fuel injection wiring harness.

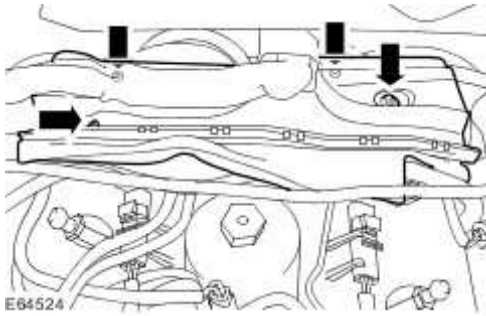


- 29 . Connect the fuel injector electrical connectors.

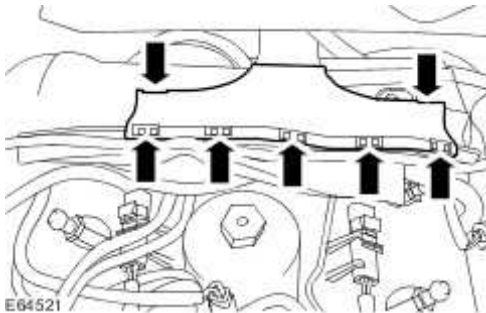


- 30 . Install the engine harness casing.

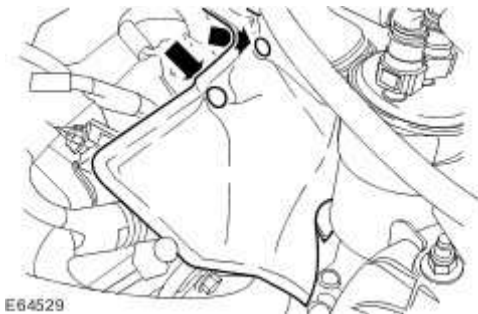
- Tighten to 4 Nm.



31 . Install the engine harness cover.



32 . Install the injector sound proofing.



33 Install the EGR valve outlet tubes.

- For additional information, refer to Exhaust Gas Recirculation (EGR) Valve Outlet Tube (17.45.11)

34 . Install the cowl vent screen.

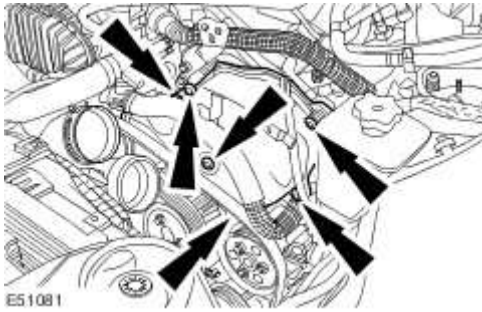
For additional information, refer to Cowl Vent Screen (76.10.01)

35 . **NOTE:**

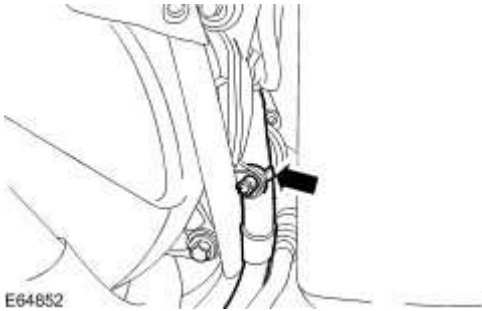
Install a new gasket.

Install the left-hand timing belt cover.

▶ Tighten to 10 Nm.

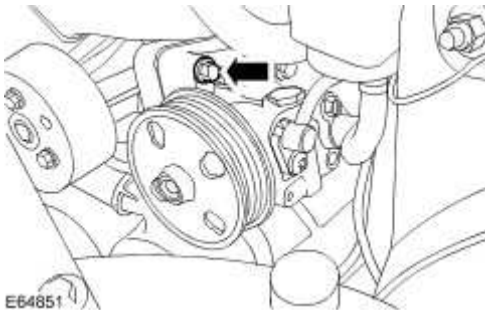


36 . Attach the wiring harness.



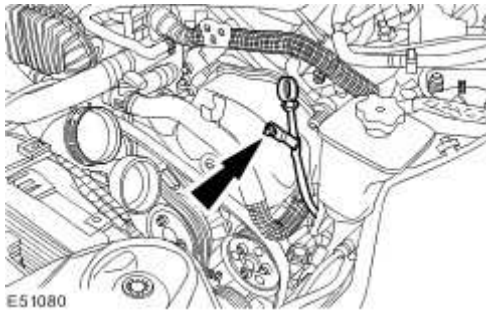
37 . Tighten the power steering pump bolt.

▶ Tighten to 22 Nm.



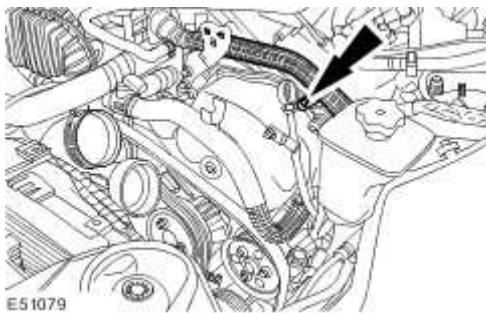
38 . Attach the oil level indicator tube.

► Tighten to 3 Nm.

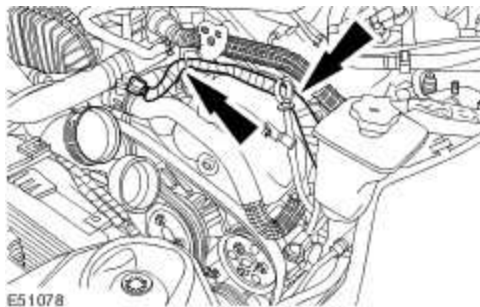


39 . Attach the EGR valve tube.

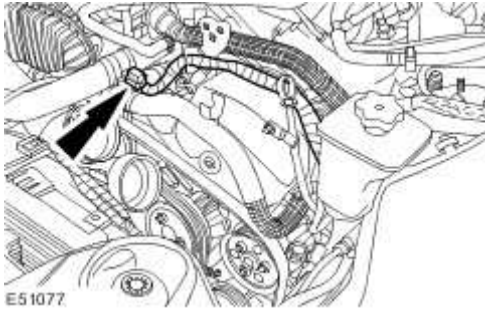
► Tighten to 3 Nm.



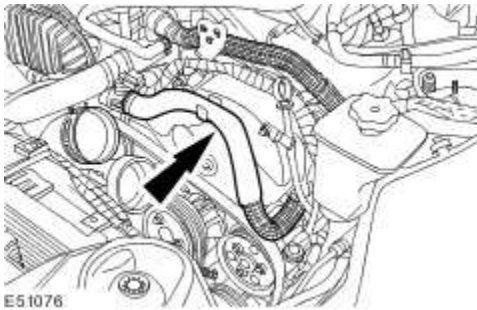
40 . Attach the ECT sensor wiring harness.



41 . Connect the ECT sensor electrical connector.



42 . Attach the coolant hose.



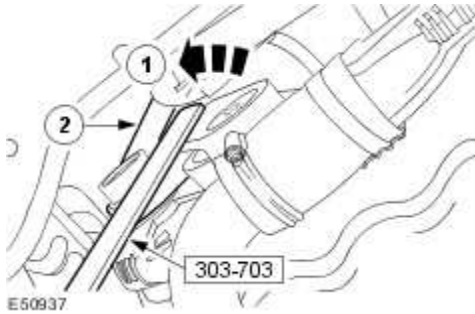
43 . Install the air cleaner.

For additional information, refer to Air Cleaner (19.10.05)

44 . Raise the vehicle.

45 Attach the accessory drive belt.

- 1) Using the special tool, rotate the accessory drive belt tensioner counter clockwise.
- 2) Install the accessory drive belt.



46 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

47 . Connect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)

48



WARNING: Do not carry out any repairs to the fuel system with the engine running. The fuel pressure within the high-pressure system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.

NOTE:

The fuel return line must be renewed if any leaks are found from the fuel return line O-ring seals.

Start the engine and check visually for fuel leaks.

Valve Cover RH (12.29.44)

Removal



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high-pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow this instruction may result in personal injury.



WARNING: Do not carry out any repairs to the fuel injection system with the engine running. The fuel pressure within the system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Do not disconnect the fuel injector electrical connectors with the engine running. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel

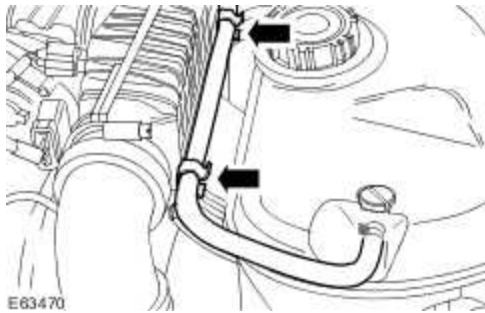
injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



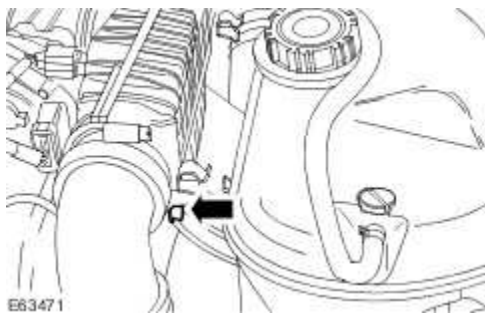
CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any exposed ports.

- 1 . Remove the fuel injectors.
For additional information, refer to

- 2 . Detach the coolant hose.



- 3 . Remove the intake air shutoff throttle elbow retaining bolt.

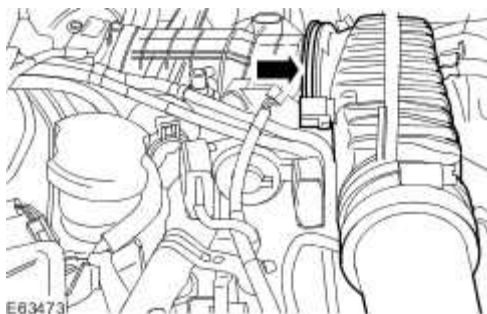


- 4 . Disconnect the intake air shutoff throttle electrical connectors.

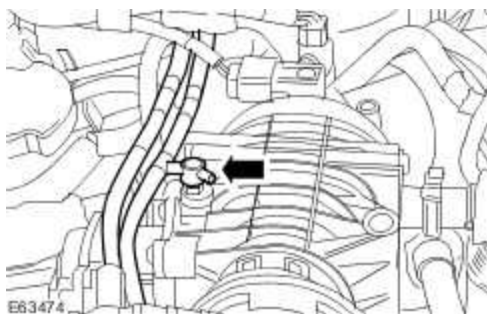


5 . Detach the intake air shutoff throttle elbow.

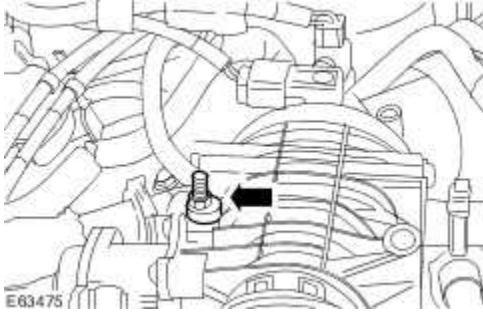
▶ Release the retaining clip.



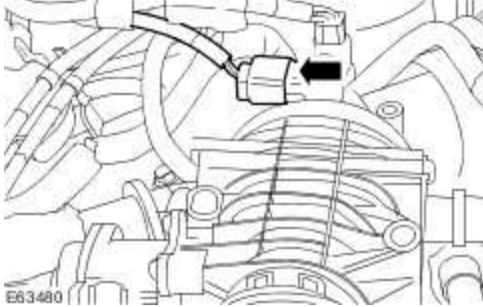
6 . Detach the vacuum hoses.



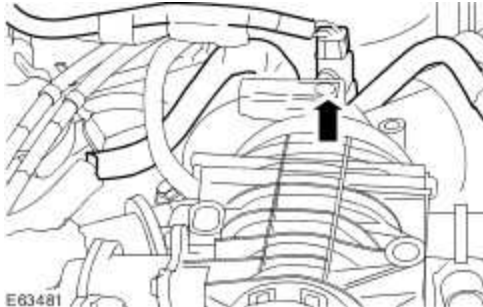
7 . Remove the intake air shutoff throttle retaining bolt.



8 . Disconnect the manifold absolute pressure (MAP) sensor electrical connector.



9 . Detach the fuel return line valve from the intake air shutoff throttle.



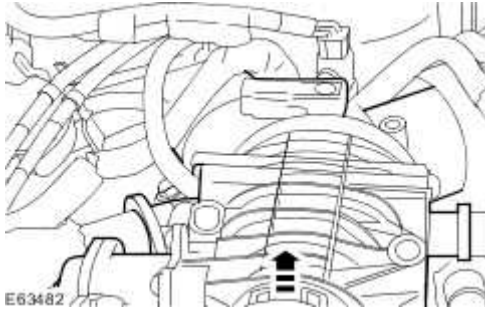
10




.

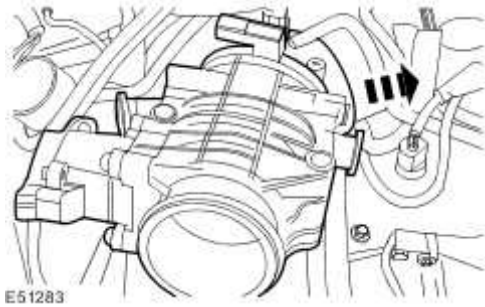
**CAUTION: Make sure the fuel return line valve retaining clip is not damaged.
Failure to follow this instruction may result in damage to the vehicle.**


Reposition the intake air shutoff throttle.



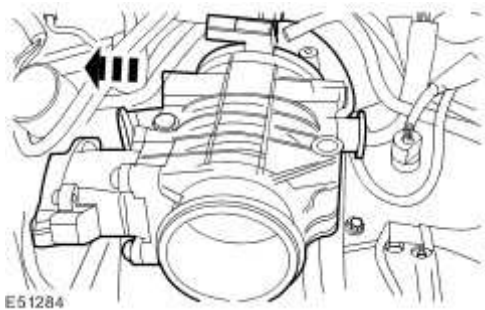
- 11  **CAUTION:** Make sure the fuel return line valve retaining clip is not damaged.
Failure to follow this instruction may result in damage to the vehicle.

Reposition the intake air shutoff throttle.



- 12  **CAUTION:** Make sure the fuel return line valve retaining clip is not damaged.
Failure to follow this instruction may result in damage to the vehicle.

Remove the intake air shutoff throttle.

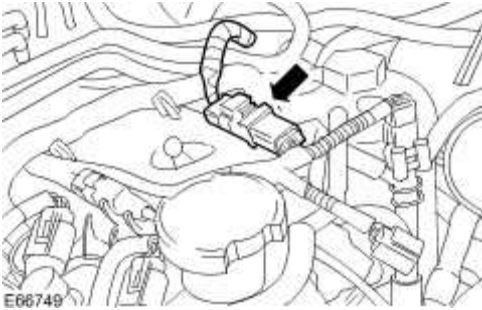


- 13 . Disconnect the knock sensor (KS) electrical connector.

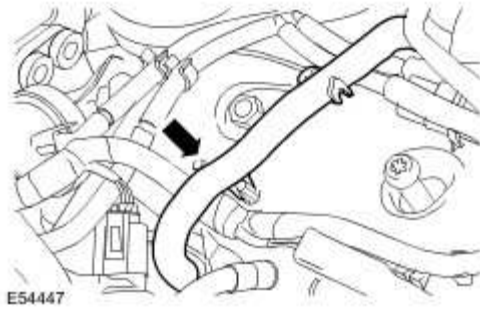
- Detach the KS electrical connector from the valve cover.



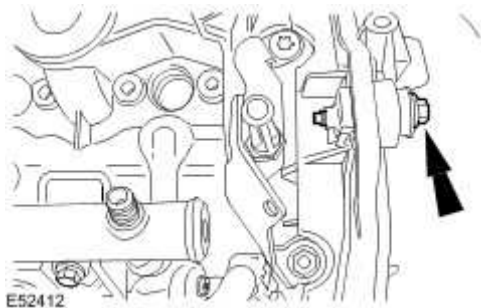
- 14 . Detach the glow plug electrical connector from the valve cover.



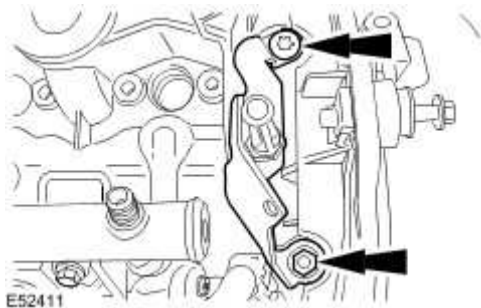
- 15 . Detach the engine breather pipe.



- 16 . Loosen the right-hand timing cover retaining bolt.



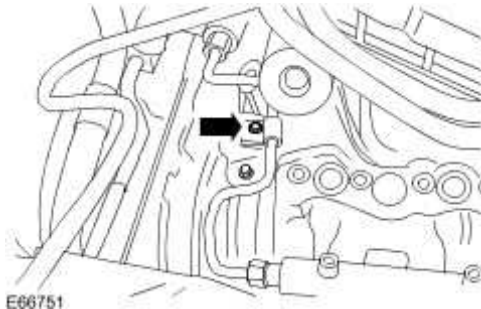
17 . Remove the engine cover mounting bracket.



18 . Disconnect the port deactivation vacuum pipe.





19 . Remove the high-pressure fuel supply line retaining bolt.



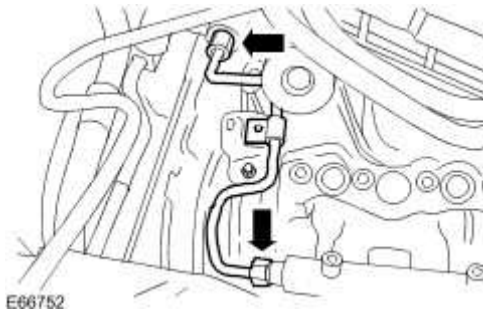
- 20 Using the pneumatic vacuum gun, vacuum foreign material from the fuel injectors and the fuel rail.

For additional information, refer to Fuel Injection Component Cleaning

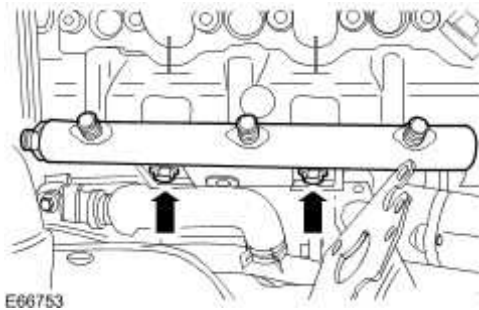
- 21  **CAUTION:** Make sure that the high-pressure fuel supply line remains in contact with both the fuel injection pump and the fuel injection supply manifold until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

 **CAUTION:** While maintaining the pressure on the high-pressure fuel supply line, clean and vacuum foreign material from the line and unions.

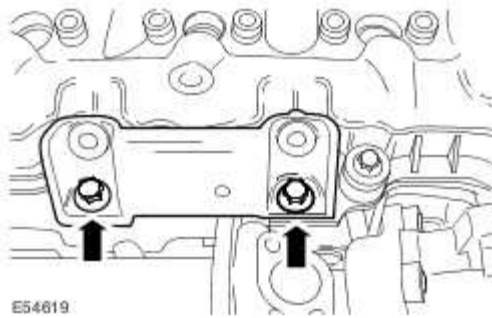
Remove and discard the high-pressure fuel supply line.



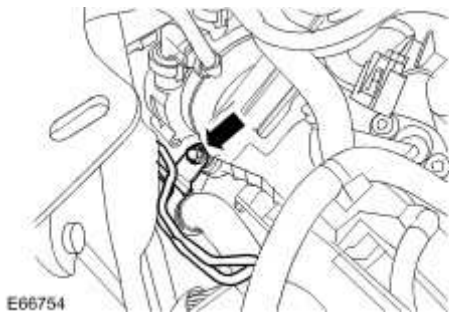
- 22 . Remove the fuel rail.



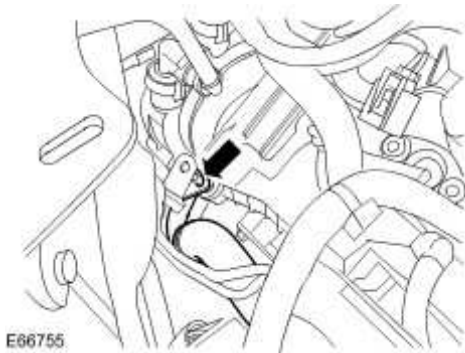
- 23 . Remove the fuel rail securing bracket.



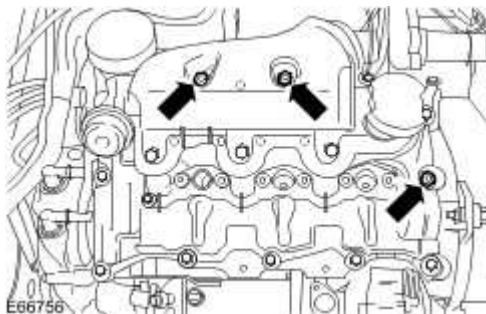
24 . Detach the diesel particulate filter high and low-pressure pipes.



25 . Detach the exhaust gas recirculation (EGR) coolant rail.

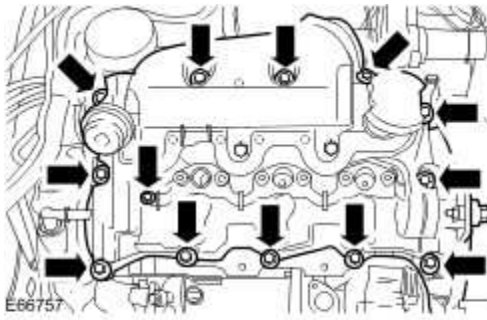


26 . Remove the engine cover locating studs.



27 . Remove the valve cover.

▶ Remove and discard the valve cover gasket.



Installation



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high-pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow this instruction may result in personal injury.



WARNING: Do not carry out any repairs to the fuel injection system with the engine running. The fuel pressure within the system can be as high as 1650 bar. Failure to follow this

instruction may result in personal injury.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Do not disconnect the fuel injector electrical connectors with the engine running. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

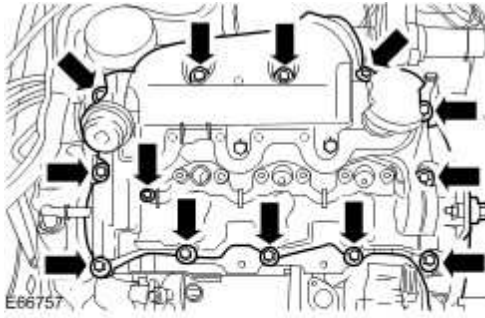


CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any exposed ports.

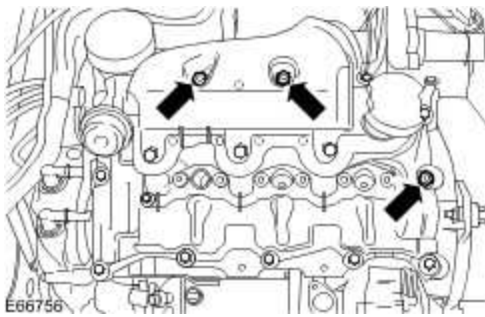
1 . Install the valve cover.

▶ Install a new valve cover gasket.

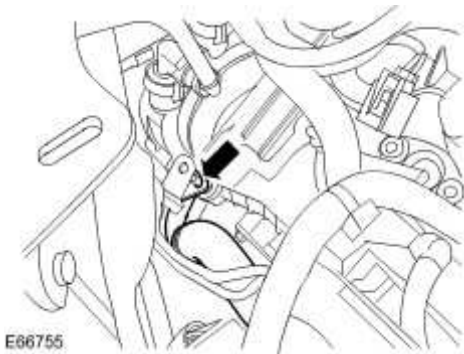
▶ Tighten to 10 Nm.



2 . Install the engine cover locating studs.

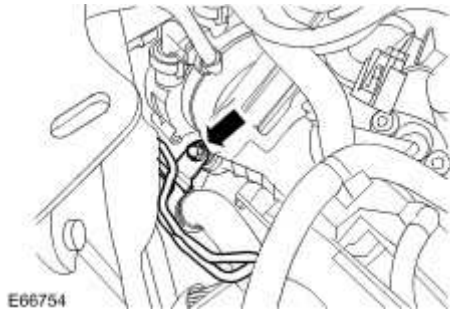


3 . Attach the EGR coolant rail.



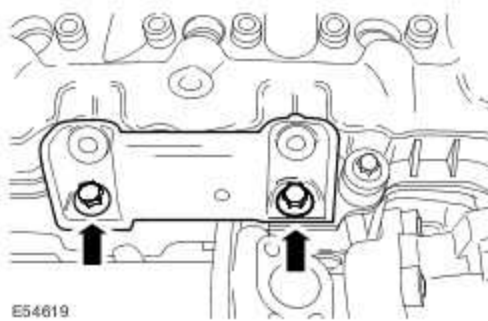
4 . Attach the diesel particulate filter high and low-pressure pipes.

► Tighten to 10 Nm.



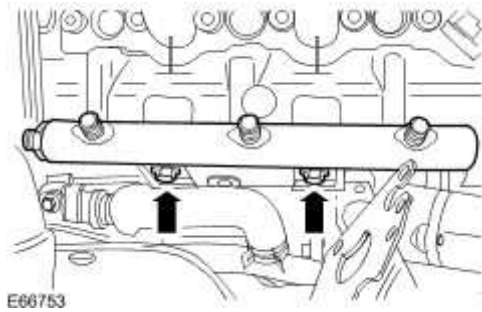
5 . Install the fuel rail securing bracket.

▶ Tighten to 24 Nm.



6 . Install the fuel rail.

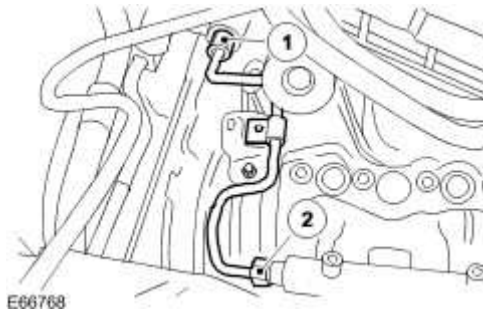
▶ Tighten to 24 Nm.



7 Install a new high-pressure fuel supply line.

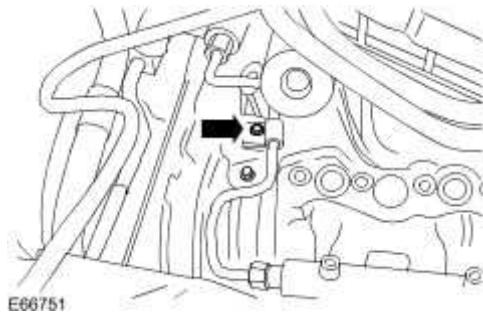
▶ Tighten the high-pressure fuel supply line in the sequence shown:

- ▶ Tighten the high-pressure fuel supply line union 1 to fuel diverter rail to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 2 to fuel rail to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 1 to fuel diverter rail to 30 Nm.
- ▶ Tighten the high-pressure fuel supply line union 2 to fuel rail to 30 Nm.



8 . Install the high-pressure fuel supply line retaining bolt.

- ▶ Tighten to 10 Nm.

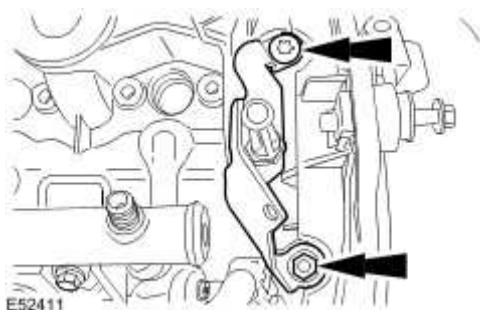


9 . Connect the port deactivation vacuum pipe.



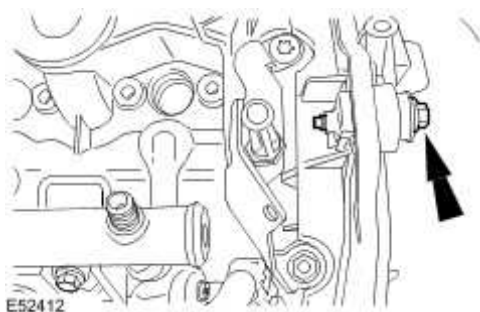
10 . Install the engine cover mounting bracket.

► Tighten to 4 Nm.

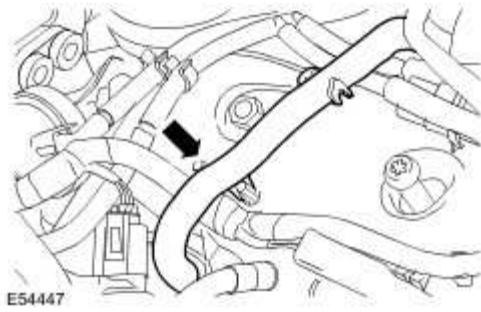


11 . Tighten the right-hand timing cover retaining bolt.

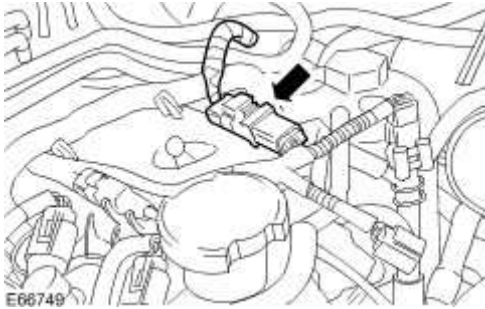
► Tighten to 10 Nm.



12 . Attach the engine breather pipe.

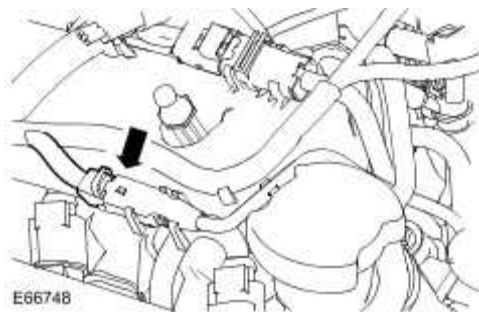



- 13 . Attach the glow plug electrical connector to the valve cover.



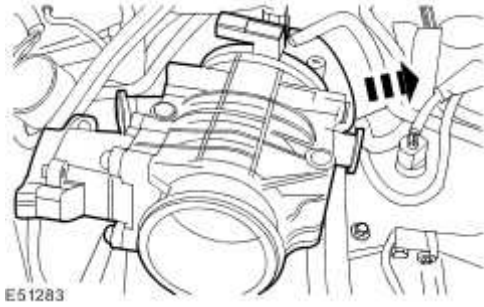
- 14 . Connect the KS electrical connector.

▶ Attach the KS electrical connector to the valve cover.

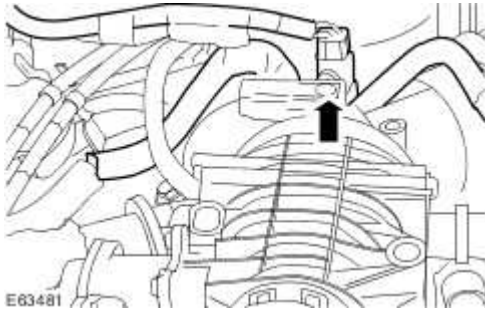


- 15  **CAUTION:** Make sure the fuel return line valve retaining clip is not damaged.
Failure to follow this instruction may result in damage to the vehicle.

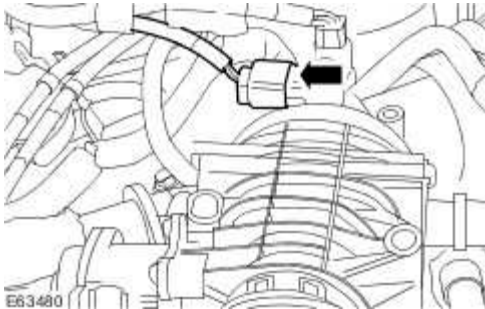
Install the intake air shutoff throttle.




16 . Attach the fuel return line valve onto the intake air shutoff throttle.

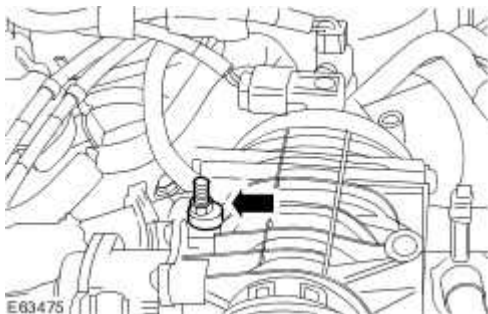


17 . Connect the MAP sensor electrical connector.

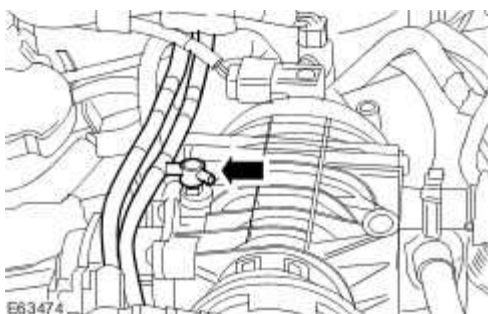


18 . Install the intake air shutoff throttle retaining bolt.

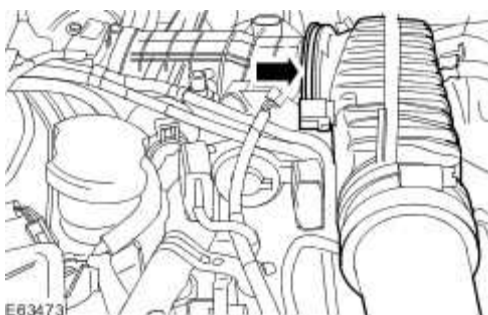
 Tighten to 10 Nm.



19 . Attach the vacuum hoses.



20 . Attach the intake air shutoff throttle elbow.

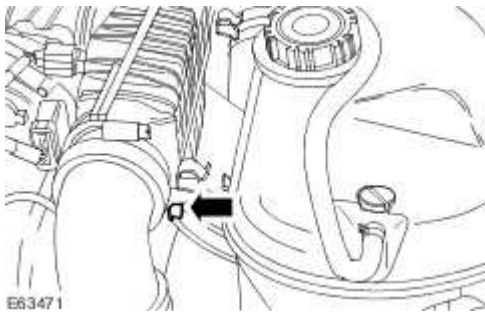


21 . Connect the intake air shutoff throttle electrical connectors.

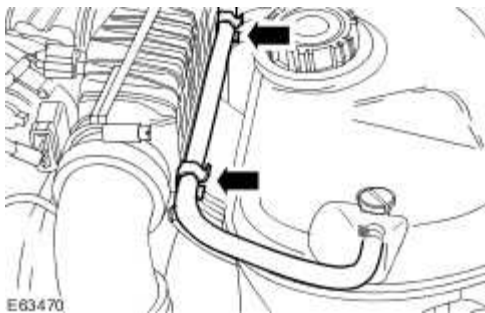


22 . Install the intake air shutoff throttle elbow retaining bolt.

► Tighten to 10 Nm.



23 . Attach the coolant hose.



24 . Install the fuel injectors.

For additional information, refer to

303-03A : Engine Cooling – 3.0L/3.5L/4.2L

Specifications

Specifications

Lubricants, Fluids, Sealers and Adhesives

Description	Specification
Jaguar Premium Cooling System Fluid	WSS M97B44-D
Jaguar Premium Cooling System Flush	EGR-M14P7-A

Cooling System Refill Capacities

Engine	Capacity
3.0L	9.4L
3.5L/4.2L	13.3L

Torque Specifications

Description	Nm	lb-ft	lb-in
Auxiliary water pump retaining bolts	10	-	89
Condenser core retaining stud	7	-	62
Coolant expansion tank bleed screw	3	-	27
Coolant expansion tank retaining bolt	3	-	27
Cooling fan motor and shroud retaining nuts	7	-	62
Cooling module retaining bolts - 4.2L SC	7	-	62
Oil cooler inlet pipe	20	15	-
Oil cooler return pipe	20	15	-
Power steering oil cooler retaining nuts - 3.5L/4.2L	7	-	62
Radiator drain plug	1	-	9
Radiator mounting bracket retaining bolts	6	-	53
Thermostat housing retaining bolts - 3.0L	18	13	-
Thermostat housing retaining bolts - 3.5L/4.2L/4.2L SC	9	-	80
Water pump drive pulley retaining bolts - 3.5L/4.2L/4.2L SC	A	-	-
Water pump retaining bolts - 3.0L	25	18	-

Water pump retaining bolts - 3.5L/4.2L/4.2L SC	A	-	-
Water pump retaining bracket bolts - 4.2L SC	7	-	62
A = refer to the procedure for the correct torque sequence	-	-	-

Cooling System Backflushing



CAUTION: The heater core must be backflushed separately from the engine cooling system to prevent the engine cooling system particles from clogging the heater core tubes and reducing (or eliminating) coolant flow through the heater core. All engine cooling system flushing and backflushing procedures must include a separate backflushing of the heater core after the flushing or backflushing of the engine cooling system.



CAUTION: Heater core internal pressure must not exceed 100 kPa (14.5 psi). Failure to follow this instruction may cause damage to the heater core.

NOTE:

Cooling system backflushing should be carried out before the cooling system components are installed after the cooling system flushing procedure.

1. Disconnect the heater outlet coolant hose from the engine and connect the heater hose to a suitable hose pipe.
2. Disconnect the heater inlet coolant hose from the engine and allow the coolant to drain into a suitable container.
3. Turn the water supply valve to the hose ON and allow water pressure to flow through the heater core.
4. Allow water pressure to flow through the heater core for approximately five minutes.
5. Turn the water supply valve to the hose OFF and disconnect the hose pipe from the heater hose.
6. Connect the heater inlet coolant hose to the engine.
7. Connect the heater outlet coolant hose to the engine.
8. Fill the cooling system as described using a 50% mixture of Jaguar Premium Cooling

System Fluid, or equivalent meeting Jaguar specification WSS M97B44-D and 50% distilled water.

9. Test the system for correct heater performance with the specified engine cooling system conditions.

Radiator Backflushing

1. Remove the radiator.
2. Invert the radiator.
3. Connect a suitable hose pipe to the lower coolant hose connection of the radiator.
4. Turn the water supply valve to the hose ON and allow water pressure to flow through the radiator.
5. Allow water pressure to flow through the radiator for approximately five minutes.
6. Turn the water supply valve to the hose OFF and disconnect the hose pipe from the radiator.
7. Allow the coolant to drain from the radiator.
8. Install the radiator.

Engine Backflushing

1. Remove the thermostat before backflushing the engine.
2. Position the high-pressure water hose into the engine through the engine return and backflush the engine.

3. Connect a suitable hose pipe to the upper coolant hose connection of the engine.
4. Turn the water supply valve to the hose ON and allow water pressure to flow through the engine.
5. Allow water pressure to flow through the engine for approximately five minutes.
6. Turn the water supply valve to the hose OFF and disconnect the hose pipe from the upper coolant hose connection of the engine.
7. Connect the upper coolant hose to the engine.
8. Fill the cooling system as described using a 50% mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and 50% distilled water.

Cooling System Draining, Filling and Bleeding

1.



WARNING: Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury. To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.



WARNING: To avoid the possibility of personal injury, do not operate the engine with the hood open until the fan blades have been examined for cracks and separation. Failure to follow this instruction may result in personal injury.



WARNING: Remove fuse 14 from the engine compartment fuse box prior to performing any under hood service in the area of the cooling fan when the engine is hot, since the cooling fan motor could operate if the engine has been switched OFF. Failure to follow this instruction may result in personal injury.



CAUTION: The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the engine.



CAUTION: Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in damage to the engine.

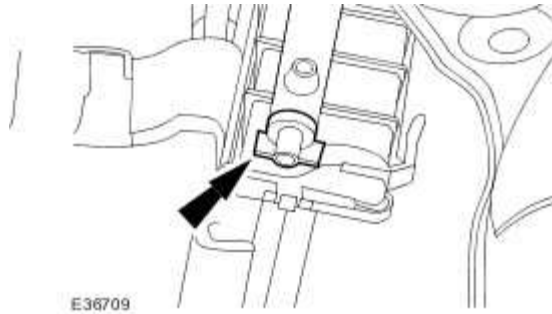
Release the cooling system pressure.

- Remove the coolant expansion tank pressure cap.

2. Remove the radiator splash shield.
Radiator Splash Shield (76.22.90)

3. Remove the coolant drain plug.

- Drain the coolant into a suitable container.



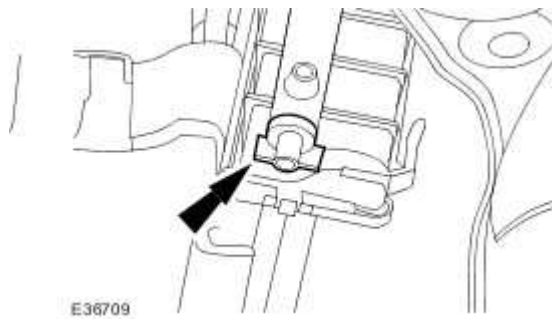
4.



CAUTION: Do not over tighten the drain plug. Failure to follow this instruction may cause damage to the vehicle.

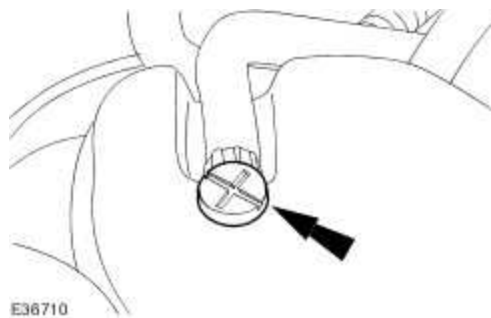
Install the drain plug when all coolant has drained.

- Tighten to 1 Nm.
- Remove the drain tray.



5. Install the radiator splash shield.
Radiator Splash Shield (76.22.90)

6. Remove the coolant expansion tank bleed screw.



7. Fill the cooling system up to the MAX mark on the coolant expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.

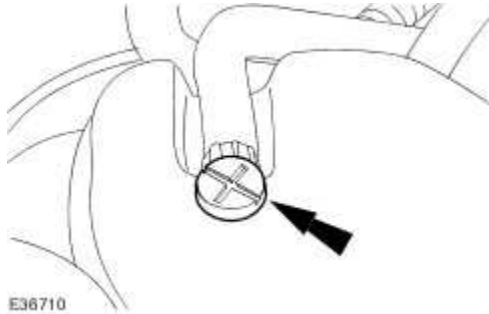
8.



CAUTION: Do not over tighten the coolant expansion tank bleed screw. Failure to follow this instruction may cause damage to the vehicle.

Install the coolant expansion tank bleed screw.

- Tighten to 3 Nm.



9. Install the coolant expansion tank pressure cap.

10.



CAUTION: Do not RUN the engine with the coolant expansion tank pressure cap removed. Failure to follow this instruction may cause damage to the vehicle.

START and RUN the engine.

11. SET the heating system to MAX heat, the blower motor to MAX speed and the air distribution to instrument panel registers.

12.



CAUTION: Observe the engine temperature gauge. If the engine starts to over-heat switch off immediately and allow to cool. Failure to follow this instruction may cause damage to the vehicle.

Allow the engine to RUN until hot air is emitted from the instrument panel registers, while observing the engine temperature gauge.

13. Switch off the engine.

14. Allow the engine to cool.

15. Release the cooling system pressure.

- Remove the coolant expansion tank pressure cap.

16. Fill the cooling system up to the MAX mark on the coolant expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.

17. Install the coolant expansion tank pressure cap.

Cooling System Draining and Vacuum Filling



WARNING: To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.



WARNING: Remove fuse 14 from the engine compartment fuse box prior to performing any under hood service in the area of the cooling fan when the engine is hot, since the cooling fan motor could operate if the engine has been switched OFF. Failure to follow this instruction may result in personal injury.

NOTE:

The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

Engine coolant will damage paint finished surfaces. If spilled, immediately remove coolant and clean area with water.

NOTE:

Vehicles fitted with supercharged engines shown, V8 NA and V6 engines similar.

1. Set the heater controls to maximum HOT.

2.



WARNING: Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.

Remove coolant expansion tank filler cap.

3.

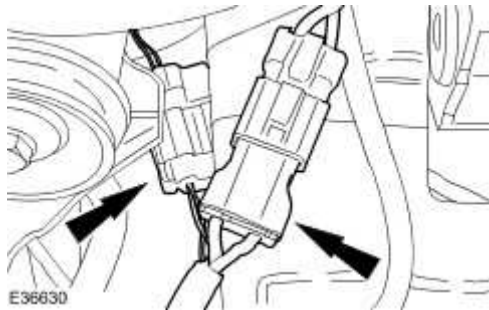


WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

Raise and support the vehicle.

4. Remove the radiator splash shield.
Radiator Splash Shield (76.22.90)

5. Detach the electrical connectors.



6. Remove the radiator lower cowl.



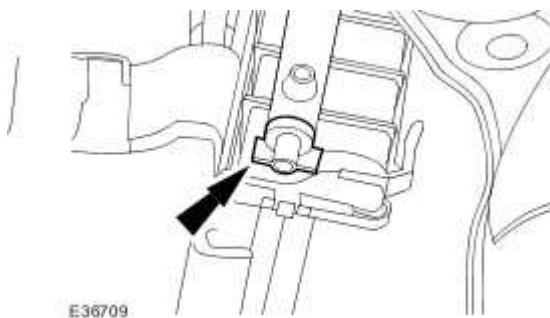
7.



WARNING: Eye protection must be worn.

Position container to collect coolant.

8. Remove the coolant drain plug.
• Allow the coolant to drain.

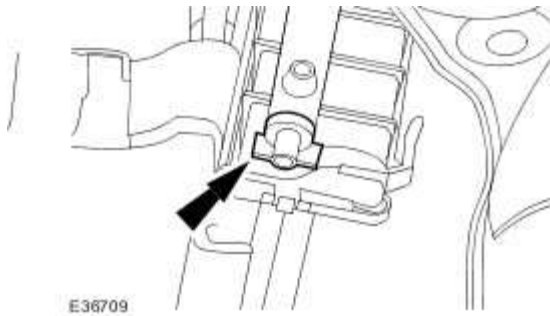


9.



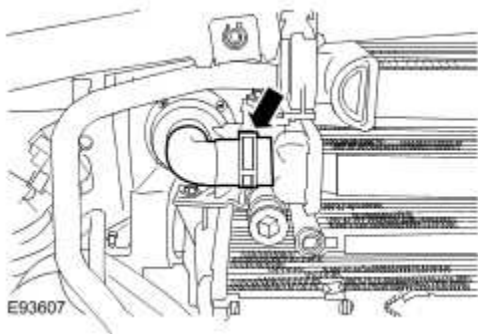
CAUTION: Do not over tighten the drain plug. Failure to follow this instruction may cause damage to the vehicle.

Install the drain plug.



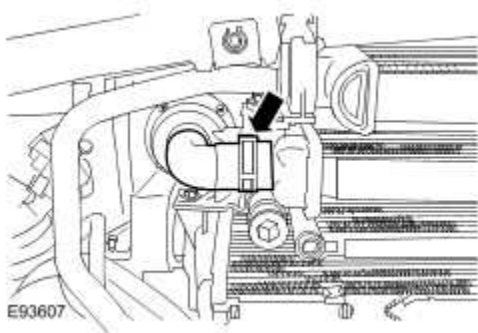
10. Disconnect the supercharger radiator bottom hose.

- Release the clip.
- Disconnect the hose.
- Allow the coolant to drain.



11. Connect the supercharger bottom hose.

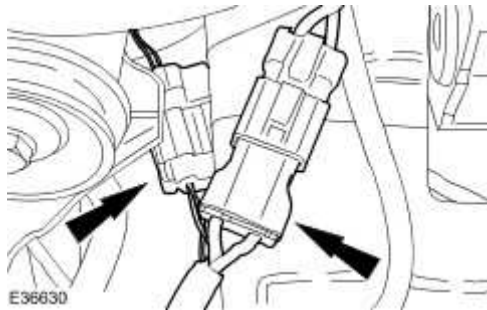
- Connect the hose.
- Secure the clip.



12. Install the radiator lower cowl.

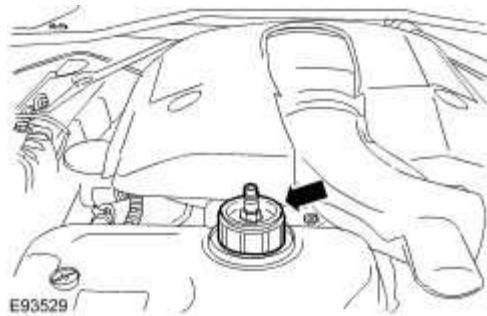


13. Attach the electrical connectors.

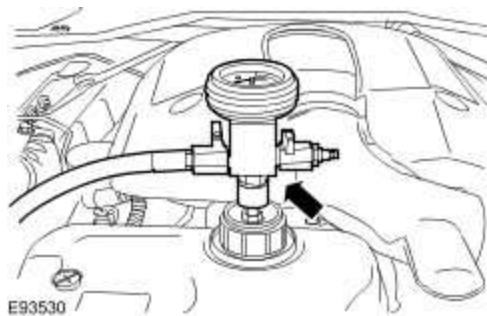


14. Install the radiator splash shield.
Radiator Splash Shield (76.22.90)

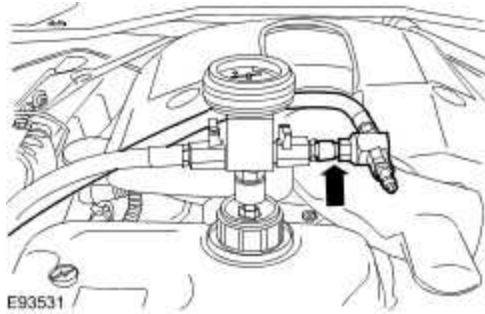
15. Install the cooling system vacuum refill adaptor to the expansion tank.



16. Install the vacuum filler gauge to the cooling system vacuum refill adaptor.



17. Install the venturi tube assembly to the vacuum filler gauge.



18. NOTE:

Make sure both valves are in the closed position on the vacuum filler gauge assembly.

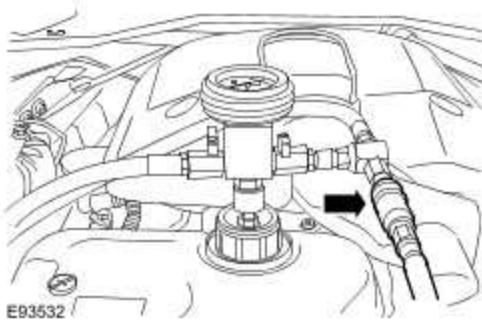
NOTE:

The coolant vacuum fill tool needs an air pressure of 6 to 8 bar (87 to 116 psi) to operate correctly.

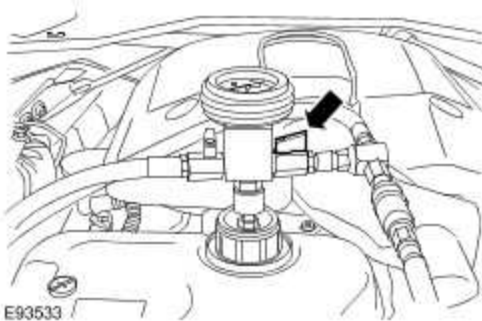
NOTE:

Small diameter or long airlines may restrict airflow to the coolant vacuum fill tool.

Connect a regulated compressed air supply to the venturi tube assembly.



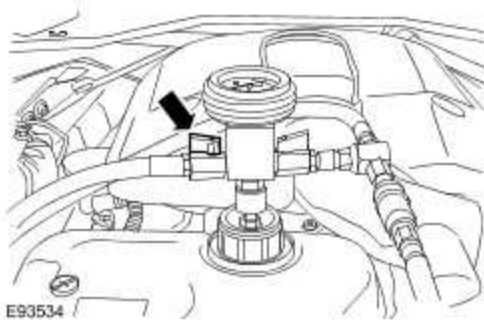
19. Open air supply valve.



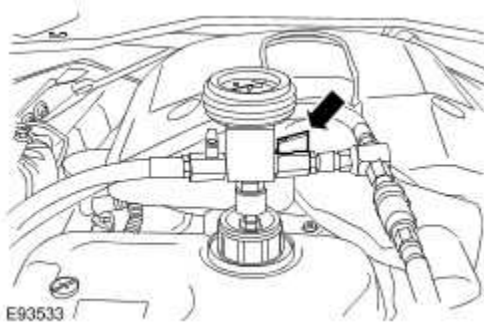
20. NOTE:

Make sure the coolant supply hose is positioned into a container of fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water. Make sure no air can enter the coolant supply hose.

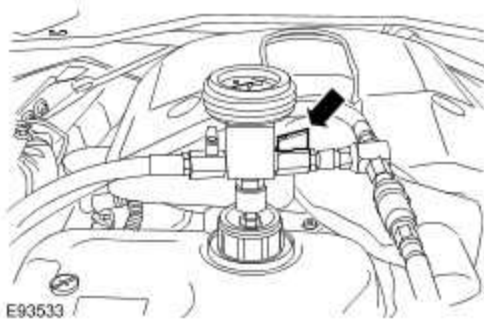
Open coolant supply valve for 2 seconds to prime coolant supply hose.



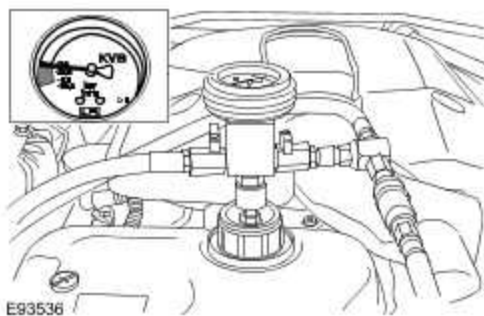
21. Apply air pressure progressively until the arrow on the vacuum filler gauge reaches the green segment.



22. Close air supply valve and disconnect air supply.



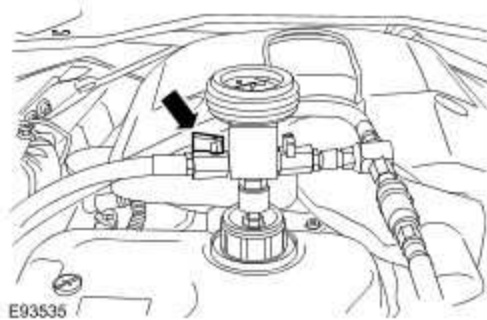
23. Allow 1 minute to check vacuum is held.



24. **NOTE:**

Close the coolant supply valve when the coolant expansion tank MAX mark is reached or coolant movement has ceased.

Open coolant supply valve and allow coolant to be drawn into system.



25. When expansion tank is full and coolant movement has ceased close coolant supply valve.

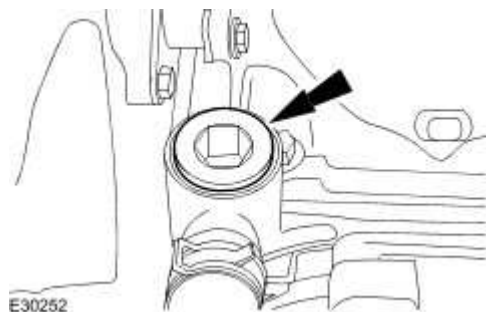
26. Remove vacuum refill adaptor and gauge from expansion tank.

27. Install the coolant expansion tank filler cap.

28. Remove the engine cover.

29. Remove the supercharger coolant filler plug.

- Remove and discard the sealing washer.



30. **NOTE:**

Place a suitable cloth around supercharger fill port.

Top up the coolant through the supercharger fill port.

31.



CAUTION: Coolant may spill from supercharger fill port when ignition switched on.

Switch ignition on.

32.



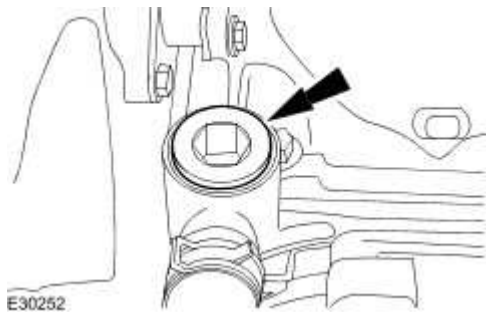
CAUTION: Do not allow the supercharger water pump to run dry for more than one minute. Failure to follow this instruction may result in damage to the vehicle.

Allow the supercharger pump to run and top up the coolant through supercharger fill port.

33. Switch the ignition off.

34. Install the supercharger coolant fill plug.

- Install a new sealing washer.
- Tighten to 45 Nm.
- Clean off any spillages.



35. Install the engine cover.

36.



CAUTION: Do not RUN the engine with the coolant expansion tank pressure cap removed. Failure to follow this instruction may cause damage to the vehicle

START and RUN the engine.

37.



CAUTION: Observe the engine temperature gauge. If the engine starts to over-heat switch off immediately and allow to cool. Failure to follow this instruction may

cause damage to the vehicle.

Allow the engine to RUN until hot air is emitted from the instrument panel registers, while observing the engine temperature gauge.

38. Switch off the engine.

39. Allow the engine to cool.

40.



WARNING: Since injury such as scalding could be caused by escaping steam or coolant, do not remove the filler cap from the coolant expansion tank while the system is hot.

Check and top up the cooling system if required.

Cooling System Flushing

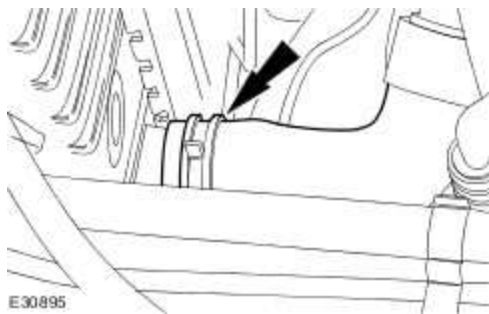
1. Remove the air cleaner. <<303-12A>>

2. Remove the air cleaner. <<303-12B>>

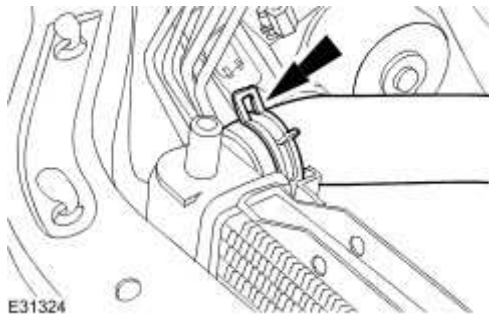
3. Remove the thermostat.

Thermostat - 4.2L, Vehicles With: Supercharger (26.45.07)

4. Detach the lower coolant hose from the radiator and position to one side.



5. Detach the upper coolant hose from the radiator.



NOTE:

To remove rust, sludge and other foreign material from the cooling system, use Premium Cooling System flush, meeting Jaguar specification EGR-M14P7-A, which is safe for use with aluminium cooling systems. This cleaning restores cooling system efficiency and helps prevent overheating.

NOTE:

In severe cases where cleaning solvents will not properly clean the cooling system, it will be necessary to use the pressure flushing method using Cooling System Flusher, 164-R3670 to restore efficient operation.

NOTE:

A pulsating or reversed direction of flushing water will loosen sediment more quickly than a steady flow in the normal coolant flow direction.

NOTE:

Dispose of old coolant and flushing water contaminated with coolant and cleaning chemicals in accordance with local, state and federal laws.

6. Connect a hose pipe to the radiator upper coolant hose connection using a suitable connector.

7.



CAUTION: Radiator internal pressure must not exceed 100 kPa (14.5 psi). Failure to follow this instruction may cause damage to the radiator.

Flush the radiator using the hose pipe until the coolant flowing from the radiator lower coolant hose connection is clear.

8. Remove the hose pipe from the radiator upper coolant hose connection.

9. Connect a hose pipe to the upper coolant hose using a suitable connector.

10. Flush the engine using the hose pipe until the coolant flowing from the radiator lower coolant hose is clear.

11. Remove the hose pipe from the upper coolant hose connection.

12. Connect the upper coolant hose to the radiator.

13. Connect the lower coolant hose to the radiator.

14. Install the thermostat.

15. Fill the cooling system.

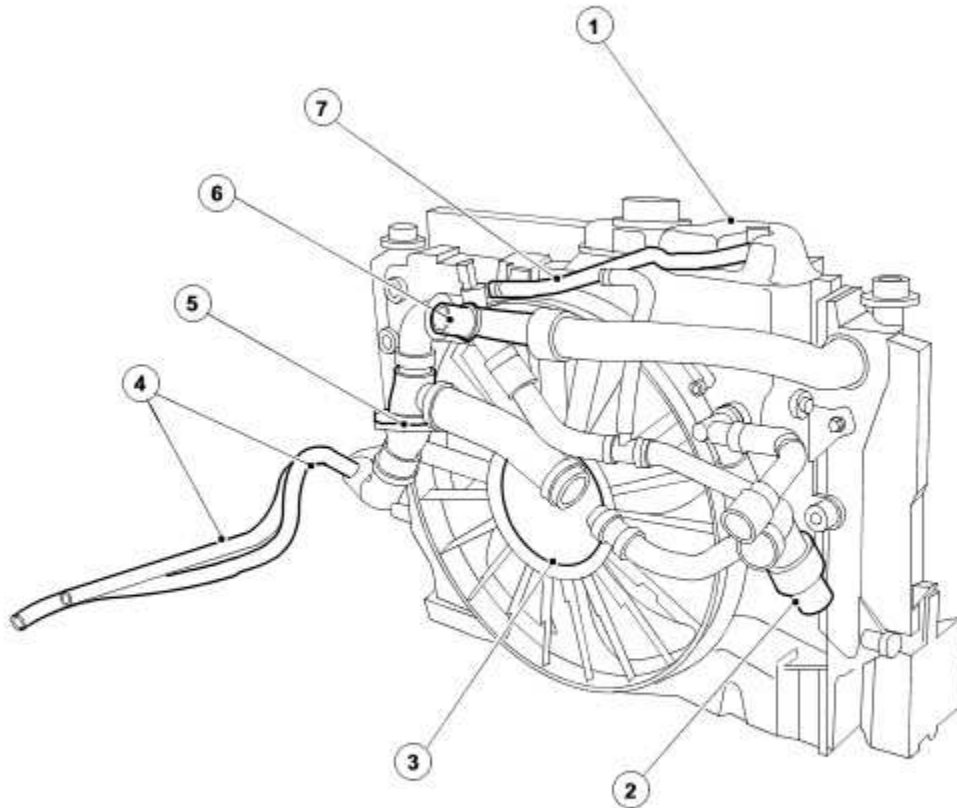
Cooling System Draining, Filling and Bleeding

16. Install the air cleaner. <<303-12A>>

17. Install the air cleaner. <<303-12B>>

Engine Cooling

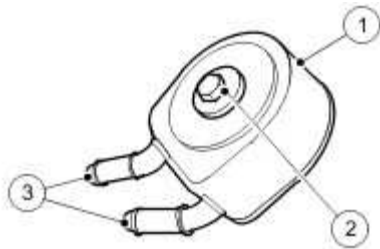
Vehicles with 3.0L engine



E37153

Item	Part Number	Description
1	—	Coolant expansion tank
2	—	Auxiliary coolant flow pump
3	—	Cooling fan motor
4	—	Oil cooler inlet and outlet hoses
5	—	Thermostat housing

6	—	Engine coolant outlet
7	—	Vent hose

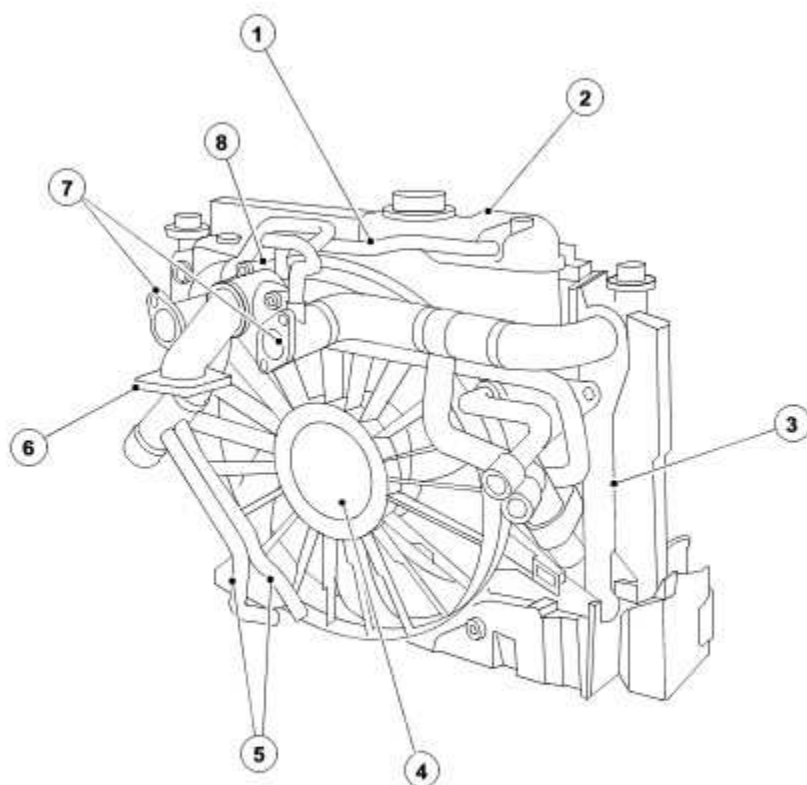


E31280

Item	Part Number	Description
1	—	Engine oil cooler
2	—	Retaining bolt
3	—	Engine oil cooler connections

Vehicles with 4.2L engine

Vehicles with 3.5L or 4.2L engine without supercharger

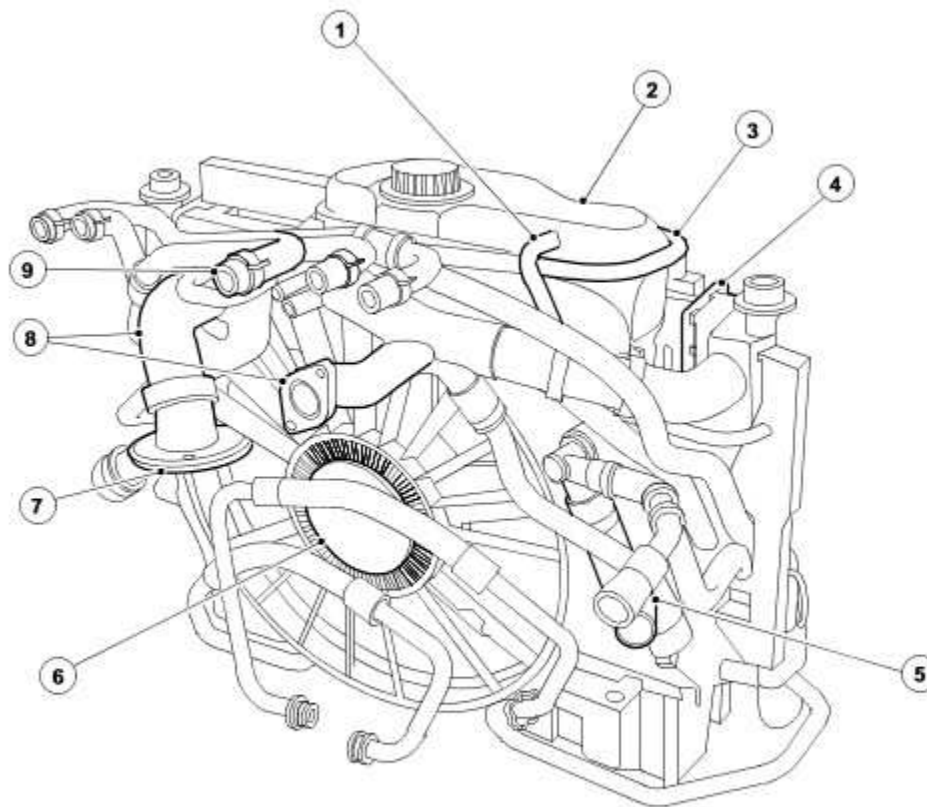


E37154

Item	Part Number	Description
1	—	Vent hose
2	—	Coolant expansion tank
3	—	Radiator
4	—	Cooling fan motor
5	—	Engine oil cooler connections
6	—	Engine coolant inlet
7	—	Engine coolant outlets

8	—	Thermostat housing
---	---	--------------------

Vehicles with 4.2L engine with supercharger



E37155

Item	Part Number	Description
1	—	Vent hose (SC radiator)
2	—	Coolant expansion tank
3	—	Vent hose
4	—	Radiator
5	—	Auxiliary coolant flow pump
6	—	Cooling fan motor

7	—	Engine coolant inlet
8	—	Engine coolant outlet
9	—	Thermostat housing



WARNING: Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury. To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.



WARNING: To avoid the possibility of personal injury, do not operate the engine with the hood open until the fan blades have been examined for cracks and separation. Failure to follow this instruction may result in personal injury.



WARNING: Remove fuse 14 from the engine compartment fuse box prior to performing any under hood service in the area of the cooling fan when the engine is hot, since the cooling fan motor could operate if the engine has been switched OFF. Failure to follow this instruction may result in personal injury.



CAUTION: The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage.



CAUTION: Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in damage to the engine.

The cooling system consists of the following:

- Radiator
- Coolant pressure cap
- Thermostat
- Water pump
- Electric cooling fan
- Coolant expansion tank
- Engine oil cooler

Water Pump

The water pump is of a conventional design and is driven by the crankshaft pulley through the accessory drive belt. The water pump belt tension is maintained by an automatic drive belt tensioner.

<<303-05>>

Thermostat

The thermostat is located in the thermostat housing and allows rapid engine warm-up by restricting coolant flow through the radiator below 82°C (180°F). The thermostat also assists in keeping the engine operating temperature within predetermined limits. On the 4.2L supercharged engine the thermostat begins to open at 84°C (183°F) and is fully open at 98°C (208°F), on the 3.5L or 4.2L and 3.0L engine the thermostat begins to open at 88°C - 92°C (190°F - 198°F) and is fully open at 102°C (216°F).

When the engine is cold and the thermostat is closed, coolant flows from the water pump through the engine. It then returns to the water pump through the upper coolant hose.

When the engine is warm and the thermostat is open, coolant flows into the radiator through the upper coolant hose. It then returns to the water pump from the radiator through the lower coolant hose and engine oil cooler.

The heater core is on a parallel circuit and is unaffected by the position of the thermostat.

Radiator

The radiator is of aluminium construction with plastic end tanks. Foam seals are fitted to the radiator to prevent the cooling air from by passing the radiator core. A coolant drain plug is provided in the lower coolant end tank of the radiator for the draining of the coolant. The cooling fan shroud is attached to the radiator.

Cooling Fan

A single, variable speed cooling fan motor is attached to a fan shroud located behind the radiator. The speed is determined by the Engine Coolant Temperature (ECT) and the air conditioning pressure and transmission oil temperature.

Under hot operating conditions, the fan may continue to operate for four minutes after the engine has been switched off.

Engine Block Heater

For vehicle markets subject to very cold climate conditions, an engine block heater for connection to an external mains power supply, is fitted in place of the engine block drain plug.

Coolant Recovery System

A pressurized coolant expansion tank system is used which continuously separates the air from the cooling system and replenishes the system through the coolant expansion tank outlet hose, attached to the heater return hose.

A continuous vent from the engine and radiator to the coolant expansion tank prevents air locks from forming in the cooling system.

Manual bleed points are provided on the coolant reservoir.

The coolant expansion tank serves as the location for:

- service fill.
- coolant expansion during warm-up.
- air separation during operation.
- system pressurization by the coolant pressure cap.

The coolant expansion tank is designed to have approximately 0.5 to 1 liter of air when cold to allow for coolant expansion.

Engine Oil Cooler

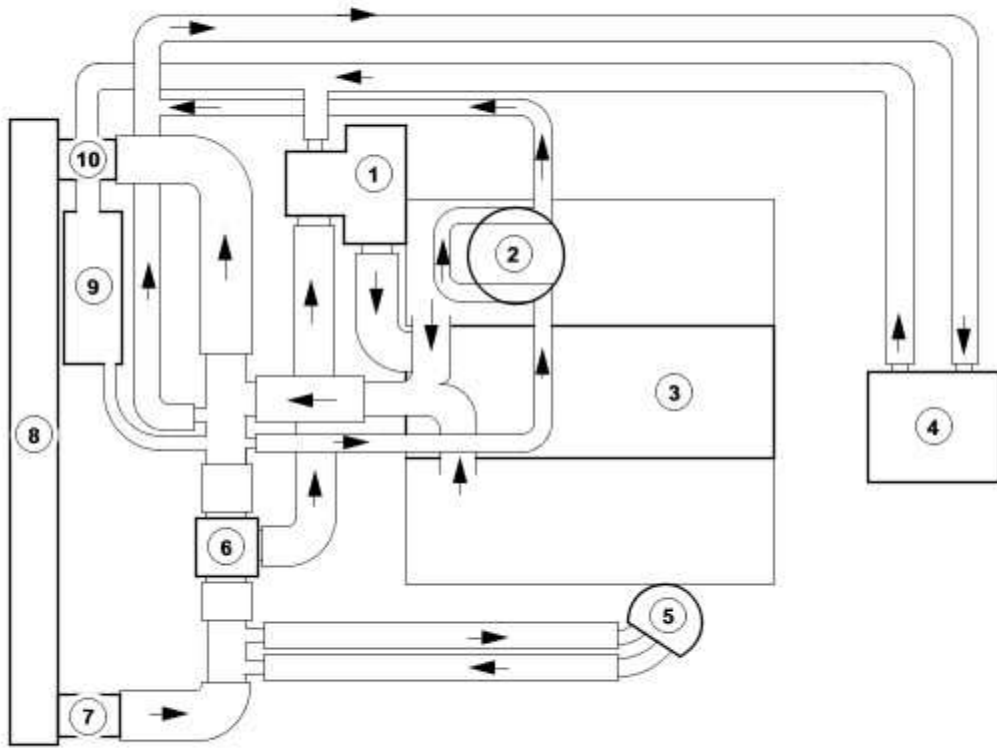
The engine oil cooler is a Modine oil to water type. The oil cooler on the 3.0L engine is fitted to the oil filter housing. The oil cooler on the 3.5L or 4.2L engine is located at the front of the engine and is fitted between the oil filter housing and the oil filter. The oil cooler on the 4.2L engine with a supercharger is fitted behind the front bumper on the front of the cooling pack.

The coolant supply for the engine oil cooler is through the radiator bottom hose.

Engine Coolant

The long life engine coolant is formulated to last for five years or 240,000 km (150,000 miles). The coolant is silicate free and orange in color. The long life engine coolant must not be mixed with conventional engine coolant.

Vehicles with 3.0L engine

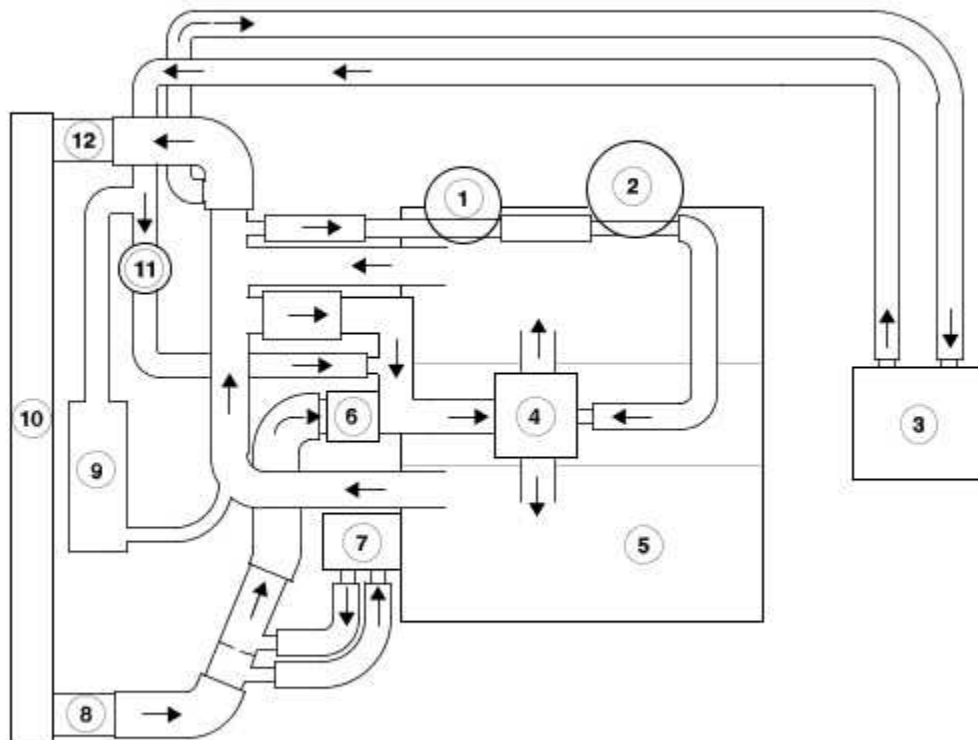


E36784

Item	Part Number	Description
1	—	Water pump
2	—	Throttle body
3	—	V6 engine
4	—	Heater core
5	—	Engine oil cooler
6	—	Thermostat
7	—	Lower hose
8	—	Radiator

9	—	Coolant expansion tank
10	—	Upper hose

Vehicles with 3.5L or 4.2L engine

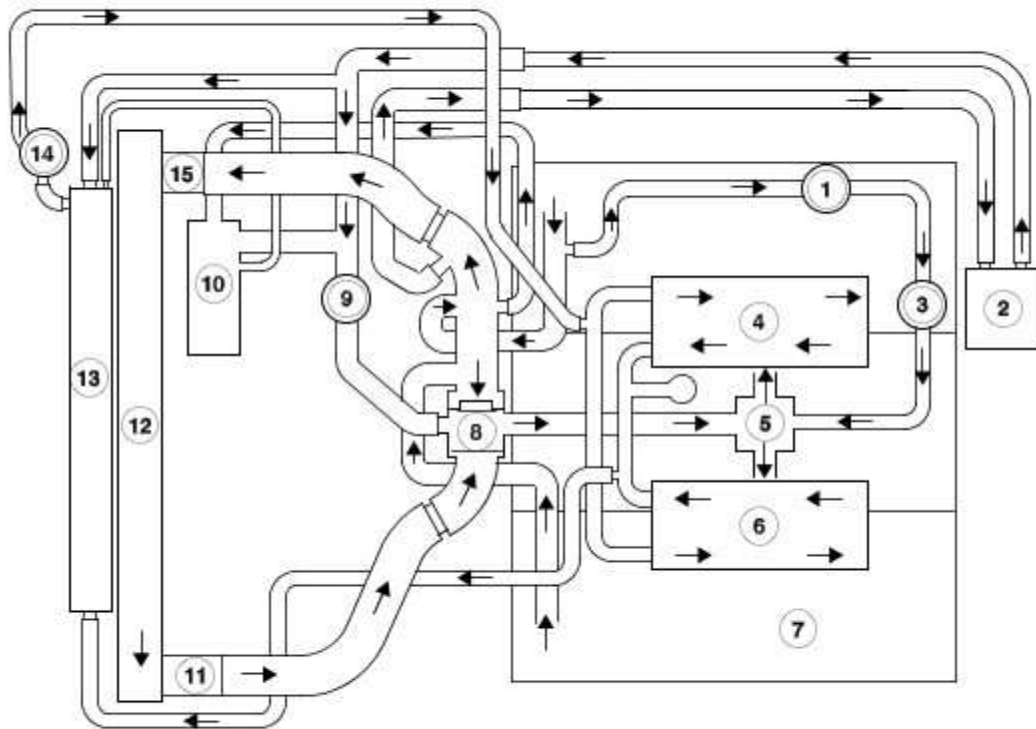


E36782

Item	Part Number	Description
1	—	EGR valve
2	—	Throttle body
3	—	Heater core
4	—	Water pump
5	—	Engine bank (left-hand)

6	—	Thermostat
7	—	Engine oil cooler
8	—	Lower hose
9	—	Coolant expansion tank
10	—	Radiator
11	—	Auxiliary coolant flow pump
12	—	Upper hose

Vehicles with 4.2L engine with supercharger



E36783

Item	Part Number	Description
------	-------------	-------------

1	—	EGR valve
2	—	Heater core
3	—	Throttle body
4	—	Charge air cooler (right-hand)
5	—	Water pump
6	—	Charge air cooler (left-hand)
7	—	Engine bank (left-hand)
8	—	Thermostat
9	—	Auxiliary coolant flow pump
10	—	Coolant expansion tank
11	—	Lower hose
12	—	Radiator
13	—	SC radiator
14	—	SC coolant pump
15	—	Upper hose

Diagnosis and testing

Engine Cooling

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Leaks	Fuse
Coolant expansion tank	Wiring harness
Electric fan	Loose or corroded connector(s)
Radiator	Engine cooling temperature (ECT) sensor or engine cylinder head temperature (CHT) sensor

- 1 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 2 . If the concern is not visually evident, verify the symptom and refer to symptom chart.

DTC	Condition	Possible Source	Action
P0116	Concern with engine coolant temperature (range/performance)	<ul style="list-style-type: none">• ECT sensor.• ECT sensor circuit(s).• Low/contaminated coolant.• Thermostat failure.• Overheating.	For V6 vehicles, <<303-14A>> For V8 Vehicles, <<303-14B>>
P0117	Concern with engine coolant temperature (low input)	<ul style="list-style-type: none">• ECT sensor.• ECT sensor circuit (short to ground/open circuit).	For V6 vehicles, <<303-14A>> For V8 Vehicles, <<303-14B>>
P0118	Concern with engine coolant temperature (high input)	<ul style="list-style-type: none">• ECT sensor.• ECT sensor circuit (short to ground/open circuit).	For V6 vehicles, <<303-14A>> For V8 Vehicles, <<303-14B>>

P0125	Concern with engine coolant temperature (insufficient for close loop control)	<ul style="list-style-type: none"> ECT sensor. ECT sensor circuit (short to ground/open circuit). 	For V6 vehicles, <<303-14A>> For V8 Vehicles, <<303-14B>>
P1474	Concern with engine coolant temperature	Water pump malfunction.	<p>Water Pump - 3.0L, VIN Range: G00442->G45703 (26.50.01)</p> <p>Water Pump - 4.2L, Vehicles With: Supercharger (26.50.01)</p> <p>Water Pump - 3.5L/4.2L, Vehicles Without: Supercharger (26.50.01)</p>
None	Concern with coolant loss	<ul style="list-style-type: none"> Hoses. Hose connections. Radiator. Water pump. Heater core. Gaskets. Engine casting cracks. Engine block core plugs. 	GO to Pinpoint Test G234419p1.
None	Concern with overheating	<ul style="list-style-type: none"> Engine coolant (level/condition). Thermostat. Fan motor. Fan motor fuses and/or circuits. ECT sensor. Engine control module (ECM). Fan speed module. 	GO to Pinpoint Test G234419p2.
None	Concern with engine not reaching normal temperature	<ul style="list-style-type: none"> Thermostat. Electric fan. Fan speed module. 	GO to Pinpoint Test G234419p3.

PINPOINT TEST G234419p1 : LOSS OF COOLANT

G234419t1 : VISUAL INSPECTION

1. Visually inspect for loss of coolant. 2. Carry out a system pressure test. See component tests in this section.

- **Is the engine cooling system leaking?**

-> **Yes**

Rectify the leak as indicated by the test result. TEST the system for normal operation.

-> **No**

Verify the customer complaint.

PINPOINT TEST G234419p2 : THE ENGINE OVERHEATS

G234419t2 : CHECK COOLANT

1. Check the coolant level and condition.

- **Does the system contain sufficient coolant of the correct specification?**

-> **Yes**

GO to Pinpoint Test G234419t3.

-> **No**

Top-up the system.

Cooling System Draining, Filling and Bleeding Check for coolant loss. GO to Pinpoint Test G234419p1.

G234419t3 : CHECK THERMOSTAT

1. Check the thermostat.

Thermostat - 3.0L (26.45.07)

Thermostat - 4.2L, Vehicles With: Supercharger (26.45.07)

Thermostat - 3.5L/4.2L, Vehicles Without: Supercharger (26.45.07) See component tests in this section.

- **Is the thermostat OK?**

-> **Yes**

<<303-14A>> Cooling fans, modules, circuits, sensors, etc. are tested in this section.

-> **No**

INSTALL a new thermostat.

Thermostat - 3.0L (26.45.07)

Thermostat - 4.2L, Vehicles With: Supercharger (26.45.07)

Thermostat - 3.5L/4.2L, Vehicles Without: Supercharger (26.45.07) TEST the system for normal operation.

PINPOINT TEST G234419p3 : THE ENGINE DOES NOT REACH NORMAL OPERATING TEMPERATURE

G234419t4 : CHECK THERMOSTAT

1. Check the thermostat.

Thermostat - 3.0L (26.45.07)

Thermostat - 4.2L, Vehicles With: Supercharger (26.45.07)

Thermostat - 3.5L/4.2L, Vehicles Without: Supercharger (26.45.07) See component tests in this section.

- **Is the thermostat OK?**

-> **Yes**

<<303-14A>> Cooling fans, modules, circuits, sensors, etc. are tested in this section.

-> **No**

INSTALL a new thermostat.

Thermostat - 3.0L (26.45.07)

Thermostat - 4.2L, Vehicles With: Supercharger (26.45.07)

Thermostat - 3.5L/4.2L, Vehicles Without: Supercharger (26.45.07) TEST the system for normal operation.

Component Tests

Pressure Test



WARNING: Never remove the coolant expansion tank cap under any circumstances while the engine is operating. Failure to follow these instructions may result in damage to the cooling system or engine and/or personal injury. To avoid having scalding hot water or steam blow out of the cooling system, use extreme care when removing the coolant expansion tank cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant expansion tank cap and turn it slowly until the pressure begins to release, step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant expansion tank cap. Failure to follow these instructions may result in personal injury.

- 1 . Switch the engine off.
- 2 . Open the hood and install protective fender covers.
- 3 . Carefully remove the coolant expansion tank cap from the coolant expansion tank to relieve pressure in the cooling system. Add coolant to coolant expansion tank as necessary.
- 4 . Install the adapter fitting from Pressure Tester tightly between overflow/air purge nipple and overflow/air purge hose at the coolant expansion tank. Reinstall the coolant expansion tank cap.
- 5 . Attach the pressure pump and gauge to the adapter fitting and pressurize the cooling system to the coolant expansion tank cap lower limit. Refer to Specification.
- 6 . Pressurize the cooling system. Observe the gauge reading for approximately two minutes. Pressure should not drop during this time.

➤ If system holds pressure, proceed to step 8.

➤ If the pressure drops, check for leaks at the engine to heater core hoses, engine to radiator hoses, bypass hose, water valve hose (if applicable), thermostat housing gasket, radiator and heater core, etc. Also refer to engine system checks if a leak cannot be located in the cooling system. Correct any leaks found and recheck the system.

- 7 . Release the system pressure by loosening the coolant expansion tank cap. Check the coolant level. Replenish as necessary with the correct coolant solution.
- 8 . Check the radiator overflow hose for any obstructions which may block the flow of coolant either to or from the coolant expansion tank.
- 9 . Conduct the coolant expansion tank pressure cap pressure test in this section.

Coolant Expansion Tank Pressure Cap Pressure Test



WARNING: Never remove the coolant expansion tank cap under any circumstances while the engine is operating. Failure to follow these instructions may result in damage to the cooling system or engine and/or personal injury. To avoid having scalding hot water or steam blow out of the cooling system, use extreme care when removing the coolant expansion tank cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant

expansion tank cap and turn it slowly until the pressure begins to release, step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant expansion tank cap. Failure to follow these instructions may result in personal injury.

- 1 . Remove the expansion tank cap from the radiator coolant expansion tank.
- 2 . Use water to clean in area of rubber seal and vacuum relief valve. Immerse expansion tank cap in water and install expansion tank cap pressure test adapter from Pressure Tester on the expansion tank cap.

3 . NOTE:

If the plunger of the pump is depressed too quickly, an erroneous pressure reading will result.

Slowly depress the plunger of the pressure test pump until the pressure gauge reading stops increasing, and note highest pressure reading obtained.

- 4 . Release pressure by turning the pressure relief screw counterclockwise. Then tighten the pressure relief screw and repeat Step 5 at least twice to make sure the pressure test reading is repeatable and within acceptable gauge reading limits of the expansion tank cap.

- 5 . If the pressure test gauge readings are not within acceptable gauge reading limits, install a new expansion tank cap.

Thermostat Test - mechanical

Remove and inspect the thermostat, note its opening temperature and immerse it in water. Heat the water until this temperature is reached. The thermostat should begin to open. If it does not begin to open, install a new thermostat. Continue to heat the water until the thermostat fully opens, 5.8 mm (0.2 in) or more off the valve seat. If it does not fully open, install a new thermostat.

Radiator Leak Test - removed from the vehicle



CAUTION: Do not leak test an aluminium radiator in the same water that is used to leak test copper/brass radiators. Flux and caustic cleaners may be present in the test water which will corrode aluminium.

Clean the radiator before leak testing to prevent contamination of the test tank. Leak test the radiator in clean water with 138 kPa (20 psi) air pressure.

A separate clean test tank is recommended for aluminium radiators. If a separate tank is not available for aluminium radiator testing, rinse the test tank each time before testing an aluminium radiator.

Coolant Expansion Tank (26.15.01)

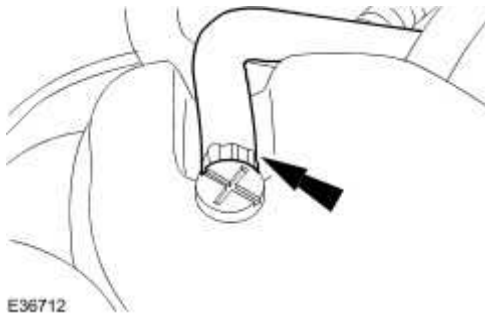
Removal

Vehicles without supercharger

1 . NOTE:

Cap the vent hose to minimize coolant loss.

Detach the vent hose.

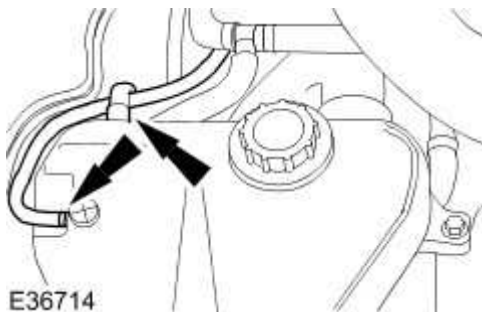


Vehicles with supercharger

2 . NOTE:

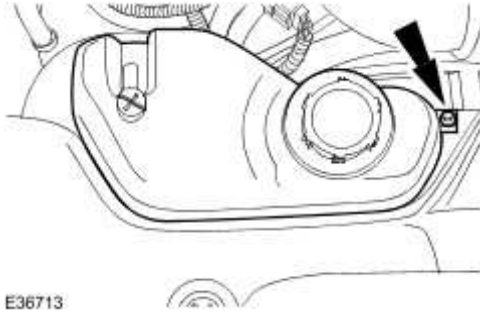
Cap the vent hoses to minimize coolant loss.

Detach the vent hoses.

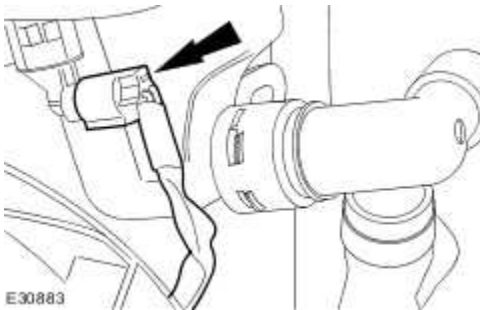


All vehicles

- 3 . Detach the coolant expansion tank.



- 4 . Disconnect the coolant expansion tank low level sensor electrical connector.



- 5 . **NOTE:**

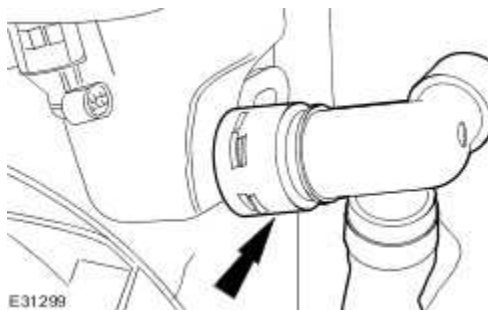
Make sure the retaining clip is not removed.

NOTE:

Cap the coolant expansion tank lower hose to minimize coolant loss.

Detach the coolant expansion tank lower hose.

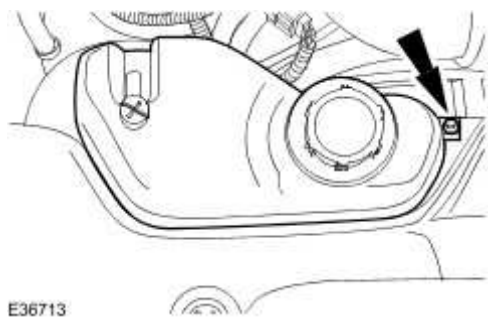
- ▶ Remove the coolant expansion tank.



Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 3 Nm.



- 2 . Check and top up the cooling system as required.

Cooling Fan Motor and Shroud (26.25.25)

Removal

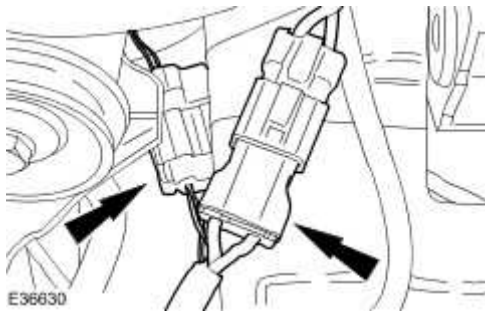
All Vehicles

- 1 Remove fuse 14 from the engine compartment fuse box prior to performing any under hood . service in the area of the cooling fan.

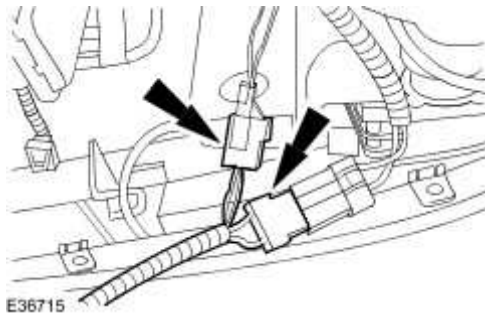
- 2 . Drain the cooling system.

For additional information, refer to

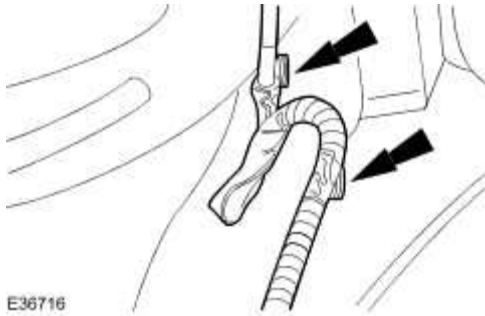
- 3 . Detach the electrical connectors.



- 4 . Disconnect the electric fan electrical connectors.

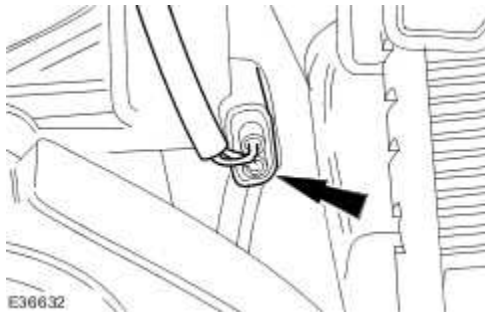


- 5 . Detach the wiring harness.



Vehicles with supercharger

- 6 . Disconnect the supercharger water pump electrical connector.



All vehicles

- 7 . Lower the vehicle.
- 8 . Remove the coolant expansion tank.
For additional information, refer to

Vehicles with 3.0L engine

- 9 . Remove the air cleaner. <<303-12A>>

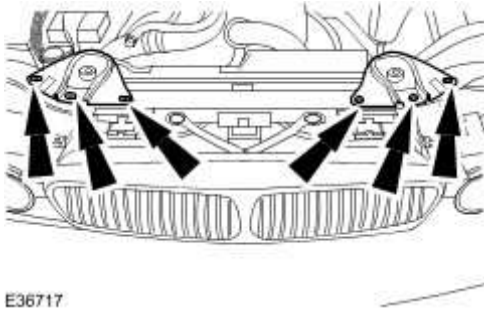
Vehicles with 3.5L or 4.2L engine

- 10 . Remove the air cleaner. <<303-12B>>

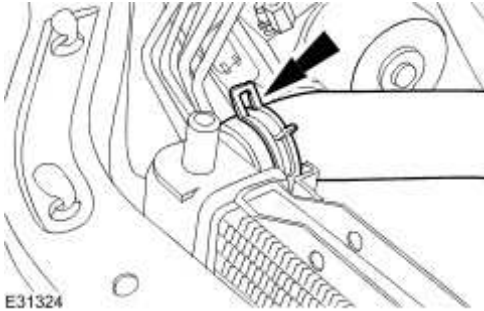
All Vehicles

- 11 . Remove the radiator grille opening panel. <<501-02>>

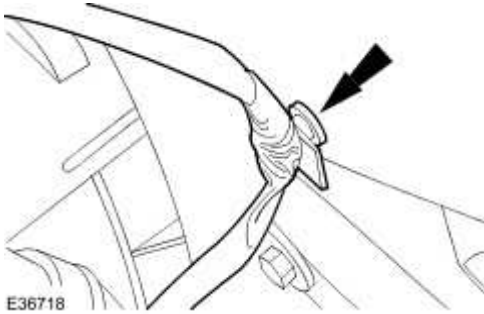
12 . Remove the radiator mounting brackets.



13 . Detach the upper coolant hose.

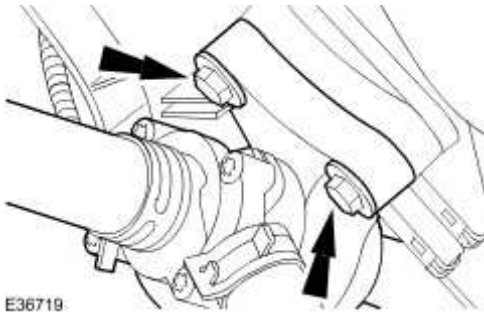


14 . Detach the wiring harness.



Vehicles with 3.5L or 4.2L engine

15 . Detach the auxiliary coolant flow pump.

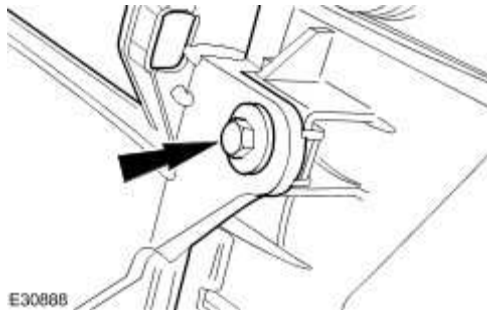


All vehicles

16 . NOTE:

Right-hand shown left-hand similar.

Remove the cooling fan motor and shroud retaining bolt.



17



CAUTION: Make sure that the retaining lugs of the radiator are not damaged when detaching the cooling fan motor and shroud. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

Left-hand shown right-hand similar.

Detach the cooling fan motor and shroud retaining lugs from the radiator.



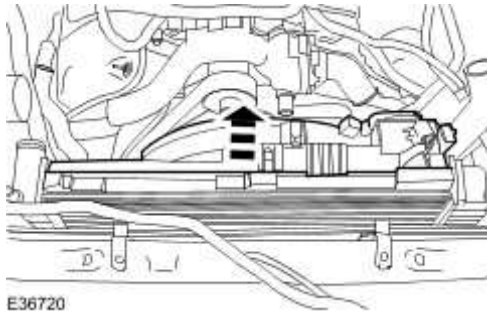
18



CAUTION: Make sure that the radiator is not damaged when removing the cooling fan motor and shroud. Failure to follow this instruction may result in damage to the


vehicle.


Remove the cooling fan motor and shroud.



Installation

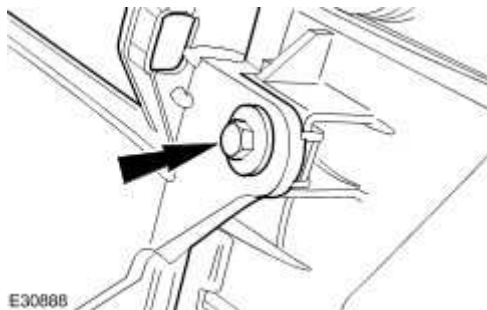
All vehicles

- 1  **CAUTION:** Make sure that the radiator is not damaged when installing the cooling fan motor and shroud. Failure to follow this instruction may result in damage to the vehicle.

 **CAUTION:** Make sure that the retaining lugs of the radiator are not damaged when installing the cooling fan motor and shroud. Failure to follow this instruction may result in damage to the vehicle.

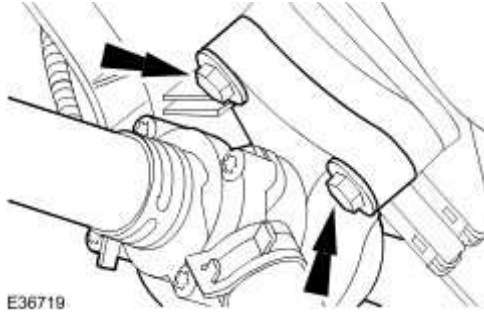
To install, reverse the removal procedure.

 Tighten to 7 Nm.



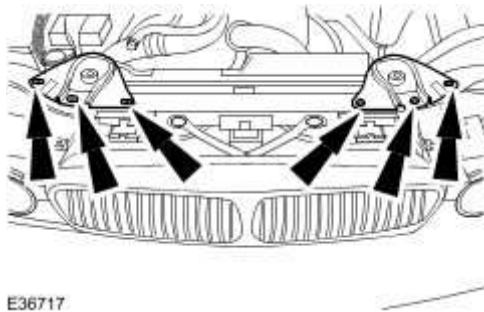
Vehicles with 3.5L or 4.2L engine

2 . Tighten to 10 Nm.



All vehicles

3 . Tighten to 9 Nm.



4 . Fill the cooling system.

For additional information, refer to

Radiator (26.40.01)

Removal

All vehicles

- 1 . Remove the cooling fan motor and shroud.
For additional information, refer to Cooling Fan Motor and Shroud (26.25.25)

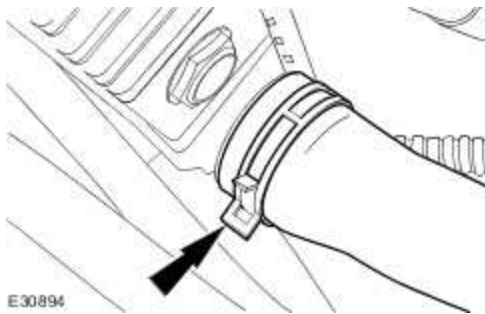
- 2 . Detach the transmission oil cooler inlet and return pipes.

▶ Remove and discard the O-ring seals.

▶ Cap the oil cooler inlet and return pipes and the oil cooler.



- 3 . Detach the lower coolant hose.



- 4 . Raise the vehicle.

- 5 . Remove the radiator lower cowl.

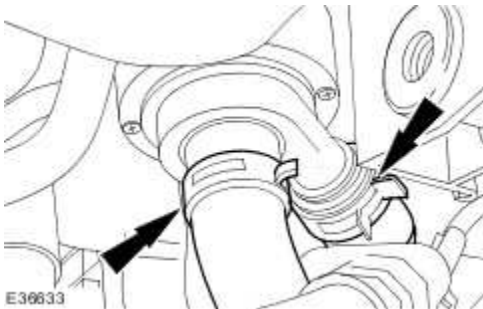


Vehicles with supercharger

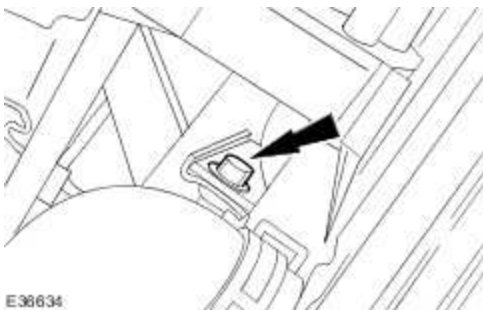
6 . Remove the oil cooler.

For additional information, refer to Oil Cooler - Vehicles With: Supercharger (12.60.68)

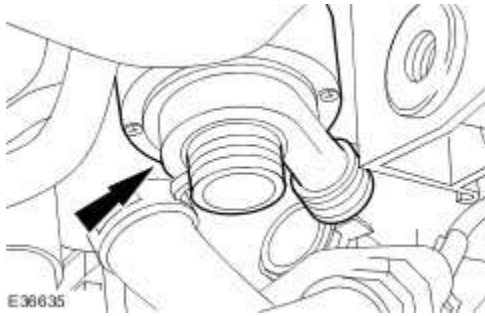
7 . Disconnect the water pump coolant hoses.



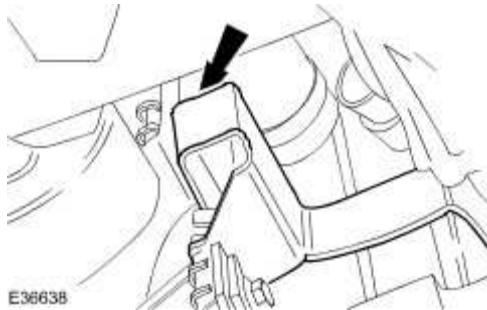
8 . Remove the water pump retaining bolt.



9 . Remove the water pump.



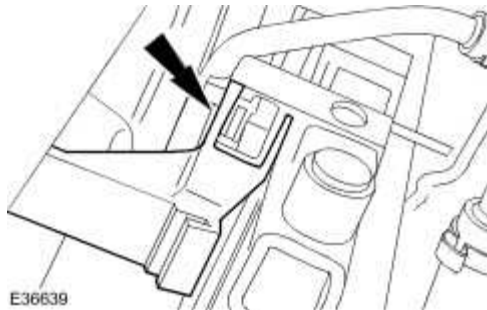
10 . Remove the water pump retaining bracket.



11 . **NOTE:**

Left-hand shown, right-hand similar.

Detach the power assisted steering oil cooler.

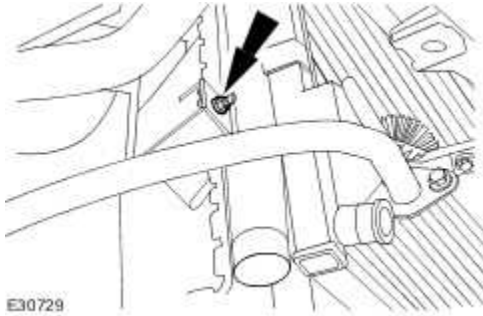


12 **NOTE:**

Left-hand shown, right-hand similar.

Remove the cooling module retaining bolt.

- ▶ Secure the supercharger cooling radiator, condenser core and engine oil cooler using suitable retaining straps.

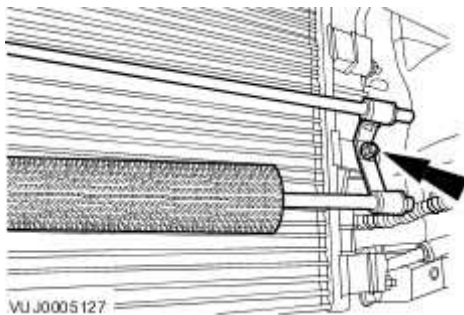


Vehicles without supercharger

13 . NOTE:

Left-hand shown, right-hand similar.

Detach the power steering oil cooler.

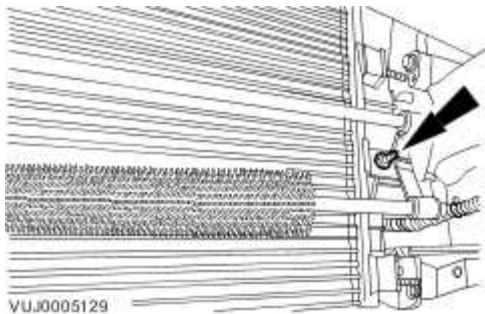


14 . NOTE:

Left-hand shown, right-hand similar.


Remove the condenser core retaining stud.

- ▶ Secure the condenser core and PAS cooler using suitable retaining straps.

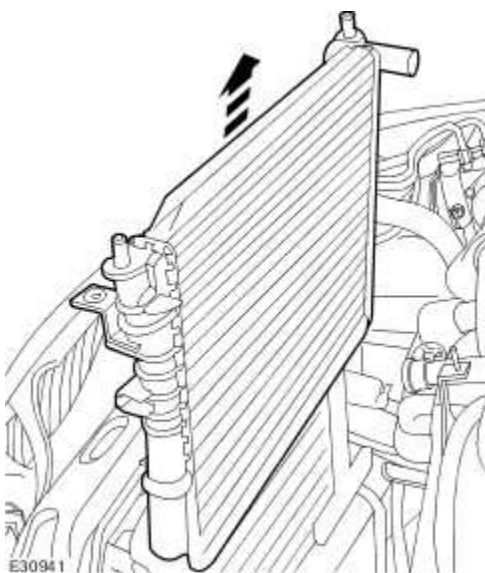


All vehicles

15 . Lower the vehicle.

16 .  **CAUTION:** Make sure that the radiator is not damaged when removed.

Remove the radiator.



Installation

All vehicles

1 .  **CAUTION:** Make sure that the radiator is not damaged when installed.

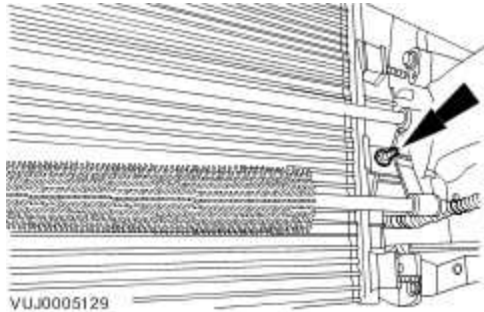
To install, reverse the removal procedure.

Vehicles without supercharger

2 . NOTE:

Left-hand shown, right-hand similar.

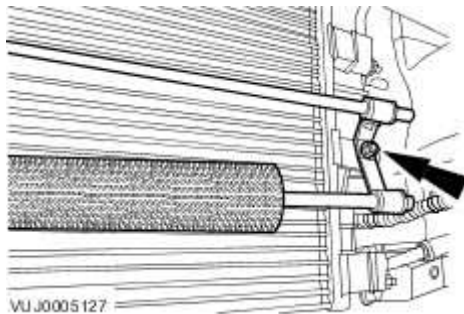
Tighten to 7 Nm.



3 . NOTE:

Left-hand shown, right-hand similar.

Tighten to 7 Nm.

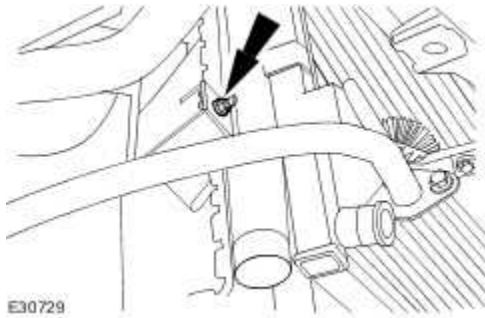


Vehicles with supercharger

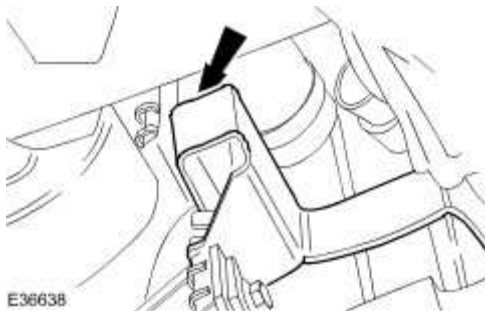
4 . NOTE:

Left-hand shown, right-hand similar.

Tighten to 7 Nm.



5 . Tighten to 7 Nm.



All vehicles

6 . **NOTE:**

Install new O-ring seals.

Tighten to 20 Nm.



7 . Fill the cooling system.

For additional information, refer to Cooling System Draining, Filling and Bleeding

8 . Carry out transmission fluid level check.

For additional information, refer to Transmission Fluid Level Check

Thermostat - 3.0L (26.45.07)

Removal

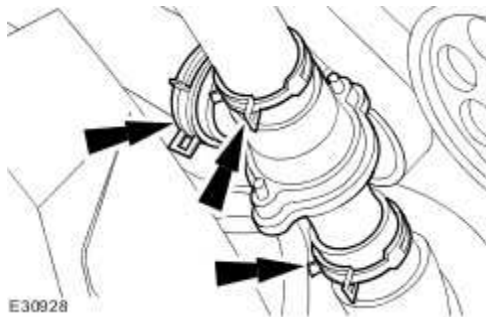
- 1 Remove fuse 14 from the engine compartment fuse box prior to performing any under hood
service in the area of the cooling fan.

- 2 . Drain the cooling system.
For additional information, refer to

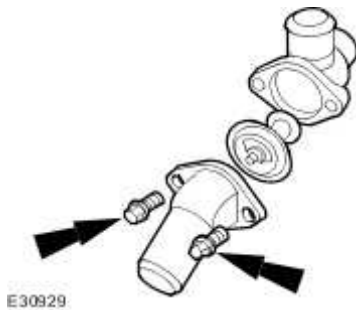
- 3 . Lower the vehicle.

- 4 . Remove the air cleaner outlet pipe. <<303-12A>>

- 5 . Remove the thermostat housing.



- 6 . Remove the thermostat.

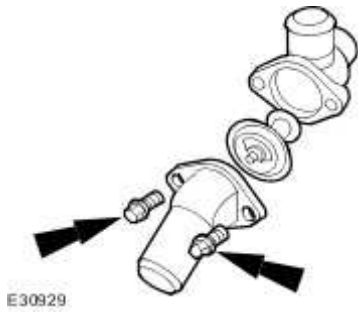


Installation

1 . To install, reverse the removal procedure.

▶ Install a new O-ring seal.

▶ Tighten to 18 Nm.



2 . Fill the cooling system.

For additional information, refer to

Thermostat - 3.5L/4.2L, Vehicles Without: Supercharger (26.45.07)

Removal



WARNING: Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury. To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.



WARNING: To avoid the possibility of personal injury, do not operate the engine with the hood open until the fan blades have been examined for cracks and separation. Failure to follow this instruction may result in personal injury.



WARNING: Remove fuse 14 from the engine compartment fuse box prior to performing any under hood service in the area of the cooling fan when the engine is hot, since the cooling fan motor could operate if the engine has been switched OFF. Failure to follow this instruction may result in personal injury.



CAUTION: The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the engine.



CAUTION: Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in damage to the engine.

- 1 Remove fuse 14 from the engine compartment fuse box prior to performing any under hood

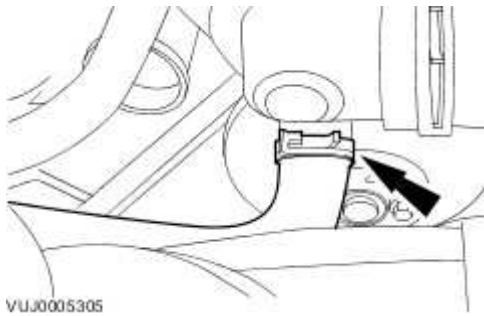
. service in the area of the cooling fan.

2 . Remove the air cleaner outlet tube.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

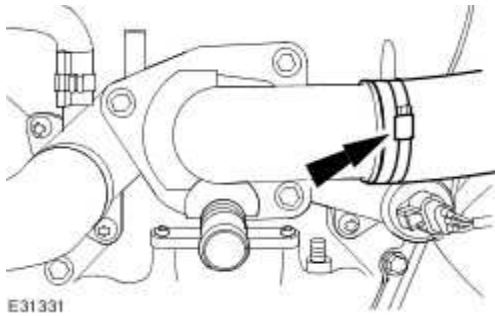
3 . Detach the thermostat housing hose.

▶ Clamp the relevant hoses, to minimise coolant loss.

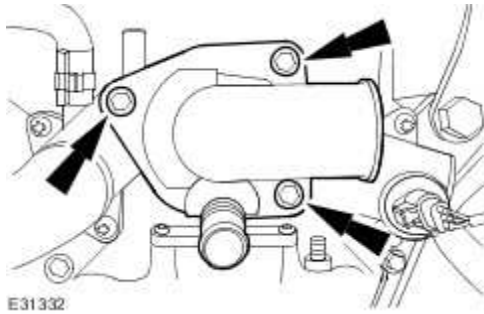


4 . Detach the thermostat housing hose.

▶ Clamp the relevant hoses, to minimise coolant loss.



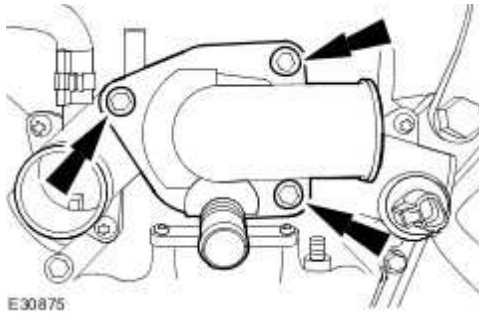
5 . Remove the thermostat.



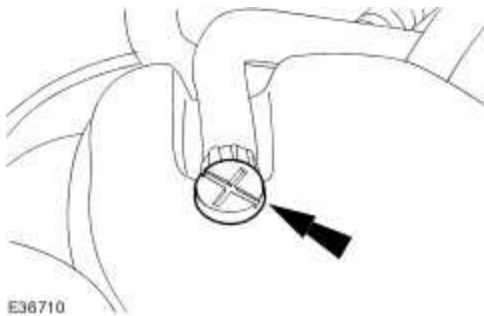
Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 9 Nm.



- 2 . Remove the coolant expansion tank bleed screw.



- 3 Fill the cooling system up to the MAX mark on the coolant expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.

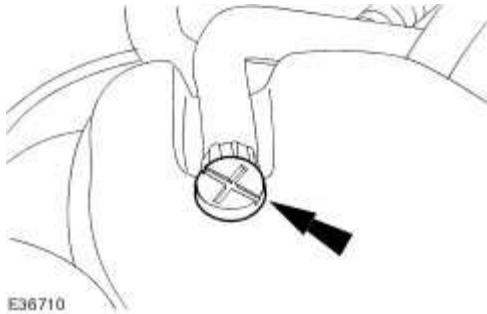
4



- **CAUTION: Do not over tighten the coolant expansion tank bleed screw. Failure to follow this instruction may cause damage to the vehicle.**

Install the coolant expansion tank bleed screw.

▶ Tighten to 3 Nm.



5 . Install the coolant expansion tank pressure cap.

6



- **CAUTION: Do not RUN the engine with the coolant expansion tank pressure cap removed. Failure to follow this instruction may cause damage to the vehicle.**

START and RUN the engine.

7 SET the heating system to MAX heat, the blower motor to MAX speed and the air distribution to instrument panel registers.

8



- **CAUTION: Observe the engine temperature gauge. If the engine starts to over-heat switch off immediately and allow to cool. Failure to follow this instruction may cause damage to the vehicle.**


Allow the engine to RUN until hot air is emitted from the instrument panel registers, while

observing the engine temperature gauge.


9 . Switch off the engine.

10 . Allow the engine to cool.

11 . Release the cooling system pressure.

 Remove the coolant expansion tank pressure cap.

12 Top up the cooling system.

 Fill the cooling system up to the MAX mark on the coolant expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.

13 . Install the coolant expansion tank pressure cap.

Thermostat - 4.2L, Vehicles With: Supercharger (26.45.07)

Removal



WARNING: Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury. To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.



WARNING: To avoid the possibility of personal injury, do not operate the engine with the hood open until the fan blades have been examined for cracks and separation. Failure to follow this instruction may result in personal injury.



WARNING: Remove fuse 14 from the engine compartment fuse box prior to performing any under hood service in the area of the cooling fan when the engine is hot, since the cooling fan motor could operate if the engine has been switched OFF. Failure to follow this instruction may result in personal injury.



CAUTION: The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the engine.



CAUTION: Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in damage to the engine.

- 1 Remove fuse 14 from the engine compartment fuse box prior to performing any under hood

. service in the area of the cooling fan.

2 . Remove the air cleaner outlet tube.

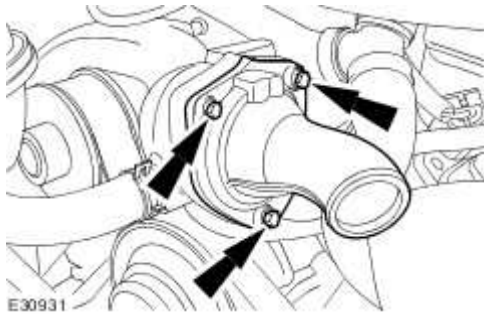
For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

3 . Detach the thermostat housing coolant hose.

▶ Clamp the relevant hose, to minimise coolant loss.



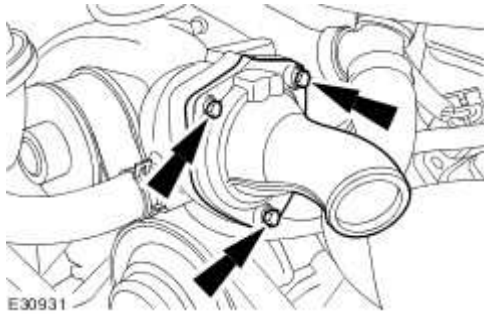
4 . Remove the thermostat.



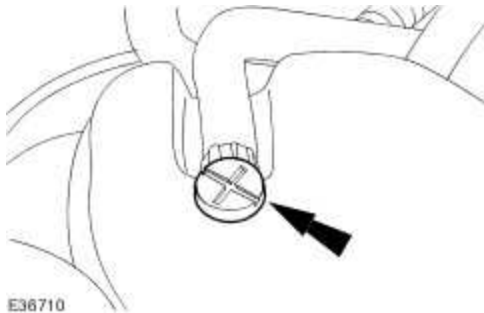
Installation

1 . To install, reverse the removal procedure.


▶ Tighten to 9 Nm.



2 . Remove the coolant expansion tank bleed screw.

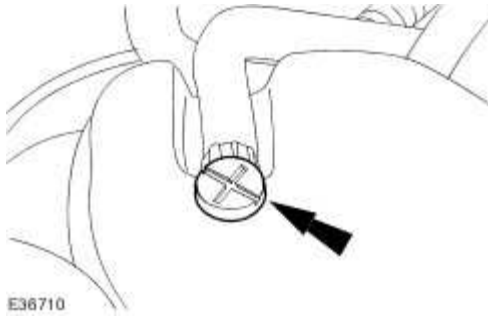


3 Fill the cooling system up to the MAX mark on the coolant expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.


4  **CAUTION: Do not over tighten the coolant expansion tank bleed screw. Failure to follow this instruction may cause damage to the vehicle.**

Install the coolant expansion tank bleed screw.

 Tighten to 3 Nm.




5 . Install the coolant expansion tank pressure cap.

- 6
-  **CAUTION: Do not RUN the engine with the coolant expansion tank pressure cap removed. Failure to follow this instruction may cause damage to the vehicle.**

START and RUN the engine.

- 7 SET the heating system to MAX heat, the blower motor to MAX speed and the air distribution
- to instrument panel registers.


- 8
-  **CAUTION: Observe the engine temperature gauge. If the engine starts to over-heat switch off immediately and allow to cool. Failure to follow this instruction may cause damage to the vehicle.**

Allow the engine to RUN until hot air is emitted from the instrument panel registers, while observing the engine temperature gauge.


9 . Switch off the engine.

10 . Allow the engine to cool.

11 . Release the cooling system pressure.

 Remove the coolant expansion tank pressure cap.

12 Top up the cooling system.

 Fill the cooling system up to the MAX mark on the coolant expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.

13 . Install the coolant expansion tank pressure cap.

Water Pump - 3.0L, VIN Range: G00442- >G45703 (26.50.01)

Removal

- 1 Remove fuse 14 from the engine compartment fuse box prior to performing any under hood service in the area of the cooling fan.

- 2 . Drain the cooling system.


For additional information, refer to

- 3 . Lower the vehicle.

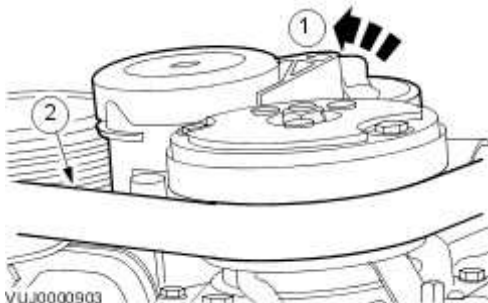
- 4 . Remove the air cleaner outlet pipe. <<303-12A>>

- 5 Remove the accessory drive belt.

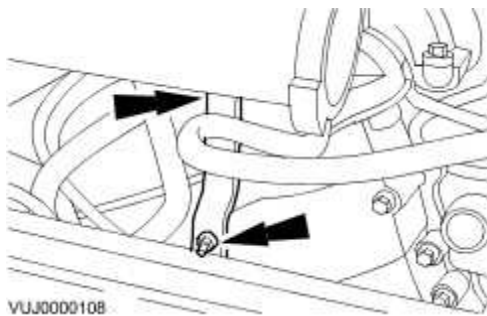
- 1) Rotate the accessory drive belt tensioner counter-clockwise.

 Use a 3/8 inch square drive bar to rotate the accessory drive belt tensioner.

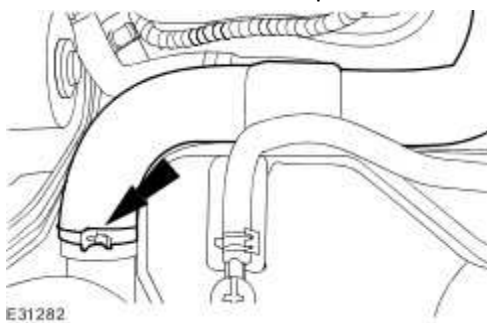
- 2) Remove the accessory drive belt.



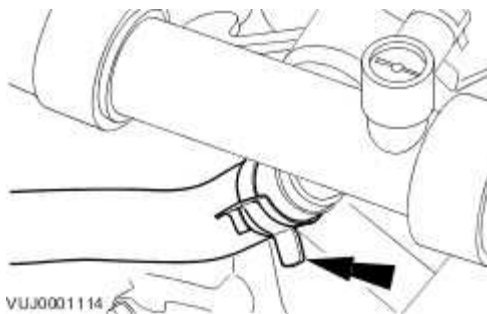
- 6 . Remove the intake manifold support bracket.



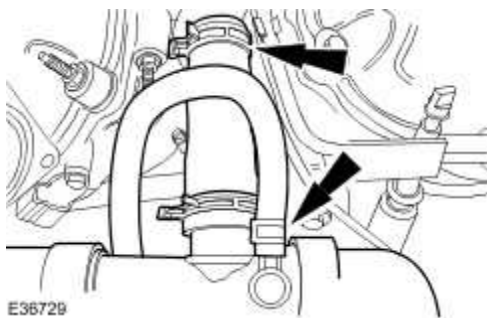
7 . Disconnect the radiator top coolant hose.



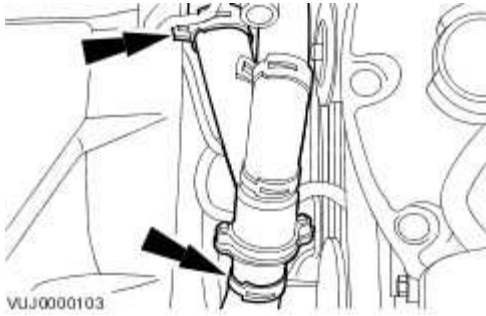
8 . Detach the coolant hose from the housing assembly.



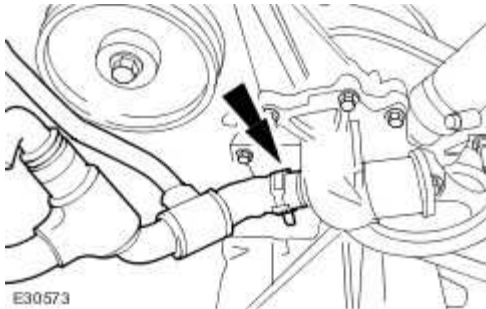
9 . Disconnect the coolant hoses.



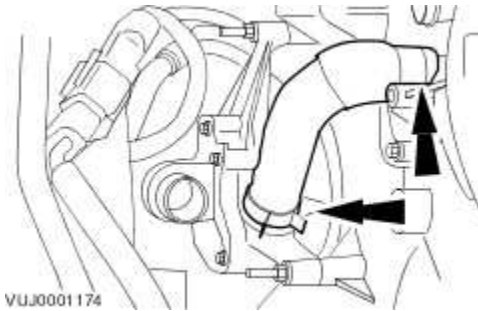
10 . Remove the hoses and thermostat housing assembly.



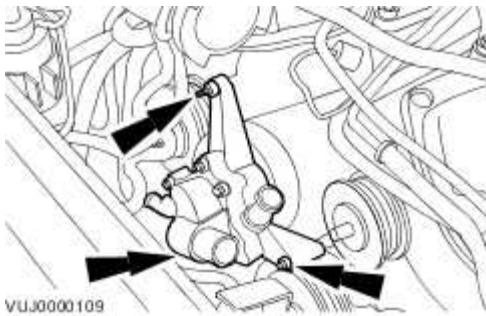
11 . Remove the coolant hose.



12 . Remove the coolant hose from the water pump to lower housing.



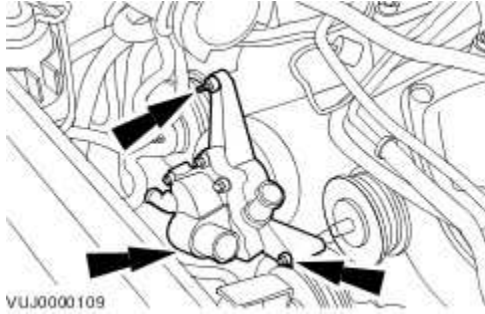
13 . Remove the water pump.



Installation

1 . To install, reverse the removal procedure.

▶ Tighten to 25 Nm.



2 . Fill the cooling system.

For additional information, refer to

Water Pump - 3.0L, VIN Range: G45704->G99999 (26.50.01)

Removal

- 1 Remove the accessory drive belt.
 - . For additional information, refer to Accessory Drive Belt - 3.0L, VIN Range: G45704->G99999 (12.10.40)

- 2 . Drain the cooling system.
 - For additional information, refer to Cooling System Draining, Filling and Bleeding

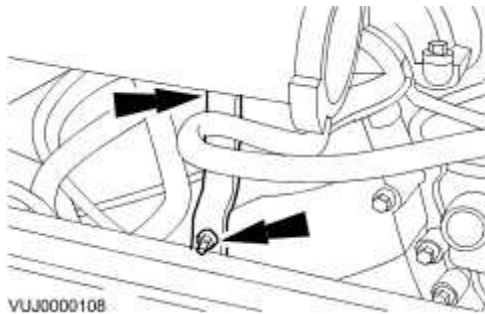
- 3 . Remove the secondary air injection (AIR) control valve.
 - For additional information, refer to Secondary Air Injection (AIR) Control Valve - 3.0L

- 4 . Lower the vehicle.

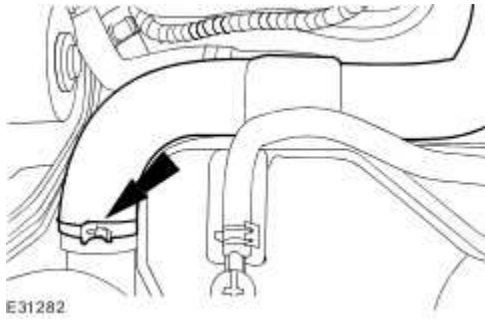
5 . NOTE:

This bracket retains the evaporative emission cannister purge valve.

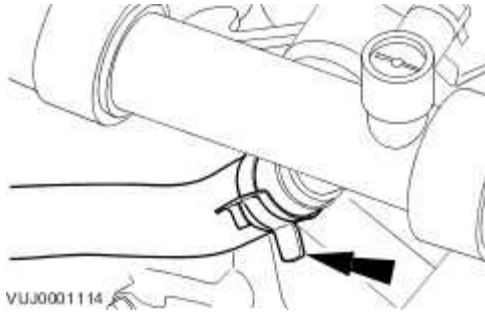
Remove the intake manifold support bracket.



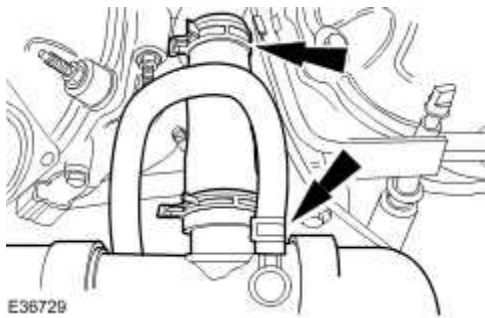
- 6 . Disconnect the radiator top coolant hose.



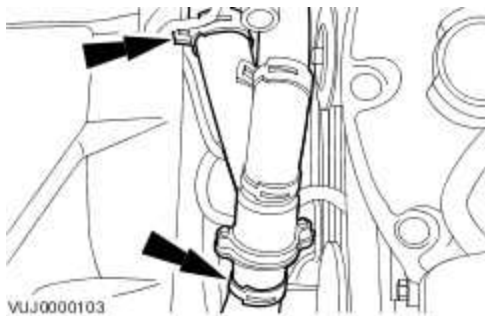
7 . Disconnect the coolant hose from the housing assembly.



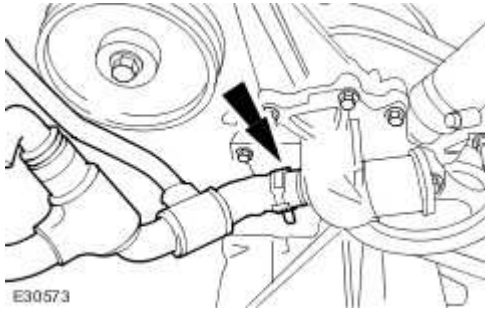
8 . Disconnect the coolant hoses.



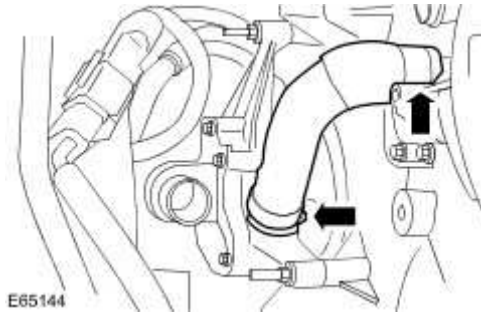
9 . Remove the coolant hoses and thermostat housing assembly.



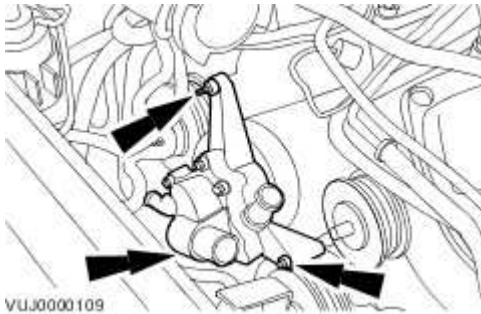
10 . Remove the coolant hose.



11 . Remove the coolant hose from the water pump to lower housing.



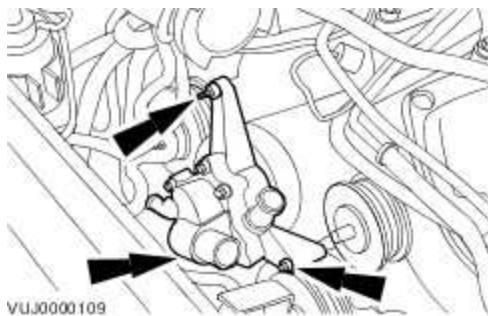
12 . Remove the water pump.



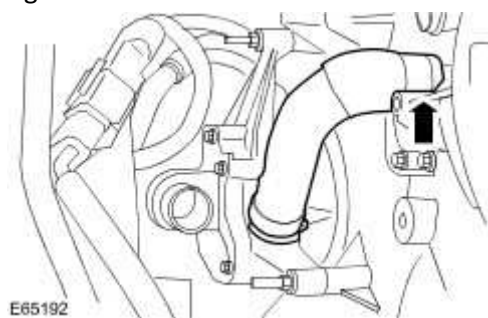
Installation

1 . To install, reverse the removal procedure.

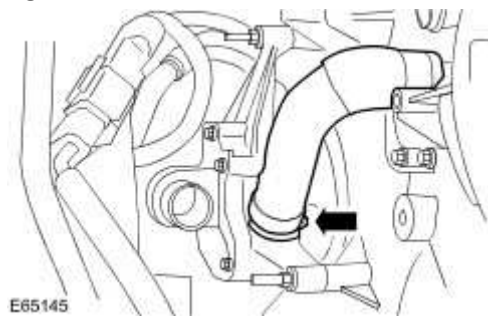
► Tighten to 25 Nm.



2 . Tighten to 5 Nm.



3 . Tighten to 3 Nm.



4 . Fill the cooling system.

For additional information, refer to Cooling System Draining, Filling and Bleeding

Water Pump - 3.5L/4.2L, Vehicles Without: Supercharger (26.50.01)

Removal

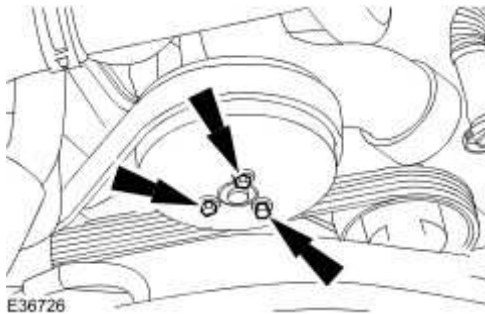
- 1 Remove fuse 14 from the engine compartment fuse box prior to performing any under hood service in the area of the cooling fan.

- 2 . Drain the cooling system.
For additional information, refer to

- 3 . Lower the vehicle.


- 4 . Remove the air cleaner outlet tube. <<303-12B>>

- 5 . Loosen the water pump pulley bolts.

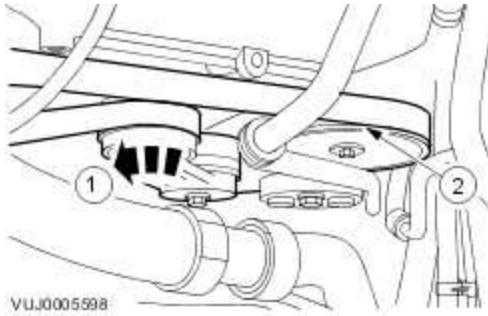


- 6 Detach the accessory drive belt.

- 1) Rotate the accessory drive belt tensioner counter-clockwise.

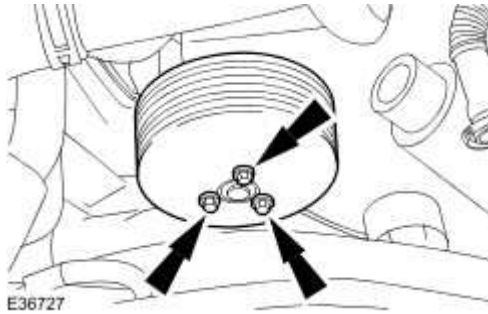
 Use a 3/8 inch square drive bar to rotate the accessory drive belt tensioner.

- 2) Detach the accessory drive belt.

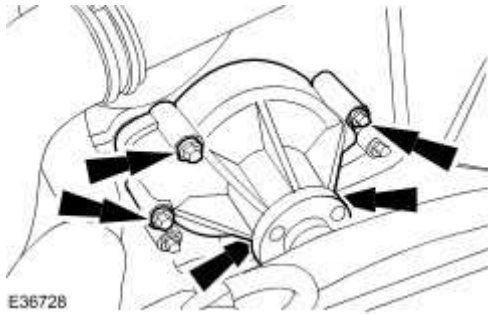


7 . Remove the water pump pulley.

► Discard the water pump pulley retaining bolts.



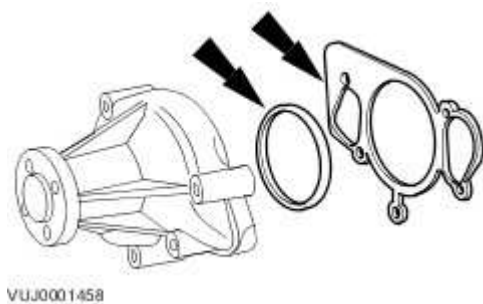
8 . Remove the water pump.



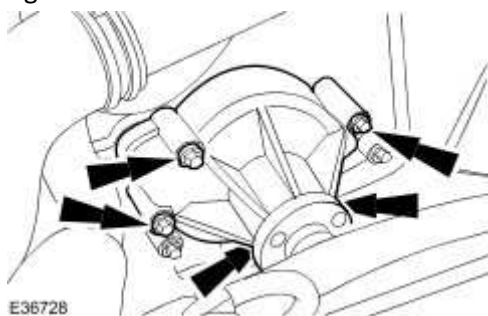
Installation

1 . To install, reverse the removal procedure.

► Install a new water pump gasket and O-ring seal.

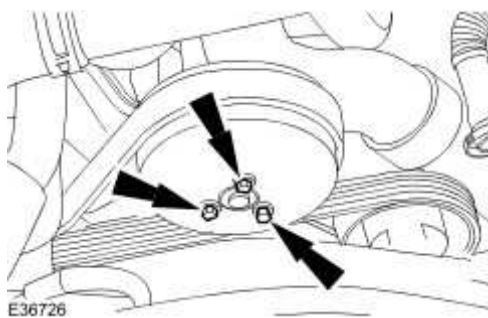


2 . Tighten to 8 Nm + 90°.



3 . Tighten to 10 Nm + 45°.

► Install new retaining bolts.



4 . Fill the cooling system.

For additional information, refer to

Water Pump - 4.2L, Vehicles With: Supercharger (26.50.01)

Removal

- 1 . Remove fuse 14 from the engine compartment fuse box prior to performing any under hood service in the area of the cooling fan.

- 2 . Drain the cooling system.
For additional information, refer to

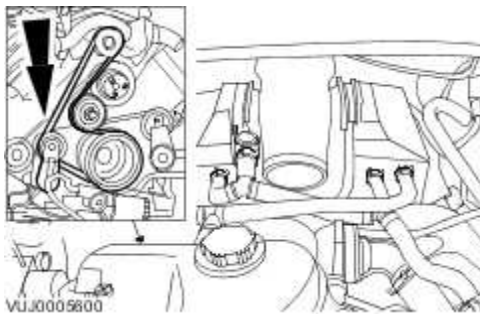
- 3 . Lower the vehicle.

- 4 . Remove the air cleaner outlet tube. <<303-12B>>

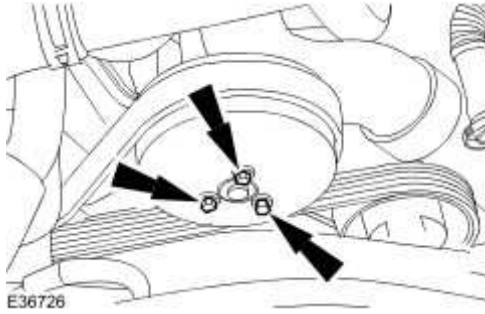
- 5 . Detach the supercharger belt.

▶ Use a 1/2 inch square drive bar to rotate the supercharger belt tensioner.

▶ Detach the supercharger belt.



- 6 . Loosen the water pump pulley bolts.

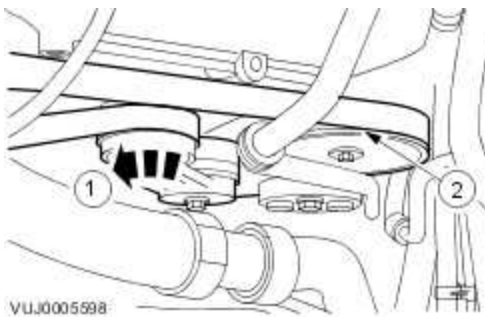


7 Detach the accessory drive belt.

1) Rotate the accessory drive belt tensioner counter-clockwise.

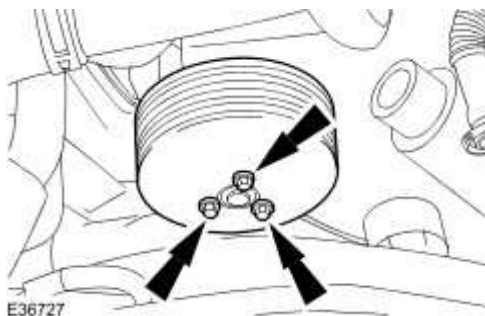
▶ Use a 3/8 inch square drive bar to rotate the accessory drive belt tensioner.

2) Detach the accessory drive belt.

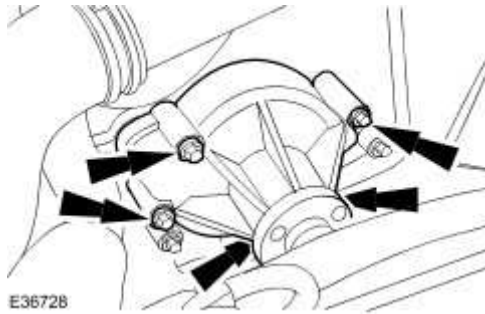


8 . Remove the water pump pulley.

▶ Discard the water pump pulley retaining bolts.



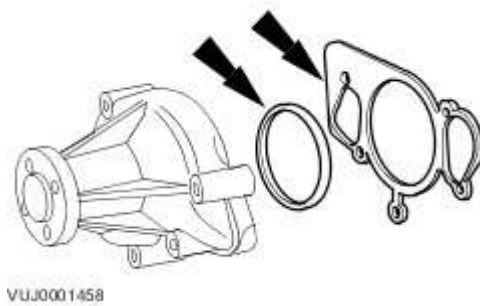
9 . Remove the water pump.



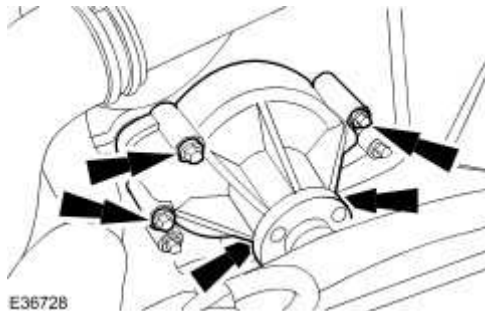
Installation

1 . To install, reverse the removal procedure.

▶ Install a new water pump gasket and O-ring seal.

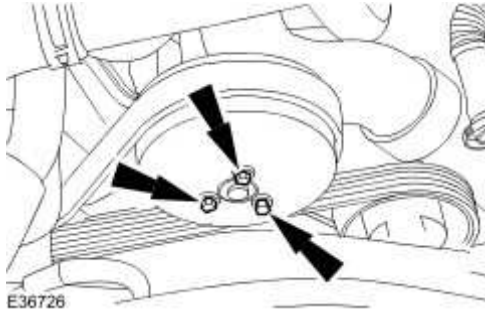


2 . Tighten to 8 Nm + 90°.



3 . Tighten to 10 Nm + 45°.

▶ Install new retaining bolts.



4 . Fill the cooling system.

For additional information, refer to

303-03B : Supercharger Cooling

Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Supercharger radiator retaining bolts	7	-	62
Supercharger water pump bracket retaining bolt	7	-	62
Supercharger radiator drain plug	1	-	9
Coolant expansion tank bleed screw	1	-	9
Supercharger coolant fill plug	45	33	-

Lubricants, Fluids, Sealers and Adhesives

Description	Specification
Jaguar Premium Cooling System Fluid	WSS M97B44-D

Supercharger Cooling System Draining, Filling and Bleeding

1.



WARNING: Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury.



WARNING: To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.



WARNING: To avoid the possibility of personal injury, do not operate the engine with the hood open until the fan blades have been examined for cracks and separation. Failure to follow this instruction may result in personal injury.



WARNING: Remove fuse 14 from the engine compartment fuse box prior to performing any under hood service in the area of the cooling fan when the engine is hot, since the cooling fan motor could operate if the engine has been switched OFF. Failure to follow this instruction may result in personal injury.



CAUTION: The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the engine.



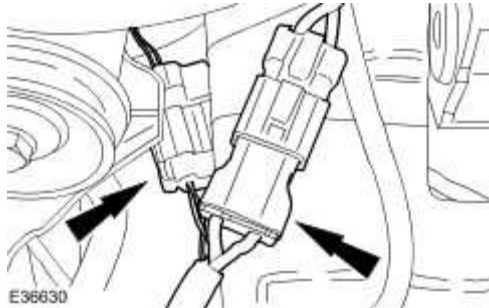
CAUTION: Never remove the coolant pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in damage to the engine.

Release the cooling system pressure.

- Remove the coolant expansion tank pressure cap.

2. Remove the radiator splash shield. <<501-02>>

3. Detach the electrical connectors.

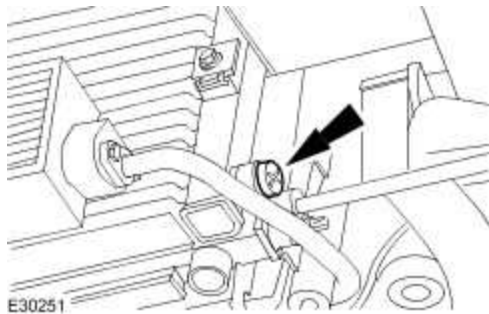


4. Remove the radiator lower cowl.



5. Remove the radiator drain plug.

- Drain the coolant into a suitable container.



6.

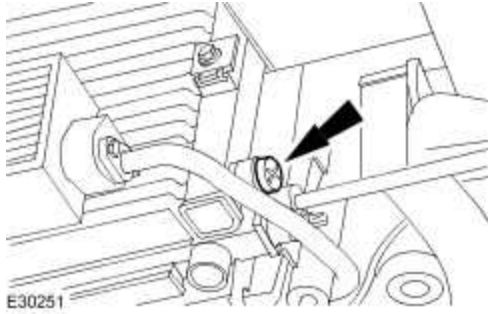


CAUTION: Do not over tighten the radiator drain plug. Failure to follow this instruction may cause damage to the vehicle.

Install the radiator drain plug when all coolant has drained.

- Tighten to 1 Nm.
- Remove the container.

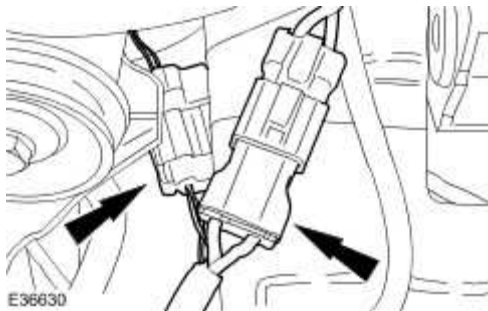
- Clean off any spillages.



7. Install the radiator lower cowl.

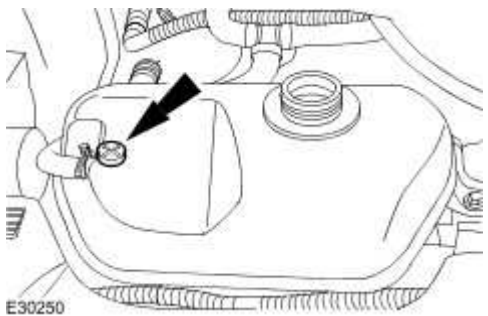


8. Connect the electrical connectors.



9. Install the radiator splash shield. <<501-02>>

10. Remove the coolant expansion tank bleed screw.



11.



CAUTION: The supercharger cooling system must be maintained with the correct concentration and type of coolant solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the vehicle.

Fill the cooling system up to the MAX mark on the coolant expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.

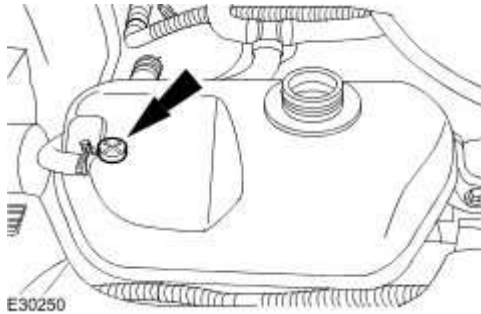
12.



CAUTION: Do not over tighten the coolant expansion tank bleed screw. Failure to follow this instruction may cause damage to the vehicle

Install the coolant expansion tank bleed screw.

- Tighten to 1 Nm.

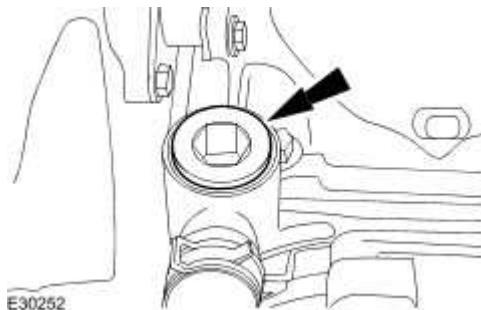


13. Install the coolant expansion tank pressure cap.

14. Remove the engine cover.

15. Remove the supercharger coolant filler plug.

- Remove and discard the sealing washer.



16. **NOTE:**

Place a suitable cloth around supercharger fill port.

Top up the coolant through the supercharger fill port.

17.



CAUTION: Coolant may spill from supercharger fill port when ignition switched on.

Switch ignition on.

18. **NOTE:**

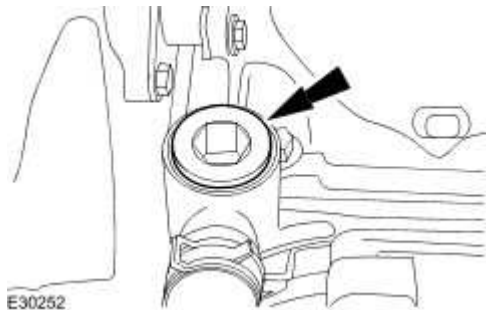
Do not allow the supercharger water pump to run dry for more than one minute. Failure to follow this instruction may result in damage to the vehicle.

Allow the supercharger pump to run and top up the coolant through supercharger fill port.

19. Switch the ignition off.

20. Install the supercharger coolant fill plug.

- Install a new sealing washer.
- Tighten to 45 Nm.
- Clean off any spillages.



21. Install the engine cover.

22.



CAUTION: Do not RUN the engine with the coolant expansion tank pressure cap removed. Failure to follow this instruction may cause damage to the vehicle

START and RUN the engine.

23. SET the heating system to MAX heat, the blower motor to MAX speed and the air

distribution to instrument panel registers.

24.



CAUTION: Observe the engine temperature gauge. If the engine starts to over-heat switch off immediately and allow to cool. Failure to follow this instruction may cause damage to the vehicle.

Allow the engine to RUN until hot air is emitted from the instrument panel registers, while observing the engine temperature gauge.

25. Switch off the engine.

26. Allow the engine to cool.

27. Release the cooling system pressure.

- Remove the coolant expansion tank pressure cap.

28. Fill the cooling system up to the MAX mark on the coolant expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.

29. Install the coolant expansion tank pressure cap.

Supercharger Cooling

- 1 . Verify the customer concern by operating the system.
- 2 . Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
<ul style="list-style-type: none">• Leak(s)• Hose(s)• Charge air cooler radiator• Supercharger cooling water pump• Coolant expansion tank• Coolant pressure cap• Radiator• Engine cooling water pump• Cooling fan	<ul style="list-style-type: none">• Fuse(S)• Wiring harness• Electrical connector(S)• Engine coolant temperature sensor• Cooling fan motor• Supercharger cooling water pump

- 1 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 2 . If the cause is not visually evident, verify the symptom and refer to the Jaguar Approved Diagnostic System.

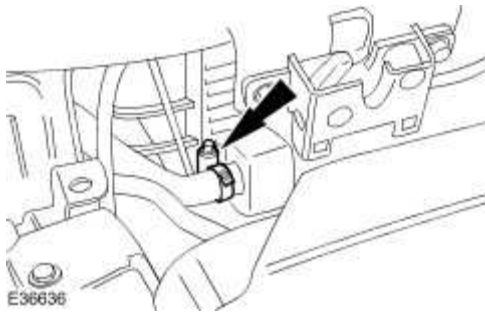
Component tests

Pressure test. <<303-03>> Coolant pressure cap pressure test. <<303-03>> Thermostat test. <<303-03>> Radiator leak test. <<303-03>>

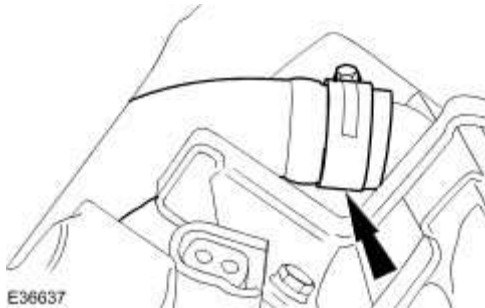
Radiator

Removal

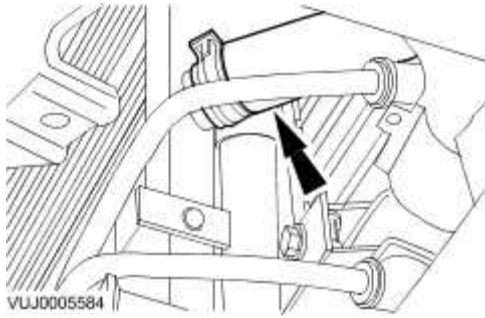
- 1 . Remove the water pump.
For additional information, refer to
- 2 . Lower the vehicle.
- 3 . Remove the radiator grille opening panel. <<501-02>>
- 4 . Disconnect the radiator coolant vent hose.



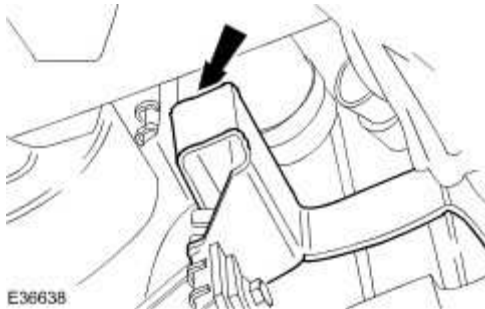
- 5 . Raise the vehicle.
- 6 . Disconnect the right-hand radiator hose.



7 . Disconnect the left-hand radiator hose.



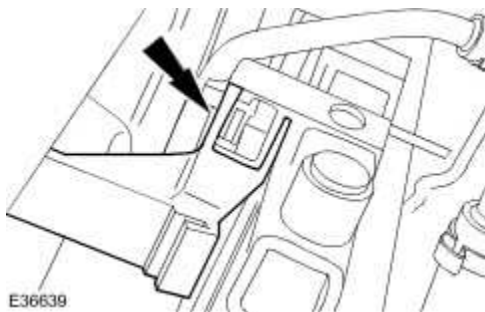
8 . Remove the water pump retaining bracket.



9 . **NOTE:**

Right-hand shown, left-hand similar.

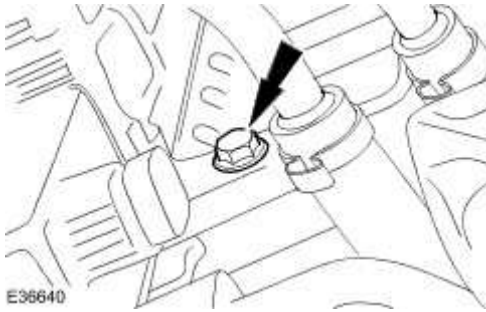
Detach the power assisted steering oil cooler.



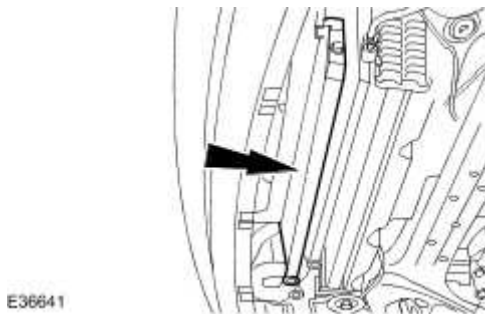
10 . **NOTE:**

Right-hand shown, left-hand similar.

Remove the radiator retaining bolt.



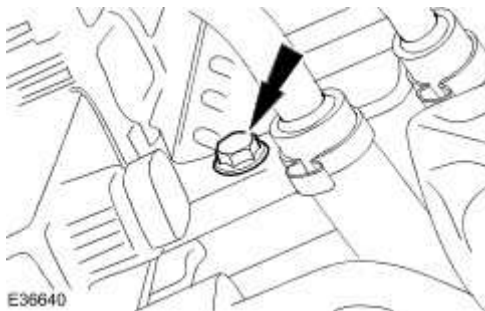
11 . Remove the radiator.



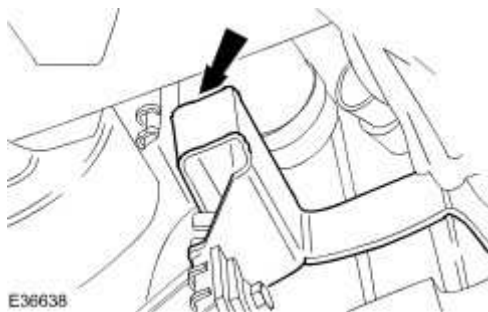
Installation

1 . To install, reverse the removal procedure.

► Tighten to 7 Nm.



2 . Tighten to 7 Nm.



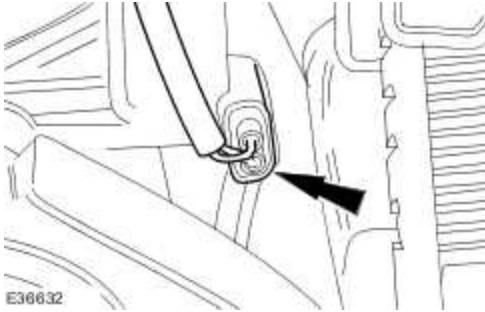
E36638

Water Pump

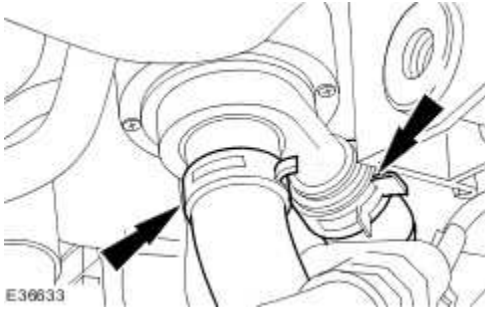
Removal

- 1 Carry out the supercharging cooling system draining procedure.
 - . For additional information, refer to Supercharger Cooling System Draining, Filling and Bleeding
- 2 . Remove the engine oil cooler.
For additional information, refer to Oil Cooler - Vehicles With: Supercharger (12.60.68)

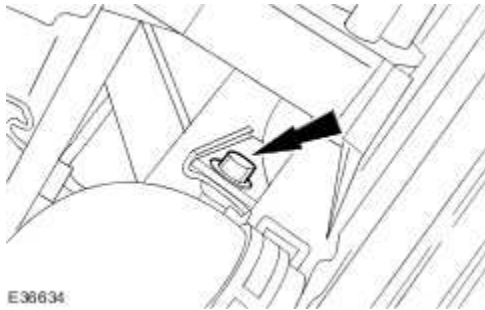
- 3 . Disconnect the water pump electrical connector.



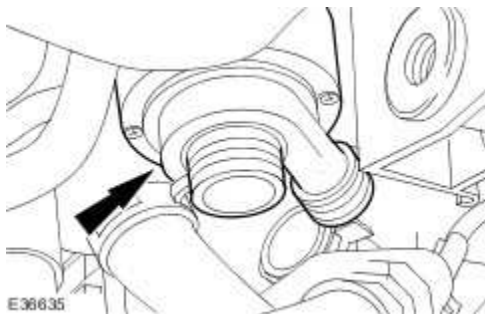
- 4 . Disconnect the water pump coolant hoses.



- 5 . Remove the water pump retaining bolt.




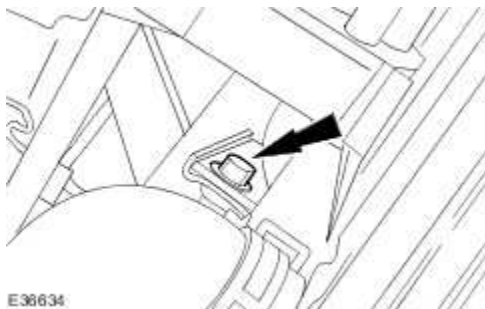
6 . Remove the water pump.



Installation

1 . To install, reverse the removal procedure.

 Tighten to 7 Nm.



- 2 Carry out the supercharging cooling system filling and bleeding procedure.
 - For additional information, refer to Supercharger Cooling System Draining, Filling and Bleeding

3 **NOTE:**

.

For NAS vehicles only.

If required, carry out a long drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Long Drive Cycle Self-Test

303-03C : Engine Cooling – 2.7L Diesel

Specifications

Specifications

Lubricants, Fluids, Sealers and Adhesives

Description	Specification
Jaguar Premium Cooling System Fluid	WSS M97B44-D
Jaguar Premium Cooling System Flush	EGR-M14P7-A

Capacities

Description	Liters
Cooling system refill	13.5

Torque Specifications

Description	Nm	lb-ft	lb-in
Coolant expansion tank retaining bolt	7	-	62
Coolant expansion tank bleed screw	3	-	27
Cooling fan motor and shroud retaining bolts	7	-	62
Water pump retaining bolts	10	-	89
Water pump pulley retaining bolts	24	18	-
Charge air cooler to radiator retaining bolts	7	-	62
Air conditioning condenser retaining bolts	7	-	62
Radiator mounting bracket retaining bolts	7	-	62
Charge air cooler intake elbow	7	-	62
Radiator drain plug	2	-	13

Cooling System Draining, Filling and Bleeding

1.



WARNING: To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.



WARNING: Relieve the cooling system pressure by unscrewing the coolant pressure cap. Failure to follow these instructions may result in personal injury.



CAUTION: The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the vehicle.

Remove the coolant expansion tank pressure cap.

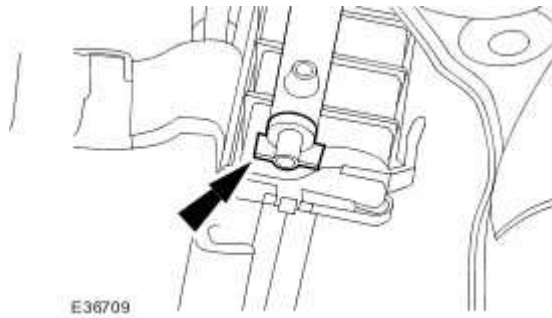
2. Remove the radiator splash shield.

3. **NOTE:**

Remove and discard the radiator drain plug O-ring seal.

Remove the coolant drain plug.

- Drain the coolant into a suitable container.



4. Allow the coolant to drain.

5. **NOTE:**

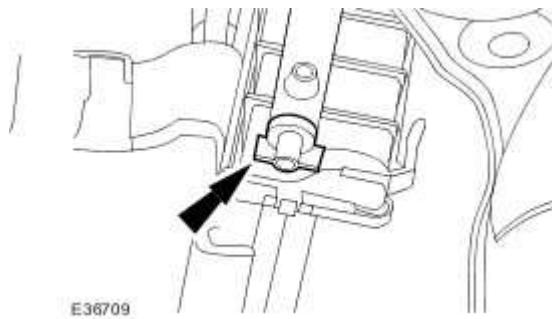
Install a new O-ring seal.

NOTE:

Do not over tighten the drain plug. Failure to follow this instruction may result in damage to the vehicle.

Install the coolant drain plug.

- Remove the drain tray.



6. Lower the vehicle.

7. Remove the coolant expansion tank bleed screw.



8. Fill the cooling system up to the MAX mark on the coolant expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar

specification WSS M97B44-D and fifty percent water.

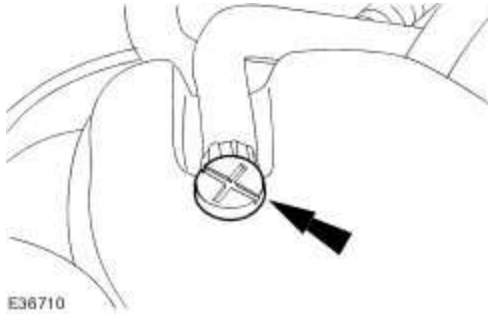
9.



CAUTION: Do not over tighten the coolant expansion tank bleed screw. Failure to follow this instruction may result in damage to the vehicle.

Install the coolant expansion tank bleed screw.

- Tighten to 3 Nm.



10. Set the heating system to the COLD position.

11. Using an assistant, turn the ignition key to the ON position.

12. **NOTE:**

Do not allow the expansion tank to empty when the electric coolant pump starts.

Fill the cooling system up to the MAX mark on the coolant expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.

13. After 3 minutes, set the heating system to the HOT position.

14. Maintain the coolant level in the coolant expansion tank at the MAX mark using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.

15. After four minutes, refit the coolant expansion tank pressure cap.

16. Start the engine and allow to idle for five minutes.

17. Raise the engine to 2500 RPM for 30 seconds.

18. Turn the ignition key to the OFF position.

19. Allow the engine to cool.

20.



WARNING: To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.

After two minutes, release the cooling system pressure.

- Remove the coolant expansion tank pressure cap.

21. **NOTE:**

Make sure the heating system is set to the HOT position.

Turn the ignition key to the ON position.

22. Maintain the coolant level in the coolant expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.

23. After three minutes, refit the coolant expansion tank pressure cap.

24. Drive the vehicle on the road at varying speeds until the engine reaches normal operating temperature.

25. Allow the engine to cool.

26.



WARNING: To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back

while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow these instructions may result in personal injury.

Release the cooling system pressure.

- Remove the coolant expansion tank pressure cap.

27. Fill the cooling system up to the MAX mark on the coolant at the MAX mark expansion tank using a fifty percent mixture of Jaguar Premium Cooling System Fluid or equivalent, meeting Jaguar specification WSS M97B44-D and fifty percent water.

28. Raise the vehicle.

29. Check for water leaks.

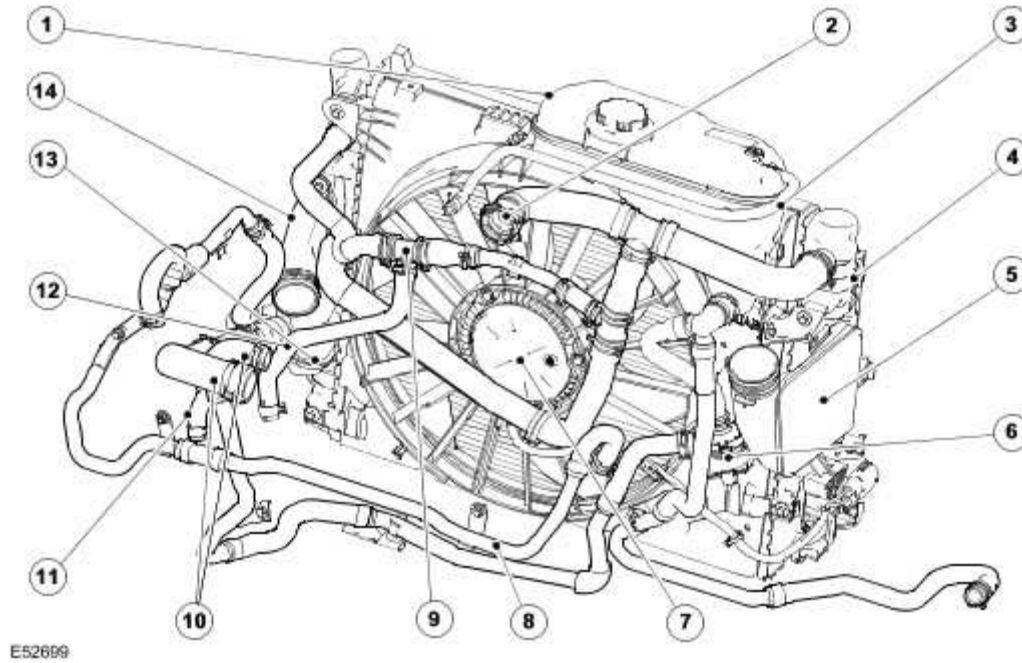
30. Install the radiator splash shield.

Cooling System Draining and Vacuum Filling

No data

Engine Cooling

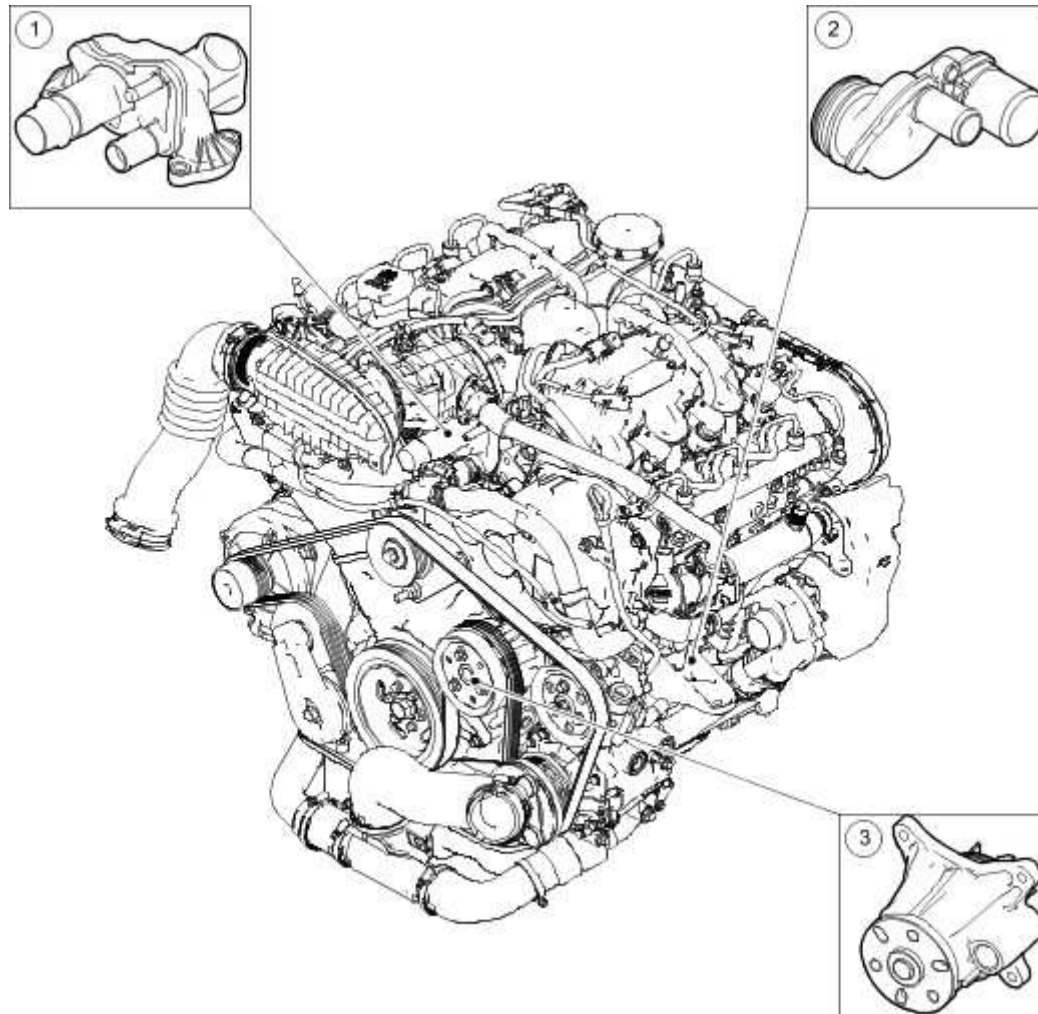
2.7 Diesel Engine Cooling System



Item	Part Number	Description
1	—	Coolant expansion tank
2	—	Engine coolant outlet
3	—	Vent hose
4	—	Radiator
5	—	Charge air cooler outlet
6	—	Auxiliary coolant flow pump
7	—	Cooling fan motor
8	—	Exhaust gas re-circulation coolant hose
9	—	Transmission oil cooler coolant control valve

10	—	Engine coolant inlet
11	—	Transmission oil cooler outlet
12	—	Transmission oil cooler inlet
13	—	Thermostat housing
14		Charge air cooler inlet

Engine Cooling System Components



E52700

Item	Part Number	Description
1	—	Engine coolant outlet assembly
2	—	Engine coolant inlet assembly

3	—	Water pump
---	---	------------

Water Pump

The water pump is of a conventional design and is driven by the crankshaft pulley through the accessory drive belt. The water pump belt tension is maintained by an automatic drive belt tensioner. For additional information, refer to Accessory Drive Belt Tensioner - 2.7L Diesel (303-05)

Thermostat

The thermostat is located in the thermostat housing and allows rapid engine warm-up by restricting coolant flow through the radiator below approximately 92°C (198°F). The thermostat also assists in keeping the engine operating temperature within predetermined limits.

When the engine is cold and the thermostat is closed, coolant flows from the water pump through the engine. It then returns to the water pump through the upper coolant hose.

When the engine is warm and the thermostat is open, coolant flows into the radiator through the upper coolant hose. It then returns to the water pump from the radiator through the lower coolant hose.

The heater core is on a parallel circuit and is unaffected by the position of the thermostat.

Radiator

The radiator is of aluminium construction with plastic end tanks. Foam seals are fitted to the radiator to prevent the cooling air from by passing the radiator core. A coolant drain plug is provided in the lower coolant end tank of the radiator for the draining of the coolant. The cooling fan shroud is attached to the radiator.

Cooling Fan

A single, variable speed cooling fan motor is attached to a fan shroud located behind the radiator. The speed is determined by the Engine Coolant Temperature (ECT) and the air conditioning pressure and transmission oil temperature.

Under hot operating conditions, the fan may continue to operate for four minutes after the engine has been switched off.

Coolant Recovery System

A pressurized coolant expansion tank system is used which continuously separates the air from the cooling system and replenishes the system through the coolant expansion tank outlet hose, attached to the heater return hose.

A continuous vent from the engine and radiator to the coolant expansion tank prevents air locks from forming in the cooling system.

A manual bleed point is provided on the coolant reservoir.

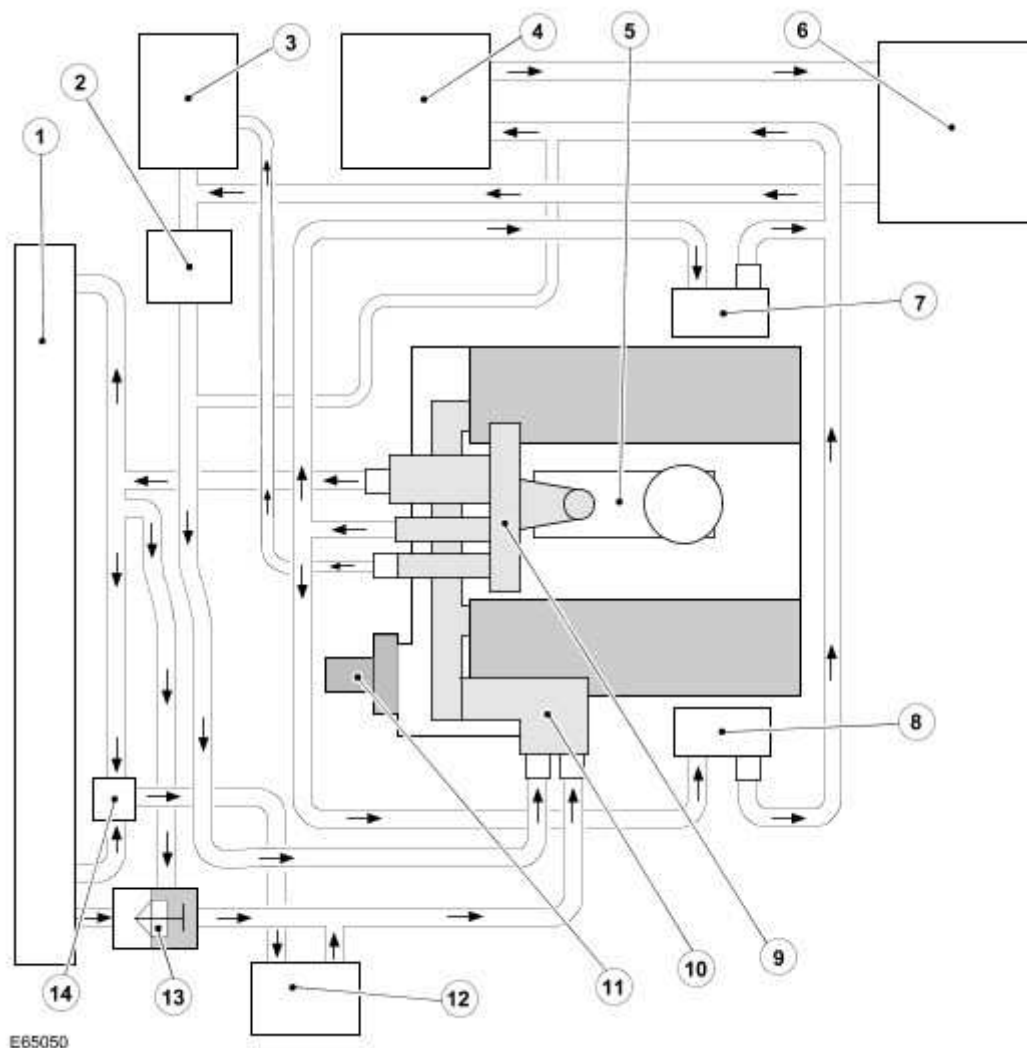
The coolant expansion tank serves as the location for:

- Service fill.
- Coolant expansion during warm-up.
- Air separation during operation.
- System pressurization by the coolant pressure cap.
- The coolant expansion tank is designed to have approximately 0.5 to 1 liter of air when cold to allow for coolant expansion.

Engine Coolant

The long life engine coolant is formulated to last for five years or 240,000 km (150,000 miles). The coolant is silicate free and orange in color. The long life engine coolant must not be mixed with conventional engine coolant.

Coolant Flow Diagram (Thermostat open)



Item	Part Number	Description
1	—	Radiator
2	—	Auxiliary coolant flow pump
3	—	Coolant expansion tank
4	—	Auxiliary heater
5	—	Engine oil and fuel cooler
6	—	Heater matrix
7	—	Right-hand exhaust gas recirculation cooler
8	—	Left-hand exhaust gas recirculation cooler
9	—	Engine coolant outlet
10	—	Engine coolant inlet
11	—	Water pump
12	—	Transmission oil cooler
13	—	Thermostat
14	—	Transmission oil cooler coolant control valve

Engine Cooling

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
<ul style="list-style-type: none">• Coolant leaks• Hoses• Expansion tank• Radiator• Accessory drive belt• Cooling fan	<ul style="list-style-type: none">• Battery charge and condition• Fuses• Harnesses and connectors• Engine coolant temperature (ECT) sensor (if equipped)

- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 4 . If the cause is not visually evident, use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes. For a full list of powertrain DTCs, Electronic Engine Controls

Pinpoint tests

PINPOINT TEST G557183p1 : LOSS OF COOLANT

G557183t1 : VISUAL INSPECTION

1. Visually inspect for loss of coolant 2. Following the instructions for your workshop's pressure tester, carry out a system pressure test.

- Is the engine cooling system leaking?

-> Yes

Rectify the source of the leak as indicated by the test.

Cooling System Draining, Filling and Bleeding TEST the system for normal operation.

-> **No**

Verify the customer complaint.

PINPOINT TEST G557183p2 : THE ENGINE OVERHEATS

G557183t2 : CHECK THE COOLANT LEVEL AND CONDITION

1. Check the coolant level and condition.

- **Does the system contain sufficient coolant of the correct specification?**

-> **Yes**

GO to Pinpoint Test G557183t3.

-> **No**

Top-up the system,

Cooling System Draining, Filling and Bleeding Check for coolant loss. GO to Pinpoint Test G557183p1.

G557183t3 : CHECK THE OPERATION OF THE COOLING SYSTEM PRESSURE CAP

1. Check the opening pressure of the cooling system pressure cap. 2. **NOTE:**

Make sure the pressure is built up steadily when testing the pressure cap. Rapid increases in pressure may indicate a failure in a correctly operating pressure cap.

Following the instructions for your workshop pressure tester, test the pressure cap to the pressure indicated. 3. Check that the pressure cap holds to the pressure indicated, and releases once that pressure is reached.

- **Does the pressure cap operate correctly?**

-> **Yes**

GO to Pinpoint Test G557183t4.

-> **No**

INSTALL a new pressure cap. TEST the system for normal operation.

G557183t4 : CHECK THE OPERATION OF THE WATER PUMP

1. Remove the cooling system pressure cap and make sure there is sufficient coolant in the system. 2. Make sure the parking brake is applied and **Park** or **Neutral** is selected. 3. Start the engine and hold

the engine speed at 1,500 to 2,000 rpm for one minute while observing the coolant through the expansion tank filler neck. 4. Allow the engine to idle and switch off.

- **Is there coolant movement in the expansion tank while the engine is running?**

-> **Yes**

GO to Pinpoint Test G557183t5.

-> **No**

Check the accessory drive belt condition and tension,
Accessory Drive - 2.7L Diesel

G557183t5 : CHECK THAT THE THERMOSTAT OPENS

1. Remove and inspect the thermostat.

Cooling System Draining, Filling and Bleeding

Thermostat (26.45.07) 2. Note the opening temperature and immerse the thermostat in water. 3. Heat the water until this temperature is reached. The thermostat should begin to open.

- **Does the thermostat open?**

-> **Yes**

Check the cooling fan, modules, circuits, sensors, etc,
Electronic Engine Controls

-> **No**

INSTALL a new thermostat,
Cooling System Draining, Filling and Bleeding
Thermostat (26.45.07) TEST the system for normal operation.

PINPOINT TEST G557183p3 : THE ENGINE DOES NOT REACH NORMAL OPERATING TEMPERATURE

G557183t6 : CHECK THAT THE THERMOSTAT CLOSES

1. Remove and inspect the thermostat.

Cooling System Draining, Filling and Bleeding

Thermostat (26.45.07) 2. Allow the thermostat to cool.

- **Does the thermostat fully close?**

-> **Yes**

Check the cooling fans, modules, circuits, sensors, etc,
Electronic Engine Controls

-> **No**

INSTALL a new thermostat,

Cooling System Draining, Filling and Bleeding

Thermostat (26.45.07) TEST the system for normal operation.

Coolant Expansion Tank (26.15.01)

Removal

1



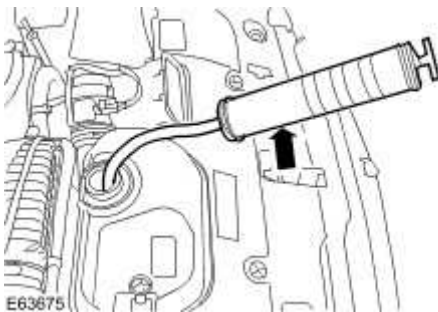
WARNING: To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the coolant pressure cap from a hot cooling system. Wait until the engine has cooled, then wrap a thick cloth around the coolant pressure cap and turn it slowly until the pressure begins to release. Step back while the pressure is released from the system. When certain all the pressure has been released (still with a cloth) turn and remove the coolant pressure cap from the coolant expansion tank. Failure to follow this instruction may result in personal injury.



CAUTION: The engine cooling system must be maintained with the correct concentration and type of anti-freeze solution to prevent corrosion and frost damage. Failure to follow this instruction may result in damage to the vehicle.

Remove the coolant expansion tank pressure cap.

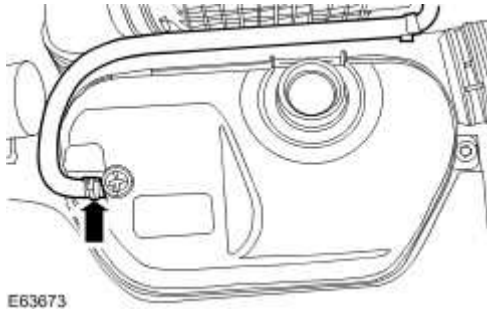
2 . Using a suitable tool, drain the coolant out of the expansion tank.



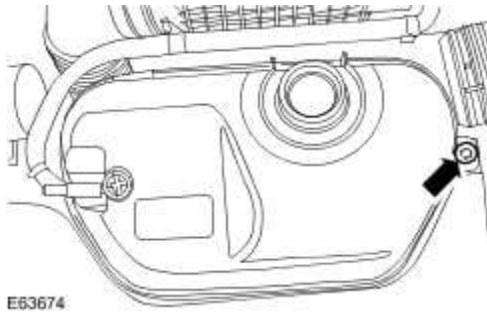
3 . **NOTE:**

Cap the vent hose to minimize coolant loss.

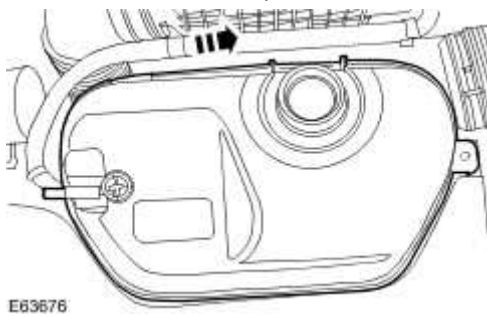
Detach the vent hose.



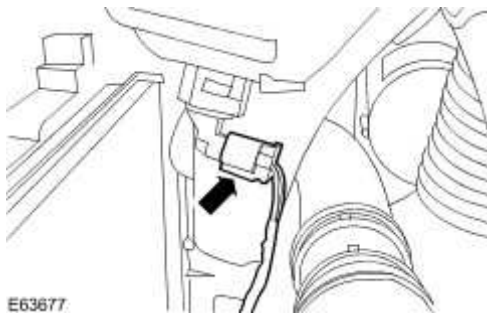
4 . Remove the coolant expansion tank retaining bolt.



5 . Detach the coolant expansion tank.



6 . Disconnect the coolant expansion tank level sensor electrical connector.



7 . NOTE:

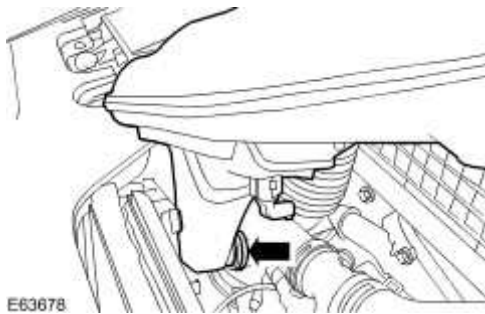
Make sure the retaining clip is not removed.

NOTE:

Clamp the coolant expansion tank lower hose to minimize coolant loss.

Remove the coolant expansion tank.

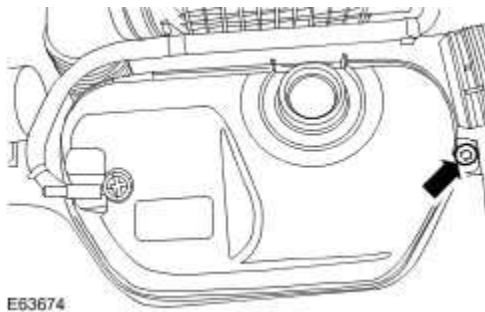
▶ Detach the coolant expansion tank lower hose.



Installation

1 . To install, reverse the removal procedure.

▶ Tighten to 7 Nm.



2 . Check and top up the cooling system as required.

Cooling Fan Motor and Shroud (26.25.25)

Removal

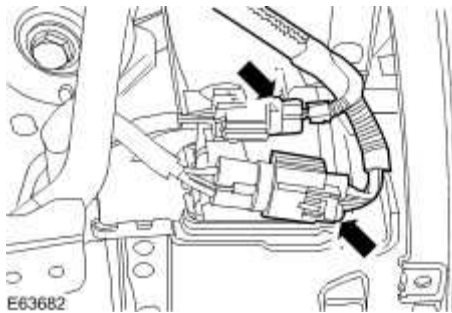
- 1 . Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

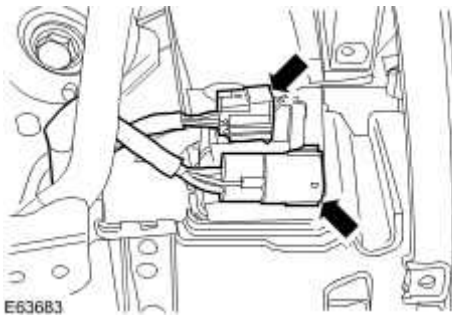
- 2 . Remove the radiator splash shield.

For additional information, refer to Radiator Splash Shield (76.22.90)

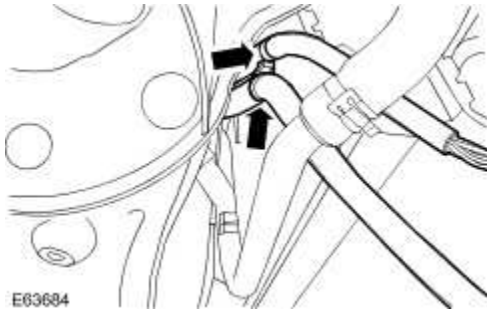
- 3 . Disconnect the cooling fan motor and shroud electrical connectors.



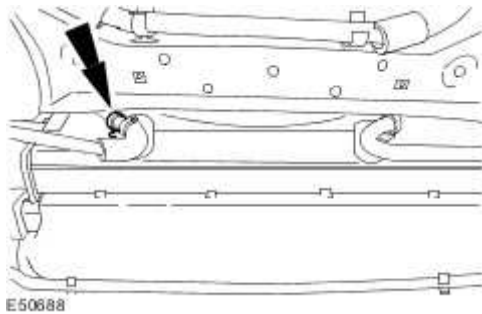
- 4 Detach the cooling fan motor and shroud electrical connectors from the cooling fan motor and shroud.



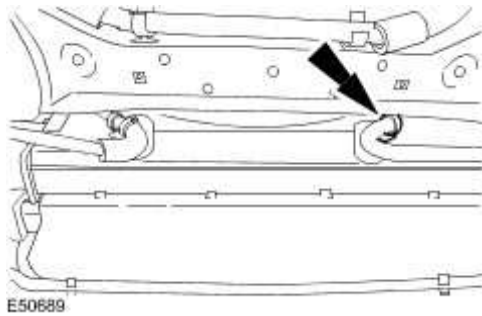
- 5 Detach the cooling fan motor and shroud wiring harness from the cooling fan motor and shroud.



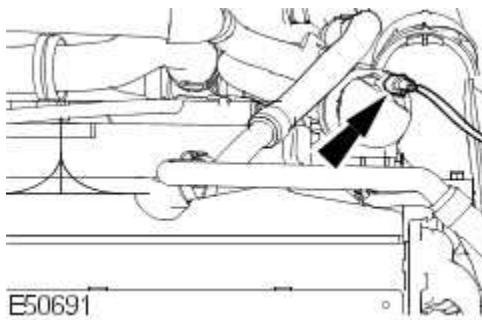
6 . Detach the air conditioning pipe.



7 . Detach the fuel fired heater hose.



8 . Disconnect the auxiliary coolant flow pump electrical connector.



9 . Lower the vehicle.

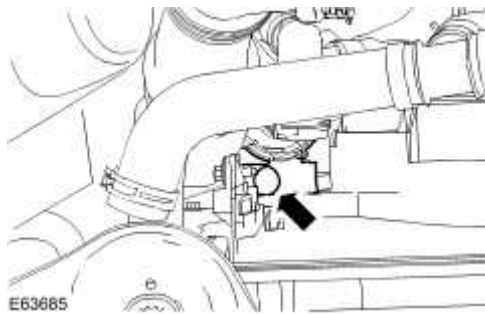
10 . Remove the air cleaner.

For additional information, refer to Air Cleaner (19.10.05)

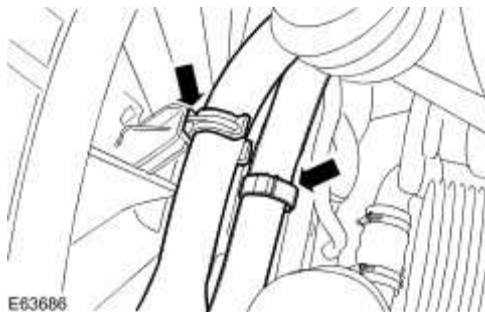
11 . Remove the coolant expansion tank.

For additional information, refer to Coolant Expansion Tank (26.15.01)

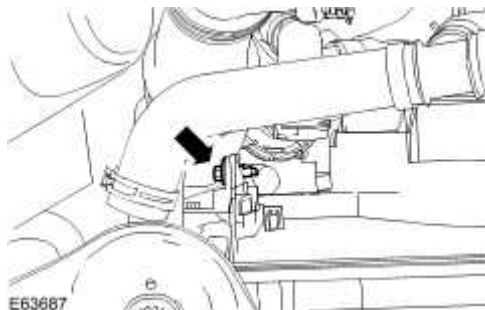
12 . Detach the auxiliary coolant flow pump.



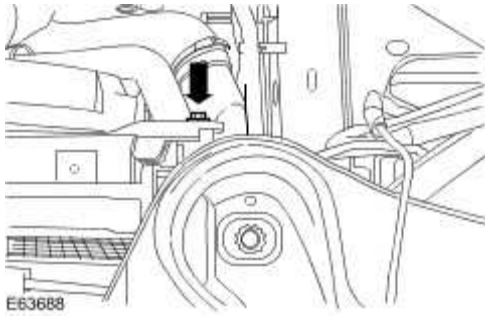
13 . Detach the coolant hoses from the cooling fan motor and shroud.



14 . Remove the cooling fan motor and shroud retaining bracket.

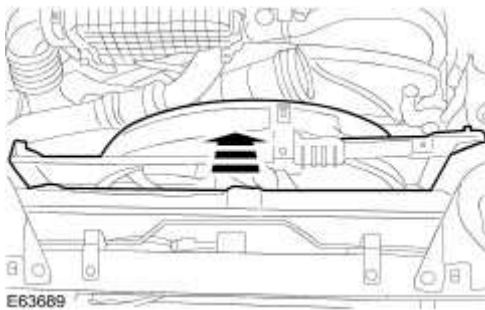


15 . Remove the cooling fan motor and shroud retaining bolt.



16 . Remove the cooling fan motor and shroud.

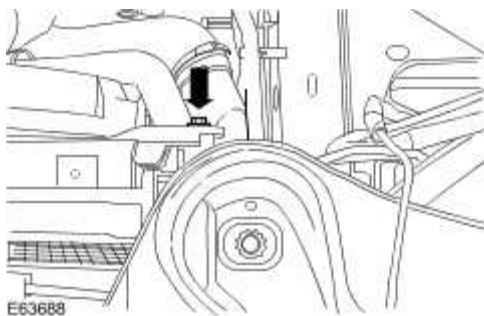
► Reposition the cooling fan motor and shroud wiring harness.



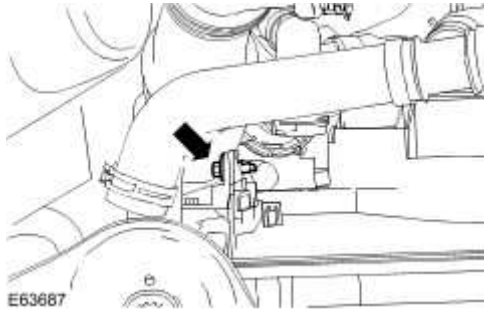
Installation

1 . To install, reverse the removal procedure.

► Tighten to 7 Nm.



2 . Tighten to 7 Nm.



Radiator (26.40.01)

Removal

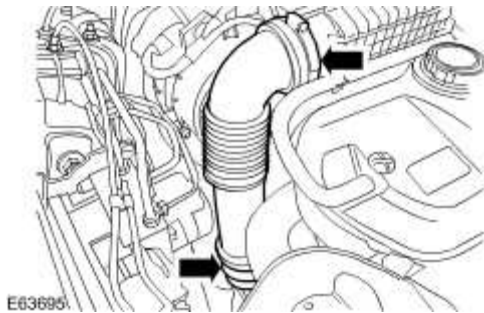
- 1 . Drain the cooling system.

For additional information, refer to Cooling System Draining, Filling and Bleeding

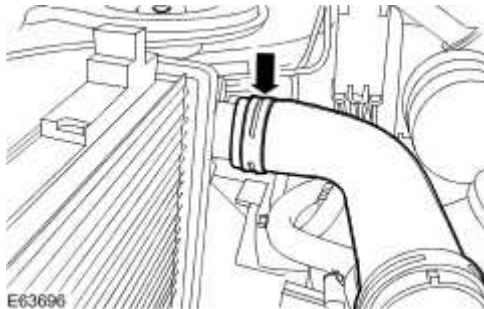
- 2 . Remove the cooling fan motor and shroud.

For additional information, refer to Cooling Fan Motor and Shroud (26.25.25)

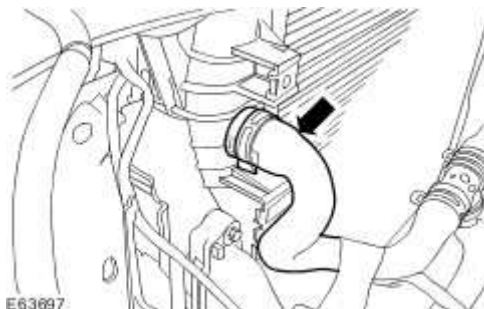
- 3 . Remove the air intake elbow pipe.



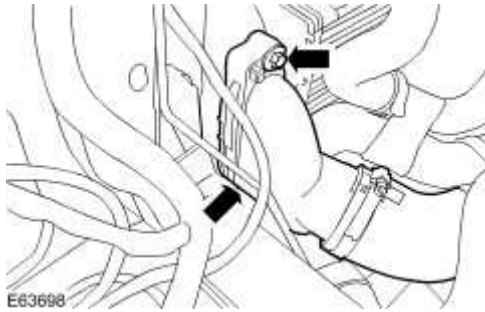
- 4 . Disconnect the radiator top hose.



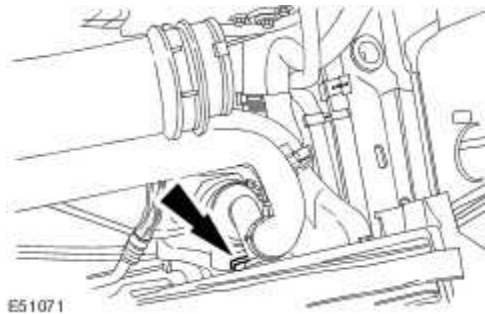
- 5 . Disconnect the coolant hose.



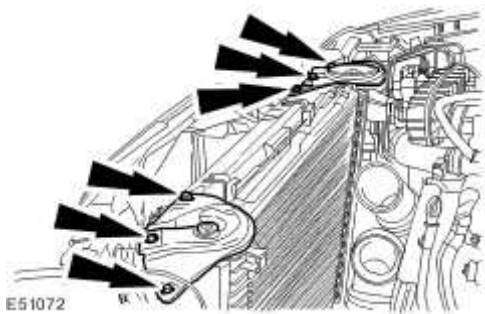
6 . Detach the charge air cooler intake elbow.



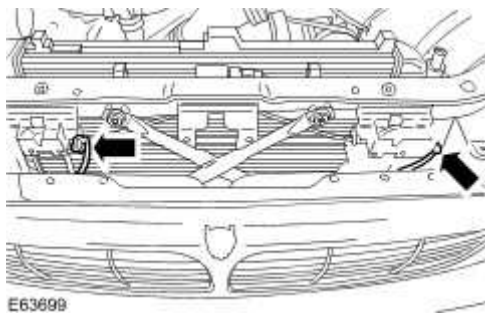
7 . Detach the thermostat.



8 . Remove the radiator mounting brackets.



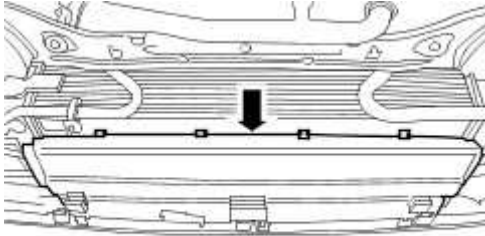
9 . Using suitable tie straps, support the condensor.



10 . Raise the vehicle.

For additional information, refer to Lifting

11 . Remove the radiator lower cowl.

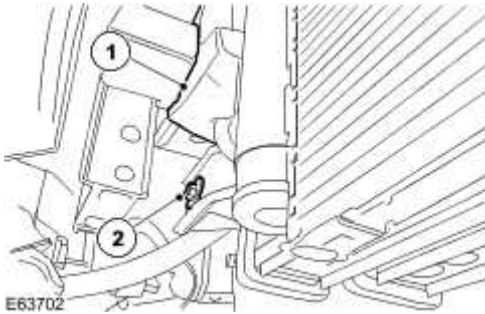


E63700

12 . Remove the right-hand air conditioning condensor retaining bolt.

1) Remove the foam insulation pad.

2) Remove the right-hand air conditioning condensor retaining bolt.

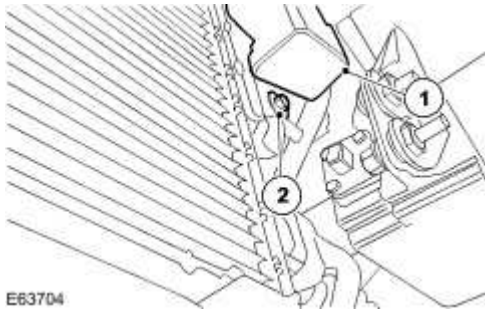


E63702

13 . Remove the left-hand air conditioning condensor retaining bolt.

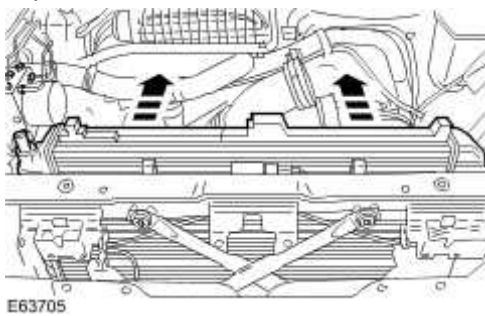
1) Remove the foam insulation pad.

2) Remove the left-hand air conditioning condensor retaining bolt.

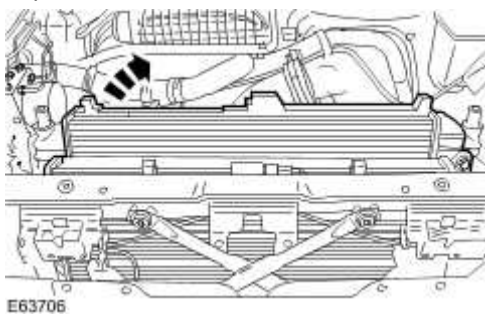


14 . Lower the vehicle.

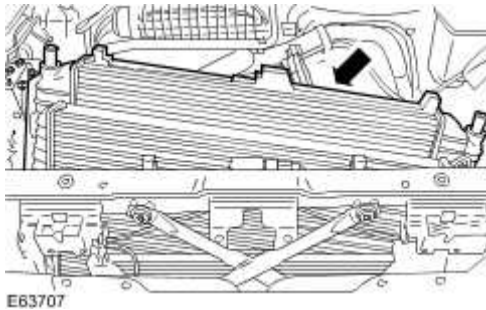
15 . Reposition the radiator rearwards.



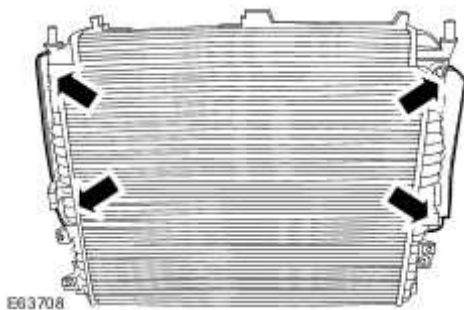
16 . Reposition the radiator to the left.



17 . Remove the radiator assembly.

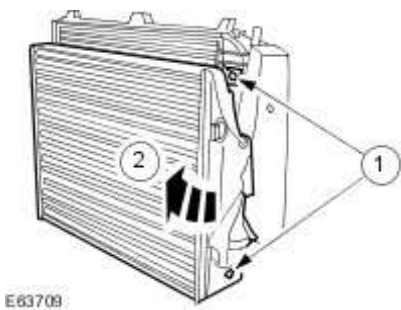


18 . Detach the foam insulation pads.



19 . Remove the charge air cooler from the radiator.

- 1) Remove the charge air cooler retaining bolts.
- 2) Remove the charge air cooler from the radiator.



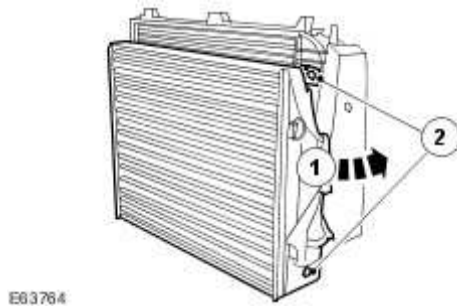
Installation

1 . Install the charge air cooler retaining bolts.

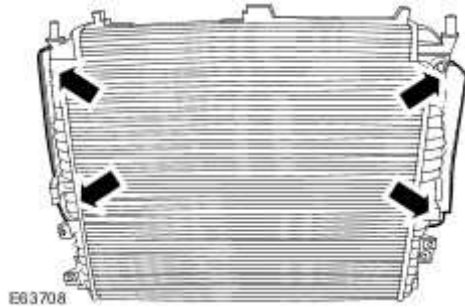
- 1) Install the charge air cooler to the radiator.

2) Install the charge air cooler retaining bolts.

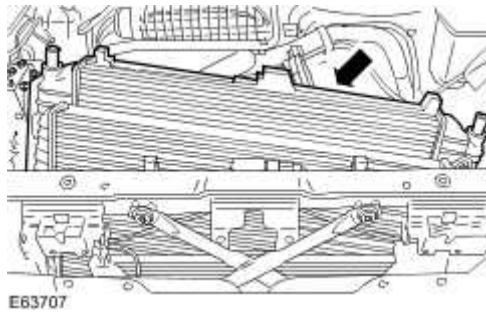
▶ Tighten to 7 Nm.



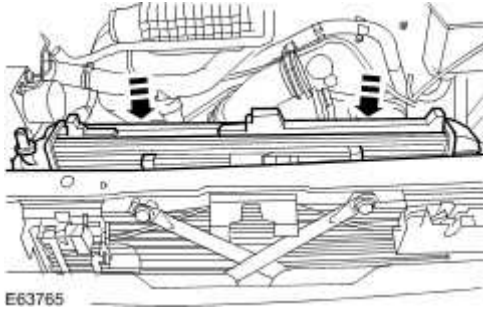
2 . Fit the foam insulation pads.



3 . Install the radiator assembly.



4 . Reposition the radiator forwards.



5 . Raise the vehicle.

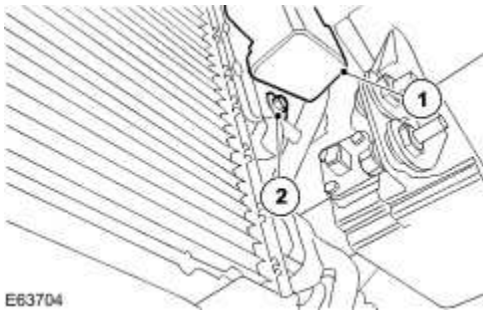
For additional information, refer to Lifting

6 . Install the left-hand air conditioning condensor retaining bolt.

1) Install the foam insulation pad.

2) Install the left-hand air conditioning condensor retaining bolt.

► Tighten to 7 Nm.

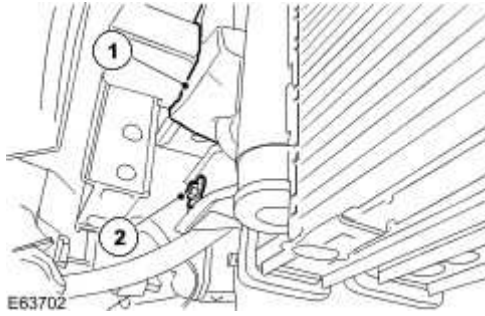


7 . Install the right-hand air conditioning condensor retaining bolt.

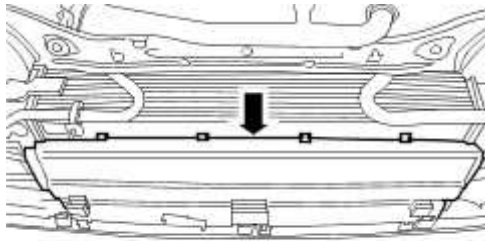
1) Install the foam insulation pad.

2) Install the right-hand air conditioning condensor retaining bolt.

3) Tighten to 7 Nm.

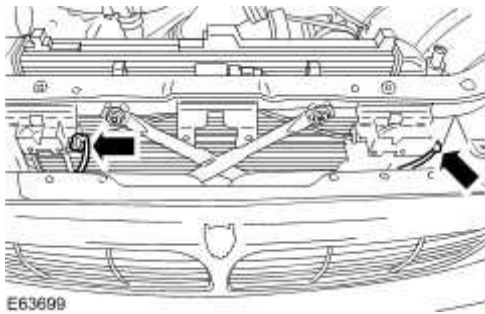


8 . Install the radiator lower cowl.



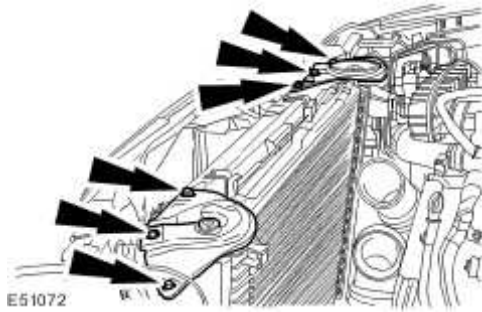
9 . Lower the vehicle.

10 . Remove the tie straps supporting the condensor.



11 . Install the radiator mounting brackets.

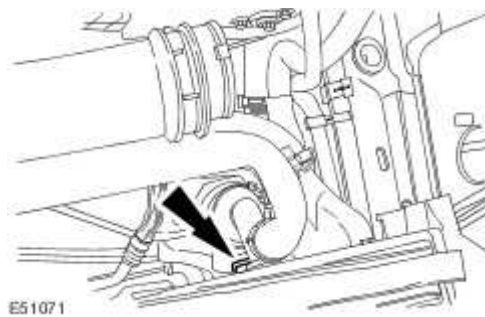
► Tighten to 7 Nm.



12 . NOTE:

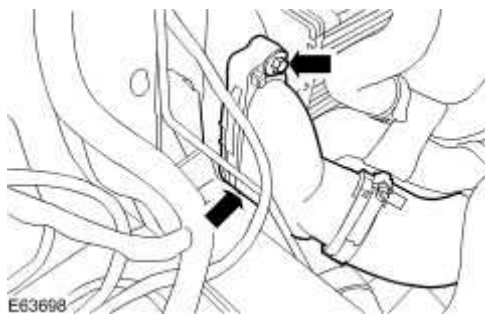
Make sure the retaining clip is fully installed.

Attach the thermostat.

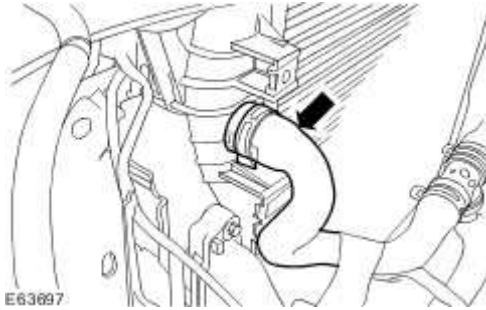


13 . Attach the charge air cooler intake elbow.

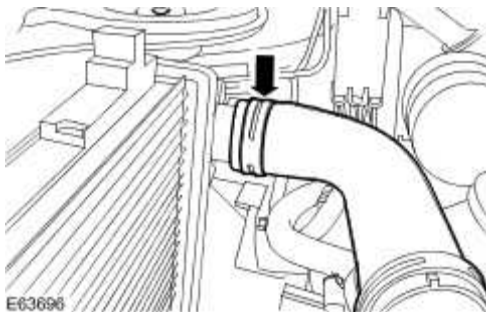
► Tighten to 7 Nm.



14 . Connect the coolant hose.

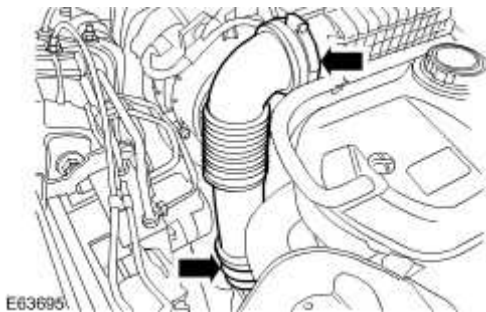


15 . Connect the radiator top hose.



16 . Install the air intake elbow pipe.

► Tighten to 4 Nm.



17 . Install the cooling fan motor and shroud.

For additional information, refer to Cooling Fan Motor and Shroud (26.25.25)

18 . Fill and bleed cooling system.

For additional information, refer to Cooling System Draining, Filling and Bleeding

Thermostat (26.45.07)

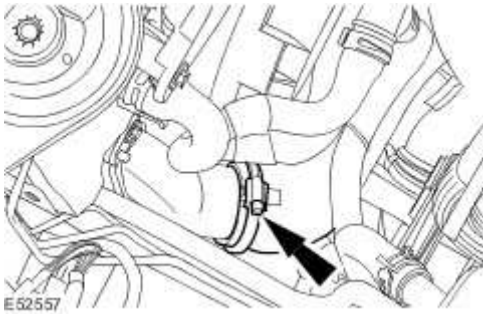
Special Service Tools



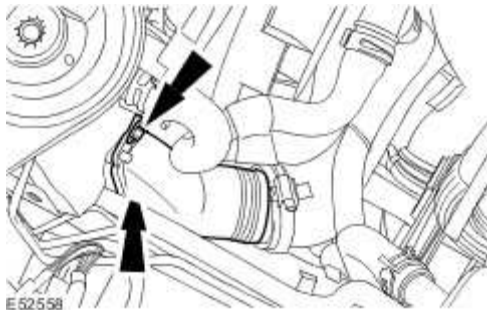
Remover/Install, Cooling Hose Clamp
303-397

Removal

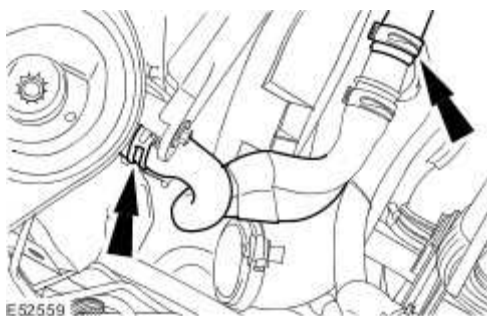
- 1 . Drain the cooling system.
For additional information, refer to Cooling System Draining, Filling and Bleeding
- 2 . Lower the vehicle.
- 3 . Remove the air cleaner.
For additional information, refer to Air Cleaner (19.10.05)
- 4 . Detach the charge air cooler inlet hose.



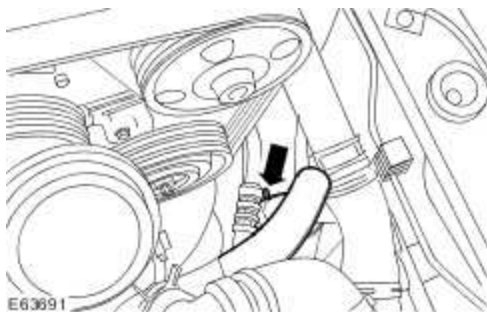
- 5 . Remove the charge air cooler inlet elbow.



6 . Detach the coolant hoses.



7 . Detach the transmission cooler hose.



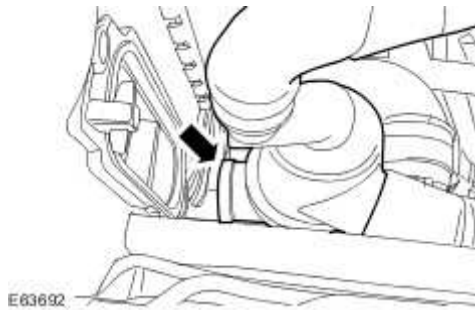
8 . Remove the coolant expansion tank.

For additional information, refer to Coolant Expansion Tank (26.15.01)

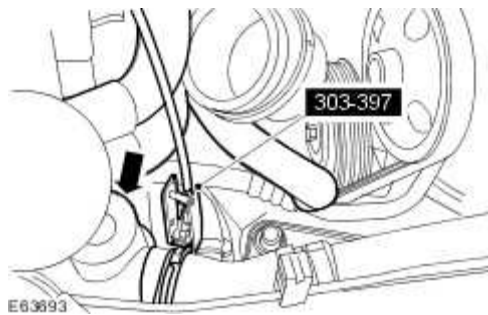
9 . Detach the coolant hose.



10 . Detach the thermostat and hose assembly.

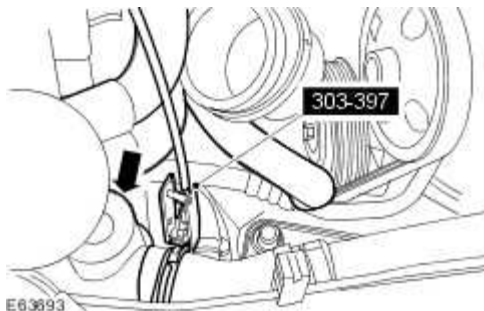


11 . Remove the thermostat and hose assembly.



Installation

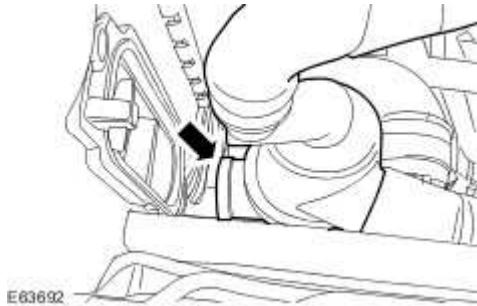
1 . Install the thermostat and hose assembly.



2 . NOTE:

Make sure the retaining clip is fully installed.

Attach the thermostat and hose assembly.



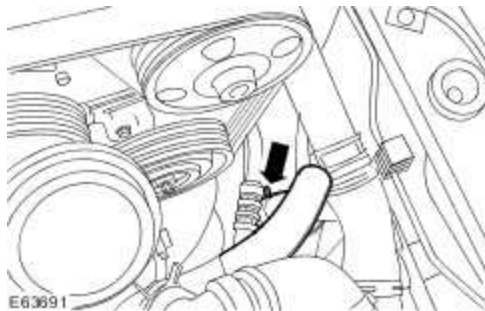
3 . Attach the coolant hose.



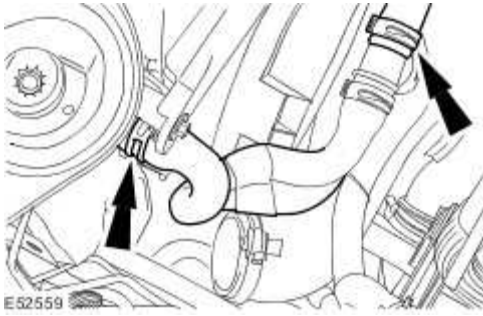
4 . Install the coolant expansion tank.

For additional information, refer to Coolant Expansion Tank (26.15.01)

5 . Attach the transmission cooler hose.

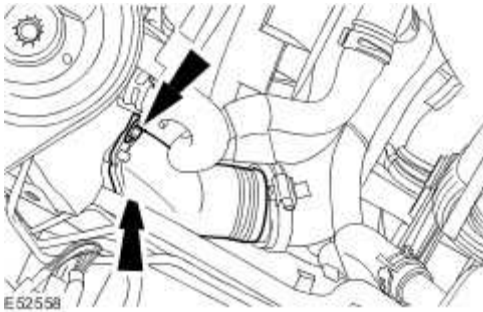


6 . Attach the coolant hoses.

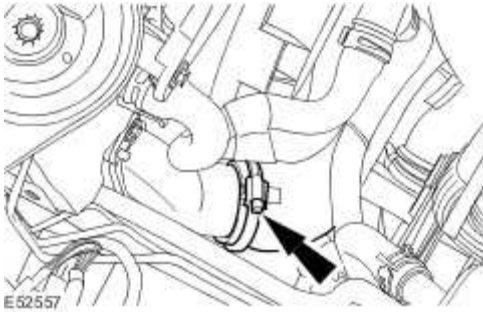


7 . Install the charge air cooler inlet elbow.

► Tighten to 7 Nm.



8 . Attach the charge air cooler inlet hose.



9 . Install the air cleaner.

For additional information, refer to Air Cleaner (19.10.05)

10 . Fill the cooling system.

For additional information, refer to Cooling System Draining, Filling and Bleeding

Water Pump (26.50.01)

Special Service Tools

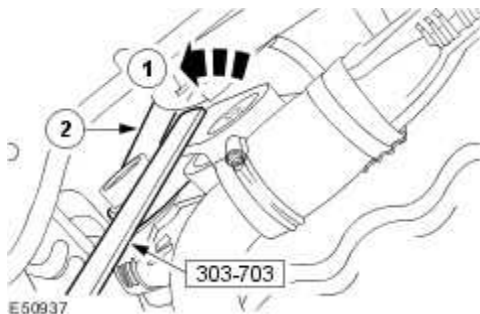


Accessory belt detensioner

303-703

Removal

- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Remove the air cleaner.
For additional information, refer to Air Cleaner (19.10.05)
- 3 . Drain the cooling system.
For additional information, refer to Cooling System Draining, Filling and Bleeding
- 4 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)
- 5 . Detach the accessory drive belt.
 - 1) Using the special tool, rotate the belt tensioner counter clockwise.
 - 2) Detach the accessory drive belt.

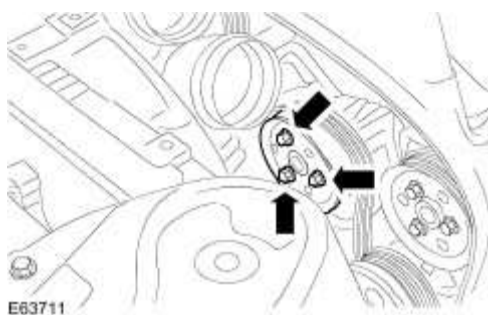


6 . NOTE:

Discard the water pump pulley retaining bolts.

Remove the water pump pulley.

▶ Using a suitable 6mm bar, retain the water pump pulley.



7



CAUTION: Reposition the accessory drive belt to prevent contamination from the coolant. Failure to follow this instruction may result in damage to the vehicle.

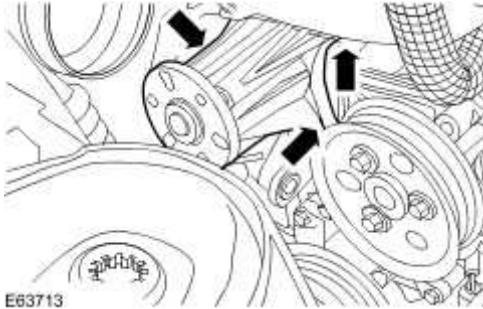
Reposition the accessory drive belt.



8 . NOTE:

Discard the water pump O-ring seal.

Remove the water pump.




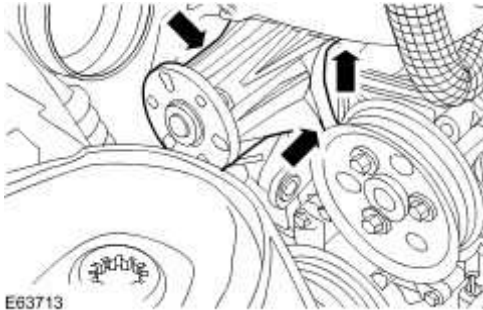
Installation

1 . NOTE:

Install a new O-ring seal.

Install the water pump.

 Tighten to 10Nm.



2 . Align the accessory drive belt.

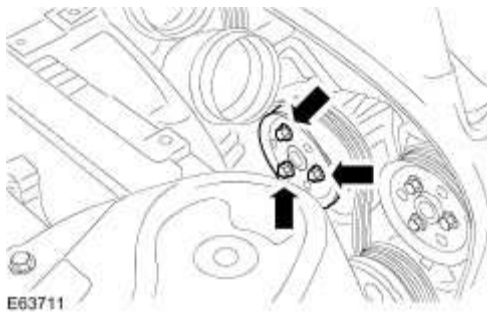


3 . NOTE:

Install new water pump pulley retaining bolts.

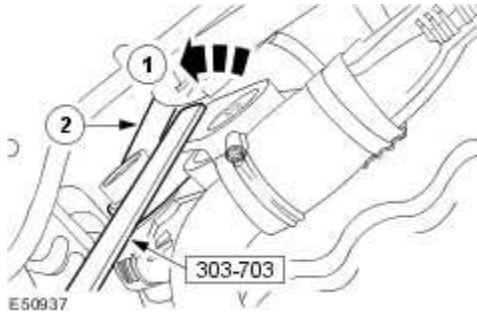
Install the water pump pulley.

- ▶ Using a suitable 6mm bar, retain the water pump pulley.
- ▶ Tighten to 24 Nm.
- ▶ Align the accessory drive belt.



4 . Attach the accessory drive belt.

- 1) Using the special tool, rotate the belt tensioner counter clockwise.
- 2) Attach the accessory drive belt.



5 . Fill the cooling system.

For additional information, refer to Cooling System Draining, Filling and Bleeding

6 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

7 . Install the air cleaner.

For additional information, refer to Air Cleaner (19.10.05)

8 . Reconnect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)

303-04A : Fuel Charging and Controls – 3.0L

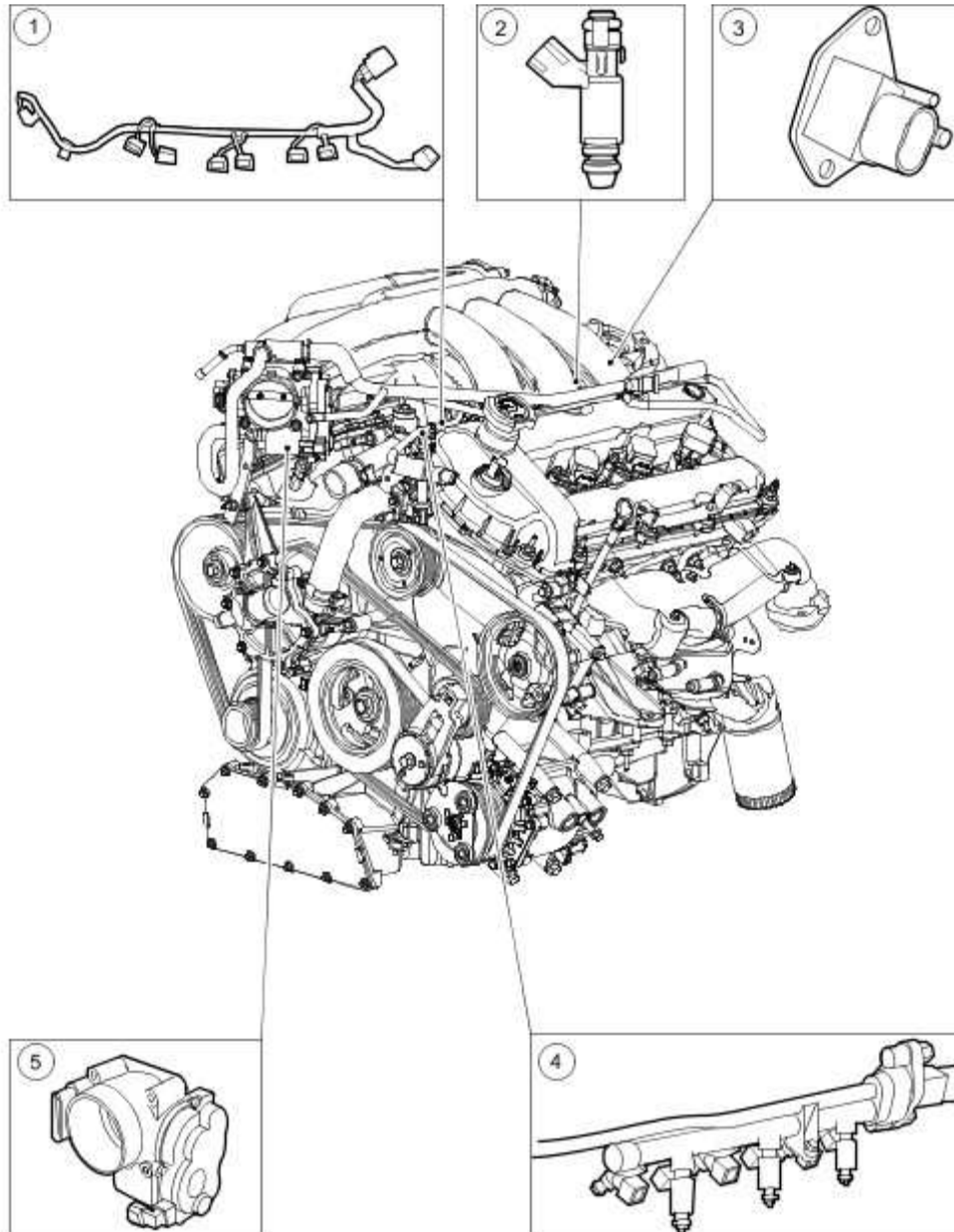
Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Lower intake manifold retaining bolts	10	-	89
Fuel injection supply manifold retaining bolts	10	-	89
Fuel pressure sensor	10	-	89
Throttle body	10	-	89
Fuel pressure sensor bracket retaining bolts, lower	10	-	89
Fuel pressure sensor bracket retaining bolts, upper	6	-	53

Fuel Charging and Controls



E31242

Item	Part Number	Description
1	—	Fuel charging wiring harness
2	—	Fuel injector
3	—	Fuel pressure sensor
4	—	Fuel injection supply manifold
5	—	Throttle body

The electronic returnless fuel system has the advantages of reduced fuel temperature and fuel tank vapor caused by constant fuel recirculation. The system delivers the correct amount of fuel to the engine under all conditions and at a constant pressure differential with respect to manifold absolute pressure.

Fuel is supplied at high pressure to the fuel injectors via a fuel injection supply manifold which incorporates fuel injectors, a fuel pressure sensor and a fuel temperature sensor. The engine control module (ECM) increases the fuel pressure to minimize fuel vapor formation to maintain fuel flow across the injectors.

The throttle body assembly is calibrated during assembly, no adjustments are required or permitted. The throttle motor is a 12 volt DC motor which, via movement of the throttle blade, controls the amount of air flowing into the engine.

Fuel Charging and Controls - VIN Range: G00442->G45703

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Confirm which, if any, warning lights and/or messages were displayed on the instrument cluster.

NOTE:

If any warning lights and/or messages were displayed when the fault occurred, refer to the Driver Information table for DTCs associated with the display, then to the DTC index table for possible sources and actions. Some warnings will appear to clear when the ignition is cycled. This is often because the warning has flagged as a result of one of the vehicle's on-board diagnostic routines having run to detect the fault. If the same routine is not run when the ignition is switched **ON**, the warning will not reflag until the routine does run. See the DTC summaries for drive cycle routines.

- 3 . Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
<ul style="list-style-type: none">• Engine oil level• Cooling system coolant level• Fuel level• Fuel contamination/grade/quality• Throttle body• Poly-vee belt	<ul style="list-style-type: none">• Fuses• Wiring harness• Electrical connector(s)• Sensor(s)• Engine control module (ECM)• Transmission control module

- 1 . Verify the following systems are working correctly:
 - Air intake system
 - Cooling system
 - Charging system
 - Ignition system
- 2 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

3 . Where the Jaguar approved diagnostic system is available, complete the S93 report before clearing any or all fault codes from the vehicle.

NOTE:

If a DTC cannot be cleared, then there is a permanent fault present that flags again as soon as it is cleared. (The exception to this is P1260, which will only clear following an ignition **OFF/ON** cycle after rectification).

4 . If the cause is not visually evident and the Jaguar approved diagnostic system is not available, use a fault code reader to retrieve the fault codes before proceeding to the Diagnostic Trouble Code (DTC) Index Chart, or the Symptom Chart if no DTCs are set.

5 . Using the Jaguar approved diagnostic system where available, and a scan tool where not, check the freeze frame data for information on the conditions applicable when the fault was flagged. The format of this will vary, depending on the tool used, but can provide information useful to the technician in diagnosing the fault.



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

Symptom	Possible source	Action
Engine cranks, but does not fire	<ul style="list-style-type: none">• Engine breather system disconnected/restricted• Ignition system• Fuel system• Harness• CKP sensor• ECM fault	Check engine breather system, <<303-08>> For ignition system, <<303-07>> Check fuel pressure, <<310-01>> For CKP tests, <<303-14>> Contact dealer technical support for advice on possible ECM failure.

Engine cranks and fires, but will not start	<ul style="list-style-type: none"> • Purge valve • Fuel pump • Engine coolant temperature (ECT) sensor • Spark plugs • HT short to ground (tracking) check rubber boots for cracks/damage • Ignition coil failure(s) • Harness 	For evaporative emissions components, <<303-13>> Check fuel pressure, <<310-01>> For ECT sensor tests, <<303-14>> For ignition system <<303-07>>
Difficult to start cold	<ul style="list-style-type: none"> • Check coolant anti-freeze content • Battery • CKP sensor • EGR valve stuck open • Fuel pump • Engine coolant temperature (ECT) sensor • Purge valve 	Check engine coolant level and condition. For battery information, <<414-01>> For CKP sensor tests, <<303-14>> For EGR system information, <<303-08>> Check fuel pressure. <<310-01>> For ECT sensor tests, <<303-14>> For evaporative emissions components, <<303-13>>
Difficult to start hot	<ul style="list-style-type: none"> • Injector leak • Fuel temperature sensor • IAT sensor • MAF sensor • Purge valve • Fuel pump • Ignition system • Engine coolant temperature (ECT) sensor • EGR valve stuck open 	For fuel injector information, Fuel Injectors (18.10.02) For fuel temperature sensor, IAT sensor and MAF sensor tests, <<303-14>> For evaporative emissions components, <<303-13>> Check fuel pressure. <<310-01>> For ignition system, <<303-07>> For ECT sensor tests, <<303-14>> For EGR information, <<303-08>>
Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)	<ul style="list-style-type: none"> • Injector leak • Fuel temperature sensor • IAT sensor • MAF sensor • Purge valve • Fuel pump • Ignition system • Engine coolant temperature (ECT) sensor • EGR valve stuck open 	For fuel injector information, For fuel temperature sensor, IAT sensor and MAF sensor tests, <<303-14>> For evaporative emissions components, <<303-13>> Check fuel pressure. <<310-01>> For ignition system, <<303-07>> For ECT sensor tests, <<303-14>> For EGR information, <<303-08>>

Engine stalls soon after start	<ul style="list-style-type: none"> • Breather system disconnected/restricted • ECM relay • Harness • MAF sensor • Engine coolant temperature (ECT) sensor • Ignition system • Air filter restricted • Fuel lines • Fuel rail pressure sensor • Air leakage 	<p>For breather system information, <<303-08>> For ECM relay, MAF sensor and ECT sensor tests, <<303-14>> For ignition system, <<303-07>> For air filter information, <<303-12>> For fuel line information, <<310-01>> For fuel rail pressure sensor tests, GO to Pinpoint Test G206886p2.</p> <p>. For intake system information, <<303-12>></p>
Engine hesitates/poor acceleration	<ul style="list-style-type: none"> • Fuel pump • Injector leak • Fuel pressure • Fuel lines • Air leakage • Throttle sensors • Throttle motor • Ignition system • Exhaust gas recirculation • HO2 sensors • Transmission malfunction • Restricted pedal travel (carpet, etc) • APP sensor 	<p>Check fuel pressure. <<310-01>> For fuel rail pressure sensor tests, GO to Pinpoint Test G206886p2.</p> <p>. For fuel line information, <<310-01>> For intake system, <<303-12>> For throttle position sensor and throttle motor tests, <<303-14>> For ignition system, <<303-07>> For exhaust gas recirculation, <<303-08>> Check for DTCs indicating a faulty HO2 sensor. Refer to the DTC index. For transmission information, <<307-01>></p> <p>Check accelerator pedal travel. For APP sensor tests, <<303-14>></p>
Engine backfires	<ul style="list-style-type: none"> • Fuel pump • Fuel lines • Air leakage • MAF sensor • Oxygen sensors • Ignition system • Sticking VCT hub • APP sensor 	<p>Check fuel pressure. <<310-01>> For fuel line information, <<310-01>> For intake system, <<303-12>> For MAF sensor tests, <<303-14>> Check for DTCs indicating a faulty HO2 sensor. Refer to the DTC index. For ignition system, <<303-07>> Check DTCs for VCT range/performance fault. For VCT information, <<303-01>> For APP sensor tests, <<303-14>></p>
Engine surges	<ul style="list-style-type: none"> • Fuel pump • Fuel lines • MAF sensor • Harness • Throttle sensors • Throttle motor 	<p>Check fuel pressure. <<310-01>> For fuel line information, <<310-01>> For MAF sensor, throttle sensor, and throttle motor relay tests, <<303-14>> For ignition system, <<303-07>></p>

	<ul style="list-style-type: none"> Ignition system 	
Engine detonates/knocks	<ul style="list-style-type: none"> KS/circuit malfunction Fuel pump Fuel lines FRP sensor MAF sensor Oxygen sensors Air leakage Sticking VCT hub BARO sensor malfunction 	<p>For KS circuit tests, <<303-14>> Check fuel pressure. <<310-01>> For fuel line information, <<310-01>> For fuel rail pressure sensor tests, GO to Pinpoint Test G206886p2.</p> <p>. For MAF sensor and oxygen sensor tests, <<303-14>> For intake system, <<303-12>> Check DTCs for VCT range/performance fault. For VCT information, <<303-01>> For BARO sensor, contact dealer technical support for advice on possible ECM failure</p>
No throttle response	<ul style="list-style-type: none"> APP sensor malfunction Throttle sensors Throttle motor 	For APP sensor, throttle position sensor and throttle motor relay tests, <<303-14>>
Poor throttle response	<ul style="list-style-type: none"> APP sensor malfunction Throttle sensors Engine coolant temperature (ECT) sensor MAF sensor Transmission malfunction Traction control event Air leakage Breather system disconnected/restricted 	For APP sensor, throttle position sensor, ECT sensor and MAF sensor tests, <<303-14>> For transmission information, <<307-01>> For intake system, <<303-12>> For breather system information, <<303-08>>

Driver Information Chart

Warning light	Message	Default Mode	DTC
Red	Engine systems fault	Engine shut-down (all cylinders fuel cut)	P1224
Red	Engine systems fault	Limp-Home	P1229
Red	Engine systems fault	Limp-Home	P0121, P0122, P0123, P0222, P0223

Red	Engine systems fault	Limp-Home	P1251, P1631
Red	Engine systems fault	Limp-Home	P1611
Red	Engine systems fault	Limp-Home	P1633
Red	Engine systems fault	High idle	P1344, P1122, P1123, P1215, P1216
Red	Restricted Performance	Limp-Home unavailable	P1254
Red	Restricted Performance	Limp-Home unavailable	P1250
Red	Restricted Performance	Safety redundancy	P1657, P1658
Red	Restricted Performance	Safety redundancy	P16634
Amber	Restricted Performance	Engine speed limited	P0116, P0117, P0118, P0125
Amber	Restricted Performance	Engine speed limited	P0101, P0102, P0103, P0104
Amber	Restricted Performance	Engine speed limited	P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P1313, P1314
Amber	Restricted Performance	Engine speed limited	P0327, P0328, P0332, P0333, P1648
Amber	Restricted Performance	Engine speed limited	P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358, P1367, P1368
Amber	Restricted Performance	Engine speed limited	P0171, P0172, P0174, P0175
Amber	Restricted Performance	Engine speed limited	P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208
Amber	Restricted Performance	Engine speed limited	P0335, P0336
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P1642
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression	P1643

		enabled	
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P0096, P0097, P0098
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P1474
Amber	Restricted Performance	Engine speed limited	P1234, P1236, P1338
Amber	None	None	P0506, P0507
Amber	None	None	P1656
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0725
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P1796
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0701
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P1603
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0605
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P1719
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0720
Amber	Gearbox	Gearbox default to set gear	P0715

	fault/Restricted performance		
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0705
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0610
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0606
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0750
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0753
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0755
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0758
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0760
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0763
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0765
Amber	Gearbox fault/Restricted	Gearbox default to set gear	P0768

	performance		
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0770
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0773
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0740
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0743
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0787
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0788
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0730
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0731
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0732
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0733
Amber	Gearbox fault/Restricted	Gearbox default to set gear	P0734

	performance		
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0735
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0729
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0781
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0782
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0783
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0784
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0829
Amber	Gearbox fault/Restricted performance	Engine speed limited, reverse throttle progression enabled	P1797
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0641
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0651
Amber	Gearbox fault/Restricted	Gearbox default to set gear	P0860

	performance		
Amber	Gearbox fault/Restricted performance	Limp-home	P1783

Default mode Definitions

LIMP-HOME MODE

- Throttle motor off
- Throttle motor relay off
- Throttle motor circuit off
- Fuel intervention
- Cruise control inhibited

LIMP-HOME UNAVAILABLE

- Power limitation
- Vehicle speed limited to 120 kph
- Reverse throttle progression enabled
- Cruise control Inhibited

REVERSE THROTTLE PROGRESSION

- Throttle opening limited to maximum 30%

NOTE:

The throttle operation uses the same map as for reverse gear.

ENGINE SPEED LIMITED

- Engine runs normally, up to 3000 rpm
- Engine speed restricted to 3000 rpm maximum, by fuel cut-off

HIGH IDLE

- Throttle valve kept in fixed position by motor
- Cruise control Inhibited

SAFETY REDUNDANCY

- Power limitation
- Vehicle speed limited to 120 kph
- Reverse throttle progression enabled
- Cruise Control Inhibited

Diagnostic Trouble Code (DTC) index

DTC	Condition	Possible Causes	Action
P0171	Right-hand cylinders combustion too lean	<ul style="list-style-type: none"> • Air intake leak between mass air flow (MAF) sensor and cylinder head • Fuel filter/system restriction • Fuel injector restriction • Fuel rail pressure (FRP) sensor fault (low fuel pressure) • Low fuel pump output • HO2S/catalyst monitor sensor harness wiring condition fault • EFT sensor fault (low fuel temperature) • Mass air flow (MAF) sensor fault (low intake air flow) • Exhaust leak (before catalyst) • ECM receiving incorrect signal from one or more of the following sensors; ECT, MAF*, IAT, fuel rail temperature 	<p>For intake system, <<303-12>> For fuel injector, Fuel Injectors (18.10.02)</p> <p>For fuel filter and pump, <<310-01>> For FRP sensor circuit tests, GO to Pinpoint Test G206886p2.</p> <p>. For HO2S/Catalyst monitor sensor tests, <<303-14>> For exhaust system, <<309-00>> For sensor tests, <<303-14>> *</p> <p>If this DTC is flagged, pay particular attention to the MAF sensor.</p>
P0172	Right-hand cylinders combustion too rich	<ul style="list-style-type: none"> • Engine misfire • Restricted air filter • Leaking fuel injector(s) • FRP sensor failure (high fuel pressure) • EFT sensor fault (high fuel temperature) • MAF sensor fault (high intake air flow) • HO2S/catalyst monitor sensor harness wiring condition fault • ECM receiving incorrect signal from one or more of the following sensors; ECT, MAF, IAT, FRP, EFT. 	<p>Check for "misfire detected" DTCs in this section; For intake system, <<303-12>> For fuel injector, Fuel Injectors (18.10.02)</p> <p>For FRP sensor circuit tests, GO to Pinpoint Test G206886p2.</p> <p>. For other sensor tests, <<303-14>></p>
P0174	Left-hand cylinders combustion too lean	<ul style="list-style-type: none"> • Air intake leak between MAF sensor and cylinder head • Fuel filter/system restriction 	<p>For intake system, <<303-12>> For fuel injectors, Fuel Injectors (18.10.02)</p> <p>For fuel filter, pump and</p>

		<ul style="list-style-type: none"> Fuel injector restriction FRP sensor failure (low fuel pressure) Low fuel pump output HO2S/catalyst monitor sensor harness wiring condition fault EFT sensor fault (low fuel temperature) Mass air flow (MAF) sensor fault (low intake air flow) Exhaust leak (before catalyst) ECM receiving incorrect signal from one or more of the following sensors; ECT, MAF*, IAT, FRP, EFT, TP. 	<p>lines, <<310-01>> For HO2S/catalyst monitor sensor tests, <<303-14>> For exhaust system, <<309-00>> For FRP sensor tests, GO to Pinpoint Test G206886p2.</p> <p>. For other sensor tests, <<303-14>> * If this DTC is flagged, pay particular attention to the MAF sensor.</p>
P0175	Left-hand cylinders combustion too rich	<ul style="list-style-type: none"> Engine misfire Restricted air filter Leaking fuel injector(s) FRP sensor failure (high fuel pressure) ECM receiving incorrect signal from one or more of the following sensors; ECT, MAF, IAT, fuel rail pressure, fuel rail temperature 	<p>Check for "misfire detected" DTCs in this section. For intake system, <<303-12>> For fuel injectors, Fuel Injectors (18.10.02) For FRP sensor tests, GO to Pinpoint Test G206886p2.</p> <p>. For other sensor tests, <<303-14>></p>
P0191	Fuel rail pressure (FRP) sensor circuit range/performance	<ul style="list-style-type: none"> Fuel filter/system restriction Fuel system leak Incorrect fuel pump output FRP sensor to ECM sensing circuit; high resistance, open circuit, short circuit to high voltage FRP sensor to splice in sensor supply circuit; high resistance, open circuit FRP sensor to splice in sensor ground circuit; high resistance, open circuit, short circuit to ground, short circuit to high voltage FRP sensor failure 	<p>For fuel filter, pump and lines, <<310-01>> For FRP sensor tests, GO to Pinpoint Test G206886p2.</p> <p>.</p>
P0192	Fuel rail pressure (FRP) sensor circuit low voltage	<ul style="list-style-type: none"> FRP sensor disconnected FRP sensor to ECM sensing 	<p>For FRP sensor tests, GO to Pinpoint Test G206886p2.</p>

	(low pressure)	circuit; open circuit or short circuit to ground <ul style="list-style-type: none"> • FRP sensor to splice in sensor supply circuit; high resistance, open circuit • FRP sensor failure 	.
P0193	Fuel rail pressure (FRP) sensor circuit high voltage (high pressure)	<ul style="list-style-type: none"> • FRP sensor to ECM wiring (supply/sense); short circuit to each other • FRP sensor to ECM sense circuit; short circuit to high voltage • FRP sensor to splice in sensor ground circuit; open circuit • FRP sensor failure 	For FRP sensor tests, GO to Pinpoint Test G206886p2. .
P0201	Fuel injector circuit malfunction, Cyl 1	<ul style="list-style-type: none"> • Injector disconnected • Injector wiring open or short circuit • Injector failure 	For fuel injectors, Fuel Injectors (18.10.02) For fuel injector circuit tests, GO to Pinpoint Test G206886p1. .
P0202	Fuel injector circuit malfunction, Cyl 2	<ul style="list-style-type: none"> • Injector disconnected • Injector wiring open or short circuit • Injector failure 	For fuel injectors, Fuel Injectors (18.10.02) For fuel injector circuit tests, GO to Pinpoint Test G206886p1. .
P0203	Fuel injector circuit malfunction, Cyl 3	<ul style="list-style-type: none"> • Injector disconnected • Injector wiring open or short circuit • Injector failure 	For fuel injectors, Fuel Injectors (18.10.02) For fuel injector circuit tests, GO to Pinpoint Test G206886p1. .
P0204	Fuel injector circuit malfunction, Cyl 4	<ul style="list-style-type: none"> • Injector disconnected • Injector wiring open or short circuit • Injector failure 	For fuel injectors, Fuel Injectors (18.10.02) For fuel injector circuit tests, GO to Pinpoint Test G206886p1. .

P0205	Fuel injector circuit malfunction, Cyl 5	<ul style="list-style-type: none"> • Injector disconnected • Injector wiring open or short circuit • Injector failure 	<p>For fuel injectors, Fuel Injectors (18.10.02)</p> <p>For fuel injector circuit tests, GO to Pinpoint Test G206886p1.</p> <p>.</p>
P0206	Fuel injector circuit malfunction, Cyl 6	<ul style="list-style-type: none"> • Injector disconnected • Injector wiring open or short circuit • Injector failure 	<p>For fuel injectors, Fuel Injectors (18.10.02)</p> <p>For fuel injector circuit tests, GO to Pinpoint Test G206886p1.</p> <p>.</p>
P0300	Random misfire detected	<ul style="list-style-type: none"> • ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged) • Ignition coil failure • Spark plug failure/fouled/incorrect gap • Fuel injector circuit fault(s) (injector DTCs also flagged) • Fuel delivery pressure high/low • Fuel injectors restricted/leaking • Fuel injectors continuously open • Fuel contamination • Worn camshaft/broken valve springs 	<p>For ignition system, <<303-07>> For injector circuit tests, GO to Pinpoint Test G206886p1.</p> <p>. Check fuel pressure, <<310-01>> For fuel injectors, Fuel Injectors (18.10.02)</p> <p>For engine information, <<303-01>></p>
P0301	Misfire detected, cylinder 1	<ul style="list-style-type: none"> • ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged) • Ignition coil failure • Spark plug failure/fouled/incorrect gap • Fuel injector circuit fault(s) (injector DTCs also flagged) • Fuel delivery pressure high/low • Fuel injectors restricted/leaking • Fuel injectors continuously 	<p>For ignition system, <<303-07>> For injector circuit tests, GO to Pinpoint Test G206886p1.</p> <p>. Check fuel pressure, <<310-01>> For fuel injectors, Fuel Injectors (18.10.02)</p> <p>For engine information, <<303-01>></p>

		<ul style="list-style-type: none"> open Fuel contamination Worn camshaft/broken valve springs 	
P0302	Misfire detected, cylinder 2	<ul style="list-style-type: none"> ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged) Ignition coil failure Spark plug failure/fouled/incorrect gap Fuel injector circuit fault(s) (injector DTCs also flagged) Fuel delivery pressure high/low Fuel injectors restricted/leaking Fuel injectors continuously open Fuel contamination Worn camshaft/broken valve springs 	<p>For ignition system, <<303-07>> For injector circuit tests, GO to Pinpoint Test G206886p1.</p> <p>. Check fuel pressure, <<310-01>> For fuel injectors, Fuel Injectors (18.10.02) For engine information, <<303-01>></p>
P0303	Misfire detected, cylinder 3	<ul style="list-style-type: none"> ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged) Ignition coil failure Spark plug failure/fouled/incorrect gap Fuel injector circuit fault(s) (injector DTCs also flagged) Fuel delivery pressure high/low Fuel injectors restricted/leaking Fuel injectors continuously open Fuel contamination Worn camshaft/broken valve springs 	<p>For ignition system, <<303-07>> For injector circuit tests, GO to Pinpoint Test G206886p1.</p> <p>. Check fuel pressure, <<310-01>> For fuel injectors, Fuel Injectors (18.10.02) For engine information, <<303-01>></p>
P0304	Misfire detected, cylinder 4	<ul style="list-style-type: none"> ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged) Ignition coil failure 	<p>For ignition system, <<303-07>> For injector circuit tests, GO to Pinpoint Test G206886p1.</p>

		<ul style="list-style-type: none"> • Spark plug failure/fouled/incorrect gap • Fuel injector circuit fault(s) (injector DTCs also flagged) • Fuel delivery pressure high/low • Fuel injectors restricted/leaking • Fuel injectors continuously open • Fuel contamination • Worn camshaft/broken valve springs 	<p>. Check fuel pressure, <<310-01>> For fuel injectors, Fuel Injectors (18.10.02) For engine information, <<303-01>></p>
P0305	Misfire detected, cylinder 5	<ul style="list-style-type: none"> • ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged) • Ignition coil failure • Spark plug failure/fouled/incorrect gap • Fuel injector circuit fault(s) (injector DTCs also flagged) • Fuel delivery pressure high/low • Fuel injectors restricted/leaking • Fuel injectors continuously open • Fuel contamination • Worn camshaft/broken valve springs 	<p>For ignition system, <<303-07>> For injector circuit tests, GO to Pinpoint Test G206886p1. . Check fuel pressure, <<310-01>> For fuel injectors, Fuel Injectors (18.10.02) For engine information, <<303-01>></p>
P0306	Misfire detected, cylinder 6	<ul style="list-style-type: none"> • ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged) • Ignition coil failure • Spark plug failure/fouled/incorrect gap • Fuel injector circuit fault(s) (injector DTCs also flagged) • Fuel delivery pressure high/low • Fuel injectors restricted/leaking • Fuel injectors continuously 	<p>For ignition system, <<303-07>> For injector circuit tests, GO to Pinpoint Test G206886p1. . Check fuel pressure, <<310-01>> For fuel injectors, Fuel Injectors (18.10.02) For engine information, <<303-01>></p>

		<ul style="list-style-type: none"> open Fuel contamination Worn camshaft/broken valve springs 	
P0460	Fuel level sensor circuit range/performance	<ul style="list-style-type: none"> Fuel level sensor to rear electronic control module circuit(s); intermittent short circuit, open circuit, high resistance Fuel level sensor failure Rear electronic control module fault (incorrect fuel level data) 	For fuel level sensor and circuit tests, <<310-01>>
P1224	Throttle control position error	<ul style="list-style-type: none"> Throttle motor failure Throttle body failure 	<p>This DTC can only be accurately diagnosed using the Jaguar approved diagnostic system. If this is not available, INSTALL a new throttle body.</p> <p>Throttle Body - VIN Range: G00442->G45703 (19.70.04) CLEAR the DTC, TEST the system for normal operation.</p>
P1229	Throttle motor control circuit malfunction	<ul style="list-style-type: none"> Throttle motor disconnected Throttle motor to ECM drive circuits; short circuit or open circuit ECM ground circuit fault(s) (EM80-04, 05, 54) Throttle motor failure Throttle body failure 	<p>For throttle motor and circuit tests, and for ECM ground tests, <<303-14>></p> <p>For throttle body, Throttle Body - VIN Range: G00442->G45703 (19.70.04)</p>
P1234	No fuel pump commands received by ECM	<ul style="list-style-type: none"> ECM to fuel pump module drive circuit; open circuit, short circuit, high resistance Fuel pump module failure 	For fuel pump module circuit tests, <<310-01>>
P1236	Fuel pump not activated when requested by ECM	<ul style="list-style-type: none"> ECM to fuel pump module drive circuit; open circuit, short circuit, high resistance 	For fuel pump module circuit tests, <<310-01>>

		<ul style="list-style-type: none"> Fuel pump module failure 	
P1250	Throttle return spring failure malfunction	Throttle return spring failure (throttle body failure)	<p>This DTC can only be accurately diagnosed using the Jaguar approved diagnostic system. If this is not available, INSTALL a new throttle body.</p> <p>Throttle Body - VIN Range: G00442->G45703 (19.70.04) CLEAR the DTC, TEST the system for normal operation.</p>
P1251	Throttle motor relay OFF failure	<ul style="list-style-type: none"> Throttle motor relay coil power supply circuit; open circuit Throttle motor relay failure Throttle motor relay coil to ECM circuit; open circuit ECM ground circuit fault (relay coil drive) 	For throttle motor relay tests, <<303-14>>
P1254	Throttle limp-home spring malfunction	Throttle body	<p>This DTC can only be accurately diagnosed using the Jaguar approved diagnostic system. If this is not available, INSTALL a new throttle body.</p> <p>Throttle Body - VIN Range: G00442->G45703 (19.70.04) CLEAR the DTC, TEST the system for normal operation.</p>
P1313	Right-hand cylinders misfire rate catalyst damage (this DTC will flag only when accompanied by an individual cylinder misfire DTC; P0300-P0306)	Refer to P0300 possible sources	Refer to P0300 Actions
P1314	Left-hand cylinders misfire rate catalyst damage (this DTC will flag only when	Refer to P0300 possible sources	Refer to P0300 Actions

	accompanied by an individual cylinder misfire DTC; P0300-P0306)		
P1316	Misfire excess emission (Note: This DTC will flag only when accompanied by an individual cylinder misfire DTC; P0300 to P0306)	Refer to P0300 possible sources	Refer to P0300 Actions
P1338	Fuel pump drive circuit low/high voltage	<ul style="list-style-type: none"> Fuel pump module to fuel pump drive circuit; open circuit, short circuit, high resistance Fuel pump module failure Fuel pump failure 	For fuel pump module circuit tests, <<310-01>>
P1631	Throttle motor power relay coil activation circuit failure	<ul style="list-style-type: none"> Throttle motor relay coil to ECM circuit; open circuit Throttle motor relay failure Throttle motor relay coil to ECM drive circuit; open circuit, short circuit to ground 	For throttle motor relay tests, <<303-14>>
P1634	Throttle watchdog circuit malfunction	<ul style="list-style-type: none"> ECM failure 	Contact dealer technical support for advice on possible ECM failure.
P1656	Throttle position (TP) sensor amplifier circuit malfunction	<ul style="list-style-type: none"> ECM failure 	Contact dealer technical support for advice on possible ECM failure.
P1657	Throttle motor relay coil drive circuit ON failure	<ul style="list-style-type: none"> Throttle motor relay failure Throttle motor relay coil to ECM drive circuit; short circuit to B+ voltage 	For throttle motor relay tests, <<303-14>>
P1658	Throttle motor relay ON failure	<ul style="list-style-type: none"> Throttle motor relay failure Throttle motor relay coil to ECM drive circuit; short circuit to B+ voltage 	For throttle motor relay tests, <<303-14>>

Pinpoint Tests

PINPOINT TEST G206886p1 : DTC P0201, P0202, P0203, P0204, P0205, P0206; FUEL INJECTORS

G206886t1 : CHECK THE INJECTOR COIL RESISTANCE

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the battery negative terminal. 3. Disconnect the relevant injector electrical connector (IL03 to IL08). 4. Measure the resistance between the injector pins.

- **Is the resistance between 12 and 16 ohms?**

-> **Yes**

GO to Pinpoint Test G206886t2.

-> **No**

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC. TEST the system for normal operation.

G206886t2 : CHECK THE INJECTOR COIL INSULATION

1. Measure the resistance between the injector pin 01 and the injector body. 2. Measure the resistance between the injector pin 02 and the injector body.

- **Is either resistance less than 10,000 ohms?**

-> **Yes**

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G206886t3.

G206886t3 : CHECK THE INJECTOR SUPPLY VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the **ON** position. 3. Disconnect the relevant injector harness electrical connector (IL03 to IL08). 4. Measure the voltage between the relevant injector harness electrical connector (IL03 to IL08) pin 02 and GROUND.

- **Is the voltage less than 10 Volts?**

-> **Yes**

REPAIR the circuit between the relevant injector harness electrical connector (IL03 to IL08) pin 02

and battery. This circuit includes the front power distribution box, fuse 13, and the EMS relay. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G206886t4.

G206886t4 : CHECK THE INJECTOR GROUND CIRCUIT

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the battery negative terminal. 3. Disconnect the ECM electrical connector PI01. 4. Measure the resistance between the relevant injector harness electrical connector (IL03 to IL08) pin 01 and PI01 pins as follows:

- Injector Cyl 1 pin 01 (BG) and PI01, pin 115 (BG).
- Injector Cyl 2 pin 01 (BR) and PI01, pin 120 (BR).
- Injector Cyl 3 pin 01 (BK) and PI01, pin 114 (BK).
- Injector Cyl 4 pin 01 (BO) and PI01, pin 119 (BO).
- Injector Cyl 5 pin 01 (BG) and PI01, pin 113 (BG).
- Injector Cyl 6 pin 01 (U) and PI01, pin 118 (U).

- **Is the resistance greater than 5 ohms?**

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G206886t5.

G206886t5 : CHECK THE INJECTOR GROUND CIRCUIT FOR SHORT CIRCUIT TO BATTERY

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the **ON** position. 3. Measure the voltage between the relevant injector harness electrical connector (IL03 to IL08) pin 01 and GROUND.

- **Is the voltage greater than 3 volts?**

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G206886t6.

G206886t6 : CHECK THE INJECTOR GROUND CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between the relevant injector harness electrical connector (IL03 to IL08) pin 01 and GROUND.

- **Is the resistance less than 10,000 ohms?**

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

Contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G206886p2 : DTC P0190, P0192, P0193; FUEL RAIL PRESSURE (FRP) SENSOR

G206886t7 : CHECK THE FRP SENSOR SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the battery negative terminal. 3. Disconnect the FRP sensor electrical connector, IL12. 4. Measure the resistance between IL12 pin 03 (U) and PI01 pin 73 (U).

- **Is the resistance greater than 5 ohms?**

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G206886t8.

G206886t8 : CHECK THE FRP SENSOR SIGNAL CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the **ON** position. 3. Measure the voltage between IL12 pin 03 (U) and GROUND.

- **Is the voltage greater than 3 volts?**

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.

TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G206886t9.

G206886t9 : CHECK THE FRP SENSOR SIGNAL CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the **OFF** position. 2. Measure the resistance between the FRP sensor electrical connector IL12 pin 03 (U) and GROUND.

- **Is the resistance less than 10,000 ohms?**

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

Recheck the DTCs. Check the sensor supply and ground circuits. <<303-14>>

Fuel Charging and Controls - VIN Range: G45704->G99999

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
<ul style="list-style-type: none">• Fuel leaks• Damaged fuel lines• Damaged push connect fittings• Fuel level• Fuel contamination/grade/quality• Throttle body• Damaged fuel tank filler pipe cap• Damaged fuel tank filler pipe	<ul style="list-style-type: none">• Fuses• Inertia switch• Loose or corroded electrical connectors• Harnesses• Sensor(s)• Engine control module (ECM)

3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the diagnostic trouble code (DTC) index.

Symptom Chart

Symptom	Possible source	Action
Engine cranks, but does not fire	<ul style="list-style-type: none">• Engine breather system disconnected/restricted• Ignition system• Fuel system• Harness• Crankshaft position (CKP) sensor• ECM fault	Check the engine breather system, Engine Emission Control - VIN Range: G45704->G99999 For ignition system tests, Engine Ignition - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L,

		VIN Range: G45704->G99999 For CKP tests, Electronic Engine Controls - VIN Range: G45704->G99999 Refer to the warranty policy and procedures manual if an ECM is suspect.
Engine cranks and fires, but will not start	<ul style="list-style-type: none"> • Evaporative emissions purge valve • Fuel pump • Spark plugs • HT short circuit to ground (tracking) check rubber boots for cracks/damage • Ignition coil failure(s) • Harness 	For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For ignition system tests, Engine Ignition - VIN Range: G45704->G99999
Difficult to start cold	<ul style="list-style-type: none"> • Check coolant anti-freeze content • Battery • CKP sensor • Exhaust gas recirculation (EGR) valve stuck open • Fuel pump • Purge valve 	Check the engine coolant level and condition. For battery information, Battery For CKP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For EGR system information, Engine Emission Control - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999
Difficult to start hot	<ul style="list-style-type: none"> • Injector leak • Engine fuel temperature (EFT) sensor • Intake air temperature (IAT) sensor • Mass air flow (MAF) sensor • Purge valve • Fuel pump • Ignition system • EGR valve stuck open 	For fuel injector information, Fuel Injectors (18.10.02) For EFT, IAT and MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For ignition system tests, Engine Ignition - VIN Range:

		G45704->G99999 For EGR system information, Engine Emission Control - VIN Range: G45704->G99999
Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)	<ul style="list-style-type: none"> • Injector leak • EFT sensor • IAT sensor • MAF sensor • Purge valve • Fuel pump • Ignition system • EGR valve stuck open 	For fuel injector information, Fuel Charging and Controls - VIN Range: G45704->G99999 For EFT, IAT and MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For ignition system tests, Engine Ignition - VIN Range: G45704->G99999 For EGR system information, Engine Emission Control - VIN Range: G45704->G99999
Engine stalls soon after start	<ul style="list-style-type: none"> • Breather system disconnected/restricted • ECM relay • Harness • MAF sensor • Fuel rail pressure (FRP) sensor • Ignition system • Air filter restricted • Air leakage • Fuel lines 	For breather system information, Engine Emission Control - VIN Range: G45704->G99999 For ECM relay, MAF and FRP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For ignition system tests, Engine Ignition - VIN Range: G45704->G99999 For air filter and intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For fuel line information, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999
Engine hesitates/poor acceleration	<ul style="list-style-type: none"> • Fuel pump • Fuel pressure • Fuel lines • Injector leak • Air leakage 	Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For injector information,

	<ul style="list-style-type: none"> • Throttle position (TP) sensors • Accelerator pedal position (APP) sensor • Throttle motor • Restricted pedal travel (carpet, etc) • Ignition system • EGR valve stuck open • HO2 sensors • Transmission malfunction 	<p>Fuel Injectors (18.10.02) For intake system information,</p> <p>Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For TP, APP sensor and throttle motor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 Check the accelerator pedal travel. For ignition system tests,</p> <p>Engine Ignition - VIN Range: G45704->G99999 For EGR system information,</p> <p>Engine Emission Control - VIN Range: G45704->G99999 Check for DTCs indicating a faulty HO2 sensor. Refer to the DTC index. For transmission information,</p>
Engine backfires	<ul style="list-style-type: none"> • Fuel pump • Fuel lines • Air leakage • MAF sensor • APP sensor • HO2 sensors • Ignition system • Sticking variable camshaft timing (VCT) hub 	<p>Check the fuel pressure, check the fuel lines,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For intake system,</p> <p>Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For MAF and APP sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 Check for DTCs indicating a faulty HO2 sensor. Refer to the DTC index. For ignition system tests,</p> <p>Engine Ignition - VIN Range: G45704->G99999 Check DTCs for VCT range/performance fault. For VCT information,</p> <p>Engine</p>
Engine surges	<ul style="list-style-type: none"> • Fuel pump • Fuel lines • MAF sensor • Harness • TP sensors • Throttle motor 	<p>Check the fuel pressure, check the fuel lines,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For MAF, TP sensor, and throttle motor</p>

	<ul style="list-style-type: none"> Ignition system 	tests, Electronic Engine Controls - VIN Range: G45704->G99999 For ignition system tests, Engine Ignition - VIN Range: G45704->G99999
Engine detonates/knocks	<ul style="list-style-type: none"> Knock sensor (KS) circuit malfunction FRP sensor MAF sensor HO2 sensors Fuel pump Fuel lines Air leakage Sticking VCT hub BARO sensor malfunction (internal ECM fault) 	For KS, FRP, MAF and HO2 sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check DTCs for VCT range/performance fault. For VCT information, Engine Refer to the warranty policy and procedures manual if an ECM is suspect.
No throttle response	<ul style="list-style-type: none"> APP sensor malfunction TP sensors Throttle motor 	For APP, TP sensor and throttle motor tests, Electronic Engine Controls - VIN Range: G45704->G99999
Poor throttle response	<ul style="list-style-type: none"> APP sensor malfunction TP sensors ECT sensor MAF sensor Transmission malfunction Traction control event Air leakage Breather system disconnected/restricted 	For APP, TP, ECT and MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For transmission information, For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For breather system information, Engine Emission Control - VIN Range: G45704->G99999

Diagnostic trouble code (DTC) index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of DTCs,
Electronic Engine Controls - VIN Range: G45704->G99999

DTC	Description	Possible Causes	Action
P008700	Fuel rail/system pressure - too low	<ul style="list-style-type: none"> • FRP sensor disconnected • FRP sensor to ECM sensing circuit: open circuit or short circuit to ground • FRP sensor supply circuit: high resistance • FRP sensor failure • Fuel pump failure • Fuel line leak • Restricted fuel line 	For FRP sensor circuit tests, Electronic Engine Controls - VIN Range: G45704->G99999 For fuel pump circuit and fuel line tests, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999
P008800	Fuel rail/system pressure - too high	<ul style="list-style-type: none"> • FRP sensor to ECM wiring (supply/sense): short circuit to each other • FRP sensor to ECM sense circuit: short circuit to high voltage • FRP sensor ground circuit: high resistance • FRP sensor failure • Restricted fuel line • Fuel pump short circuit to battery 	For FRP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For fuel pump circuit and fuel line tests, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999
P017100	System too lean (right hand bank)	<ul style="list-style-type: none"> • Air intake leak between MAF sensor and cylinder head • Fuel filter/system restriction • Low fuel pressure • Fuel injector restriction • MAF sensor fault (low intake air flow) • Exhaust leak (before catalyst) • Evaporative emission system fault 	For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For fuel

			<p>injector information, Fuel Injectors (18.10.02) For MAF sensor circuit tests, Electronic Engine Controls - VIN Range: G45704->G99999 Check the exhaust system (before catalyst) for condition and security, For evaporative emission system tests, Evaporative Emissions - VIN Range: G45704->G99999</p>
P017200	System too rich (right hand bank)	<ul style="list-style-type: none"> • Restricted air filter • High fuel pressure • Leaking fuel injector(s) • Oil contaminated with fuel (too many cold starts with vehicle subsequently not getting hot enough for long enough) • MAF sensor fault (high intake air flow) • Evaporative emission system fault 	<p>For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For fuel injector information, Fuel Injectors (18.10.02) Check the oil condition, if contamination is present, renew the engine oil and filter. For MAF sensor circuit tests, Electronic Engine Controls - VIN Range: G45704->G99999 For evaporative emission system tests, Evaporative Emissions - VIN Range: G45704->G99999</p>
P017400	System too lean (left hand bank)	<ul style="list-style-type: none"> • Air intake leak between MAF sensor and cylinder head • Fuel filter/system restriction • Low fuel pressure • Fuel injector restriction 	<p>For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check</p>

		<ul style="list-style-type: none"> • MAF sensor fault (low intake air flow) • Exhaust leak (before catalyst) • Evaporative emission system fault 	<p>the fuel pressure, check the fuel lines, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For fuel injector information, Fuel Injectors (18.10.02) For MAF sensor circuit tests, Electronic Engine Controls - VIN Range: G45704->G99999 Check the exhaust system (before catalyst) for condition and security, For evaporative emission system tests, Evaporative Emissions - VIN Range: G45704->G99999</p>
P017500	System too rich (left hand bank)	<ul style="list-style-type: none"> • Restricted air filter • High fuel pressure • Leaking fuel injector(s) • Oil contaminated with fuel (too many cold starts with vehicle subsequently not getting hot enough for long enough) • MAF sensor fault (high intake air flow) • Evaporative emission system fault 	<p>For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For fuel injector information, Fuel Injectors (18.10.02) Check the oil condition, if contamination is present, renew the engine oil and filter. For MAF sensor circuit tests, Electronic Engine Controls - VIN Range: G45704->G99999 For evaporative emission system tests, Evaporative Emissions - VIN Range: G45704->G99999</p>

P020100	Cylinder 1 injector circuit/open	<ul style="list-style-type: none"> • Injector disconnected • Injector harness wiring: short circuit • Injector failure 	For injector circuit tests, GO to Pinpoint Test G531324p1.
P020200	Cylinder 2 injector circuit/open	<ul style="list-style-type: none"> • Injector disconnected • Injector harness wiring: short circuit • Injector failure 	For injector circuit tests, GO to Pinpoint Test G531324p1.
P020300	Cylinder 3 injector circuit/open	<ul style="list-style-type: none"> • Injector disconnected • Injector harness wiring: short circuit • Injector failure 	For injector circuit tests, GO to Pinpoint Test G531324p1.
P020400	Cylinder 4 injector circuit/open	<ul style="list-style-type: none"> • Injector disconnected • Injector harness wiring: short circuit • Injector failure 	For injector circuit tests, GO to Pinpoint Test G531324p1.
P020500	Cylinder 5 injector circuit/open	<ul style="list-style-type: none"> • Injector disconnected • Injector harness wiring: short circuit • Injector failure 	For injector circuit tests, GO to Pinpoint Test G531324p1.
P020600	Cylinder 6 injector circuit/open	<ul style="list-style-type: none"> • Injector disconnected • Injector harness wiring: short circuit • Injector failure 	For injector circuit tests, GO to Pinpoint Test G531324p1.
P131500	Persistent misfire	<ul style="list-style-type: none"> • ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged) • Fuel delivery pressure low • Fuel injector circuit fault(s) (injector DTCs also flagged) • Ignition coil failure • Spark plug failure/fouled/incorrect gap • Cylinder compression low 	<p>For ignition coil circuit tests, Engine Ignition - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For injector circuit tests, GO to Pinpoint Test G531324p1.</p> <p>For ignition coil circuit and spark plug tests, Engine Ignition - VIN Range: G45704->G99999 Check the cylinder compressions.</p>

			Engine - 3.0L/3.5L/4.2L
P131600	Injector driver misfire - emissions damage	<ul style="list-style-type: none"> Injector driver module codes detected 	Check for associated DTCs and refer to the DTC index.
P210129	Throttle range performance - sub-processor	<ul style="list-style-type: none"> Jammed throttle blade, gearing or motor 	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - VIN Range: G45704->G99999 (19.70.04)
P210164	Throttle range performance	<ul style="list-style-type: none"> Jammed throttle blade, gearing or motor 	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - VIN Range: G45704->G99999 (19.70.04)
P210329	Throttle actuator motor control circuit high	<ul style="list-style-type: none"> Control circuit: short circuit to power ECM fault 	For throttle actuator motor circuit tests, GO to Pinpoint Test G531324p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P210364	Throttle actuator motor control circuit high - signal plausibility failure	<ul style="list-style-type: none"> Control circuit: short circuit to power ECM fault 	For throttle actuator motor circuit tests, GO to Pinpoint Test G531324p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P210500	Throttle actuator control system - forced engine shutdown	<ul style="list-style-type: none"> Throttle MIL request due to fuel cut 	Check for DTCs indicating the reason for the fuel cut. Follow the action indicated for those DTCs.
P210629	Throttle actuator control system - forced limited power	<ul style="list-style-type: none"> Signal invalid 	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - VIN Range: G45704->G99999

			(19.70.04)
P210664	Throttle actuator control system - forced limited power	<ul style="list-style-type: none"> Signal plausibility failure 	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - VIN Range: G45704->G99999 (19.70.04)
P211800	Throttle actuator motor control current range/performance	<ul style="list-style-type: none"> Control circuit: short circuit to power, short circuit to ground, high resistance ECM fault 	For throttle actuator motor circuit tests, GO to Pinpoint Test G531324p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P211900	Throttle actuator control throttle body range/performance	<ul style="list-style-type: none"> Throttle spring faulty 	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - VIN Range: G45704->G99999 (19.70.04)

Pinpoint Tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

PINPOINT TEST G531324p1 : FUEL INJECTORS

G531324t1 : CHECK THE INJECTOR COIL RESISTANCE

1. Disconnect the relevant injector electrical connector:

Injector connector
Cylinder 1, IL03
Cylinder 2, IL06
Cylinder 3, IL04
Cylinder 4, IL07
Cylinder 5, IL05
Cylinder 6, IL08

2. Measure the resistance between the injector pins.

- Is the resistance between 12 and 16 ohms?

-> **Yes**

GO to Pinpoint Test G531324t2.

-> **No**

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC and test the system for normal operation.

G531324t2 : CHECK THE INJECTOR COIL INSULATION

1. Measure the resistance between:

Injector, component side	Injector body
Pin 01	Injector body
Pin 02	Injector body

- Is either resistance less than 10,000 ohms?

-> **Yes**

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531324t3.

G531324t3 : CHECK THE INJECTOR SUPPLY VOLTAGE

1. Key on, engine off. 2. Make sure the EMS relay is energized. 3. Measure the voltage between:

Injector connector, harness side	Battery
Pin 02	Negative terminal

- **Is the voltage less than 10 Volts?**

-> **Yes**

REPAIR the circuit between the relevant injector harness electrical connector pin 02 and battery. This circuit includes fuse 13 of the front power distribution box and the EMS relay. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531324t4.

G531324t4 : CHECK THE INJECTOR CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Injector connector, harness side	Battery
Pin 01	Negative terminal

- **Is the resistance less than 10,000 ohms?**

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531324t5.

G531324t5 : CHECK THE INJECTOR CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Injector connector, harness side	Battery
Pin 01	Positive terminal

- **Is the resistance less than 10,000 ohms?**

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531324t6.

G531324t6 : CHECK THE INJECTOR CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector PI300. 2. Measure the resistance between:

Cylinder 1 injector connector, harness side	ECM connector PI300, harness side
IL03, pin 01	Pin 78

Cylinder 2 injector connector, harness side	ECM connector PI300, harness side
IL06, pin 01	Pin 79

Cylinder 3 injector connector, harness side	ECM connector PI300, harness side
IL04, pin 01	Pin 80

Cylinder 4 injector connector, harness side	ECM connector PI300, harness side
IL07, pin 01	Pin 81

Cylinder 5 injector connector, harness side	ECM connector PI300, harness side
IL05, pin 01	Pin 82

Cylinder 6 injector connector, harness side	ECM connector PI300, harness side
IL08, pin 01	Pin 83

- **Is the resistance greater than 5 ohms?**

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531324p3 : THROTTLE BODY

G531324t14 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the throttle body electrical connector, PI26. 2. Measure the resistance between:

Throttle body connector PI26, harness side	Battery
Pin 02	Negative terminal

- **Is the resistance less than 10,000 ohms?**

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and

test the system for normal operation.

-> **No**

GO to Pinpoint Test G531324t15.

G531324t15 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Throttle body connector PI26, harness side	Battery
Pin 02	Positive terminal

- **Is the resistance less than 10,000 ohms?**

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531324t16.

G531324t16 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR NEGATIVE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Throttle body connector PI26, harness side	Battery
Pin 01	Negative terminal

- **Is the resistance less than 10,000 ohms?**

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531324t17.

G531324t17 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR NEGATIVE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Throttle body connector PI26, harness side	Battery
Pin 01	Positive terminal

- **Is the resistance less than 10,000 ohms?**

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531324t18.

G531324t18 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

Throttle body connector PI26, harness side	ECM connector PI300, harness side
Pin 02	Pin 75

- **Is the resistance greater than 5 ohms?**

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531324t19.

G531324t19 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR NEGATIVE CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Throttle body connector PI26, harness side	ECM connector PI300, harness side
---	--

Pin 01	Pin 74
--------	--------

- **Is the resistance greater than 5 ohms?**

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new throttle body assembly.

Throttle Body - VIN Range: G45704->G99999 (19.70.04) CLEAR the DTC and test the system for normal operation.

Fuel Charging Wiring Harness (86.70.22)

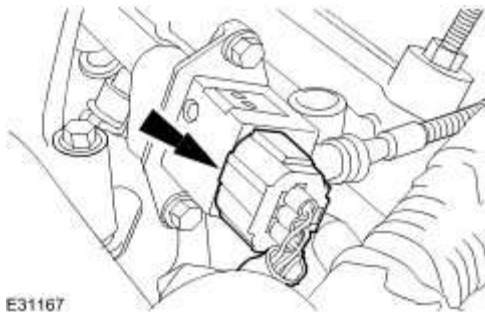
Removal

- 1 . Remove the intake manifold. <<303-01A>>
- 2 . Disconnect the spring lock coupling. <<310-00>>
- 3 . Disconnect the fuel temperature sensor electrical connector.

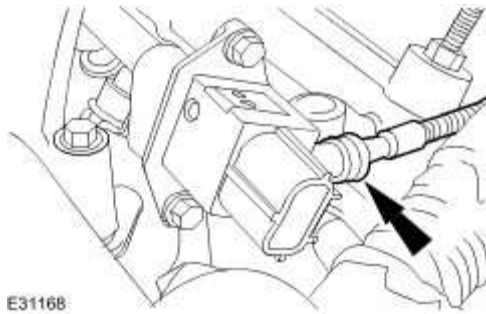
▶ Detach the fuel charging wiring harness.



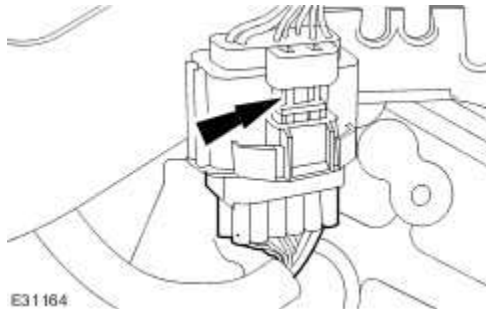
- 4 . Disconnect the fuel pressure sensor connector.



- 5 . Detach the fuel pressure sensor vacuum line.



6 . Disconnect the fuel charging wiring harness.

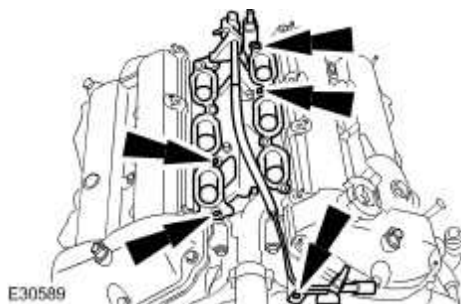


7 . **NOTE:**

Fuel may still be present in the fuel injection supply manifold.

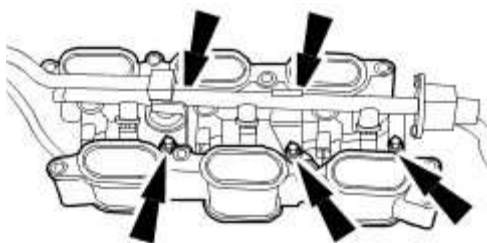
Remove the fuel injection supply manifold, lower intake manifold and place to one side.

▶ Remove and discard the lower intake manifold O-ring seals.



8 . Remove the lower intake manifolds.

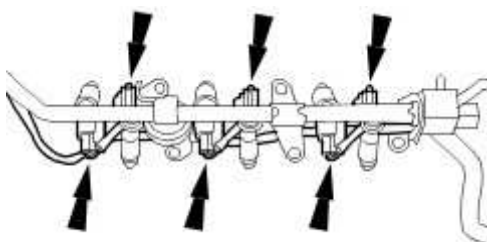
▶ Remove and discard the fuel injector O-ring seals.



E31165

9 . Remove the fuel charging wiring harness.

▶ Disconnect the electrical connectors.



VUU0003075

Installation

1 . **NOTE:**

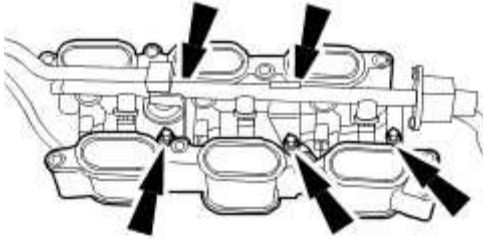
Install new fuel injector O-ring seals.

NOTE:

Install new lower intake manifold O-ring seals.

To install, reverse the removal procedure.

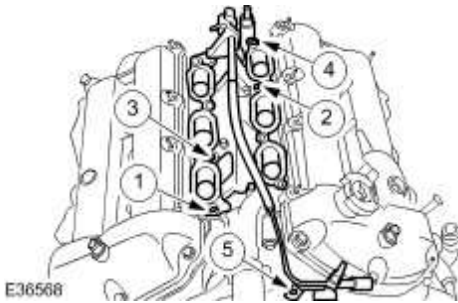
▶ Tighten to 10 Nm.



E31165

2 . Tighten to 10 Nm.

▶ Tighten in the sequence shown.



E36568

Fuel Injectors (18.10.02)

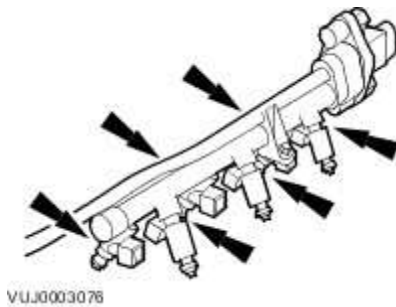
Removal

- 1 . Remove the fuel charging wiring harness.

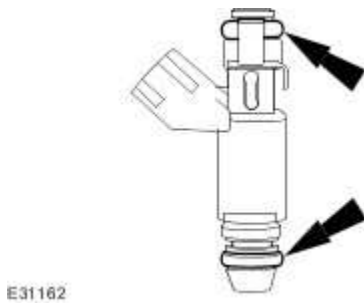
For additional information, refer to

- 2 . Remove the fuel injectors.

▶ Remove the fuel injector locating clips.



- 3 . Remove and discard the O-ring seals.



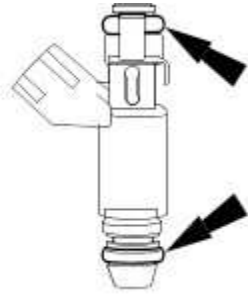
Installation

- 1 . **NOTE:**

Install new fuel injector O-ring seals.

To install, reverse the removal procedure.

▶ Lubricate the fuel injector O-ring seals with clean engine oil.



E31162

Fuel Injection Supply Manifold (19.60.13)

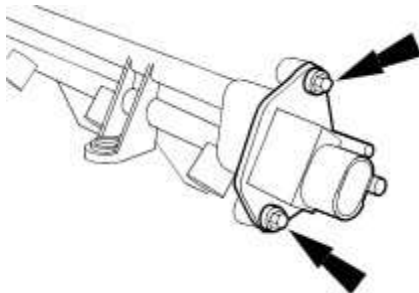
Removal

- 1 . Remove the fuel injectors.

For additional information, refer to Fuel Injectors (18.10.02)

- 2 . Remove the fuel pressure sensor.

▶ Remove and discard the O-ring seals.



E31166

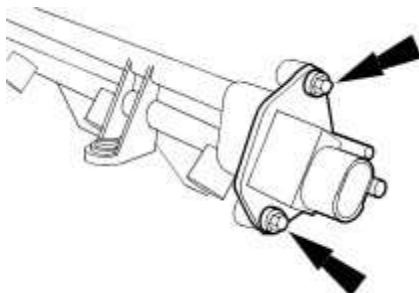
Installation

- 1 . **NOTE:**

Install new O-ring seals.

To install, reverse the removal procedure.


▶ Tighten to 10 Nm.




E31166

Throttle Body - VIN Range: G00442- >G45703 (19.70.04)

Removal

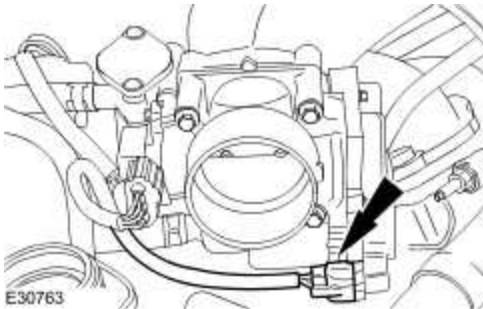
- 1  **WARNING:** When relieving cooling system pressure, cover the expansion tank cap with a thick cloth to prevent the possibility of scalding. Failure to follow these instructions may result in personal injury.

Remove the expansion tank cap to relieve the cooling system pressure.

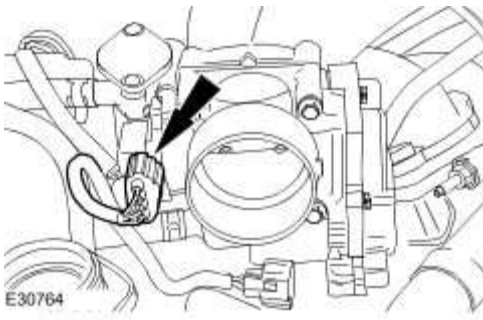
- 2  **CAUTION:** Do not attempt to clean the throttle body. The bore and the throttle plate has a special coating applied during manufacture which should not be removed.

Remove the air cleaner outlet tube. <<303-12A>>

- 3 . Disconnect the throttle motor electrical connector.



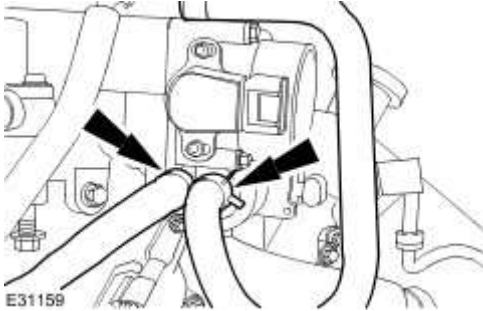
- 4 . Disconnect the throttle position (TP) sensor electrical connector.



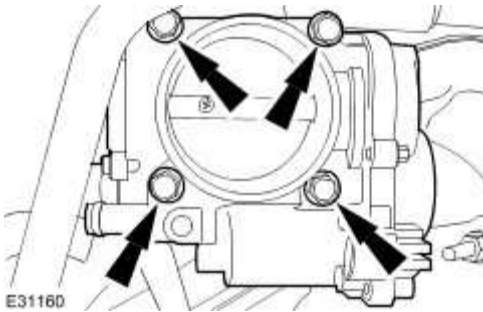
5 . **NOTE:**

Cap the coolant hoses to minimize coolant loss.

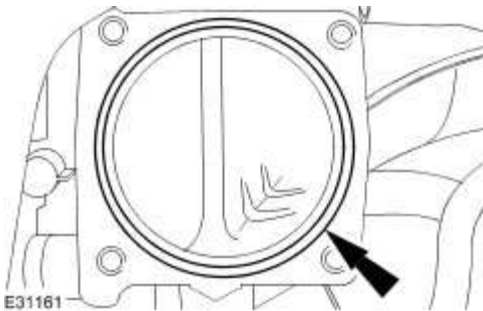
Detach the coolant hoses from the throttle body.



6 . Remove the throttle body.



7 . Remove and discard the O-ring seal.



Installation

1

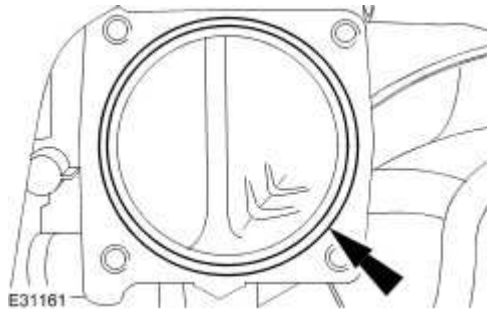


CAUTION: Do not attempt to clean the throttle body. The bore and the throttle

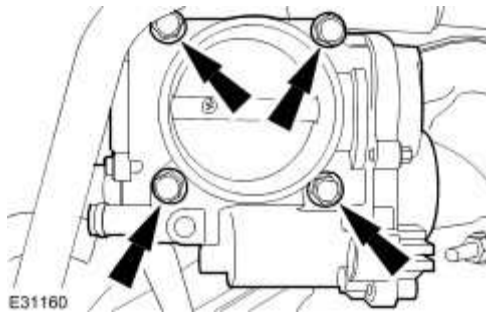
plate has a special coating applied during manufacture which should not be removed.

To install, reverse the removal procedure.

▶ Install a new O-ring seal.




2 . Tighten to 10 Nm.




3 . Check and top up the cooling system as required.

Throttle Body - VIN Range: G45704- >G99999 (19.70.04)

Removal

- 1  **WARNING:** When relieving cooling system pressure, cover the expansion tank cap with a thick cloth to prevent the possibility of scalding. Failure to follow these instructions may result in personal injury.

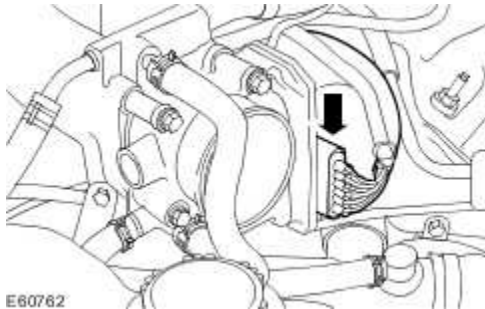
Remove the expansion tank cap to relieve the cooling system pressure.

- 2  **CAUTION:** Do not attempt to clean the throttle body. The bore and the throttle plate has a special coating applied during manufacture which should not be removed.

Remove the air cleaner outlet pipe.

For additional information, refer to

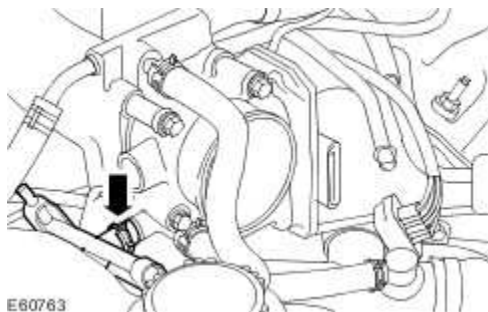
- 3 . Disconnect the throttle body electrical connector.



- 4 . **NOTE:**

Clamp the coolant hose to minimize coolant loss.

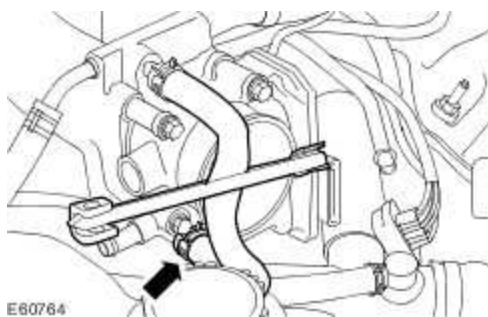
Disconnect the coolant hose.



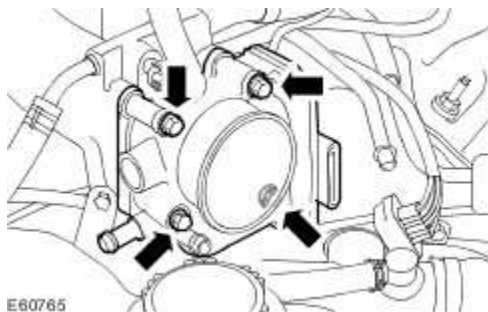
5 . NOTE:

Clamp the coolant hose to minimize coolant loss.

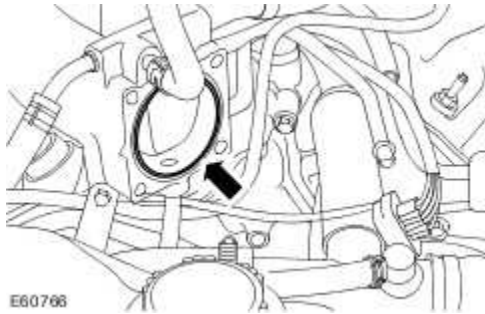
Disconnect the coolant hose.




6 . Remove the throttle body.



7 . Remove and discard the O-ring seal.

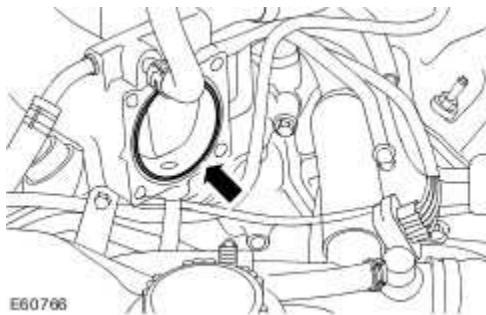


Installation

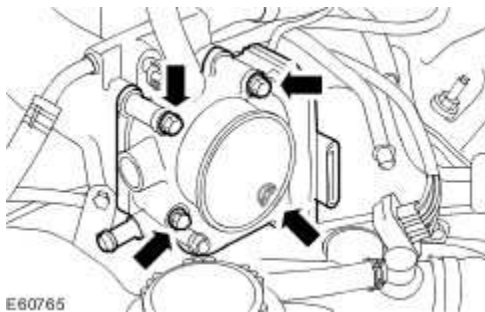
- 1  **CAUTION:** Do not attempt to clean the throttle body. The bore and the throttle plate has a special coating applied during manufacture which should not be removed.

To install, reverse the removal procedure.

- ▶ Install a new O-ring seal.



- 2 . Tighten to 10 Nm.



3 . Check and top up the cooling system as required.

303-04B : Fuel Charging and Controls – 3.5L/4.2L

Specifications

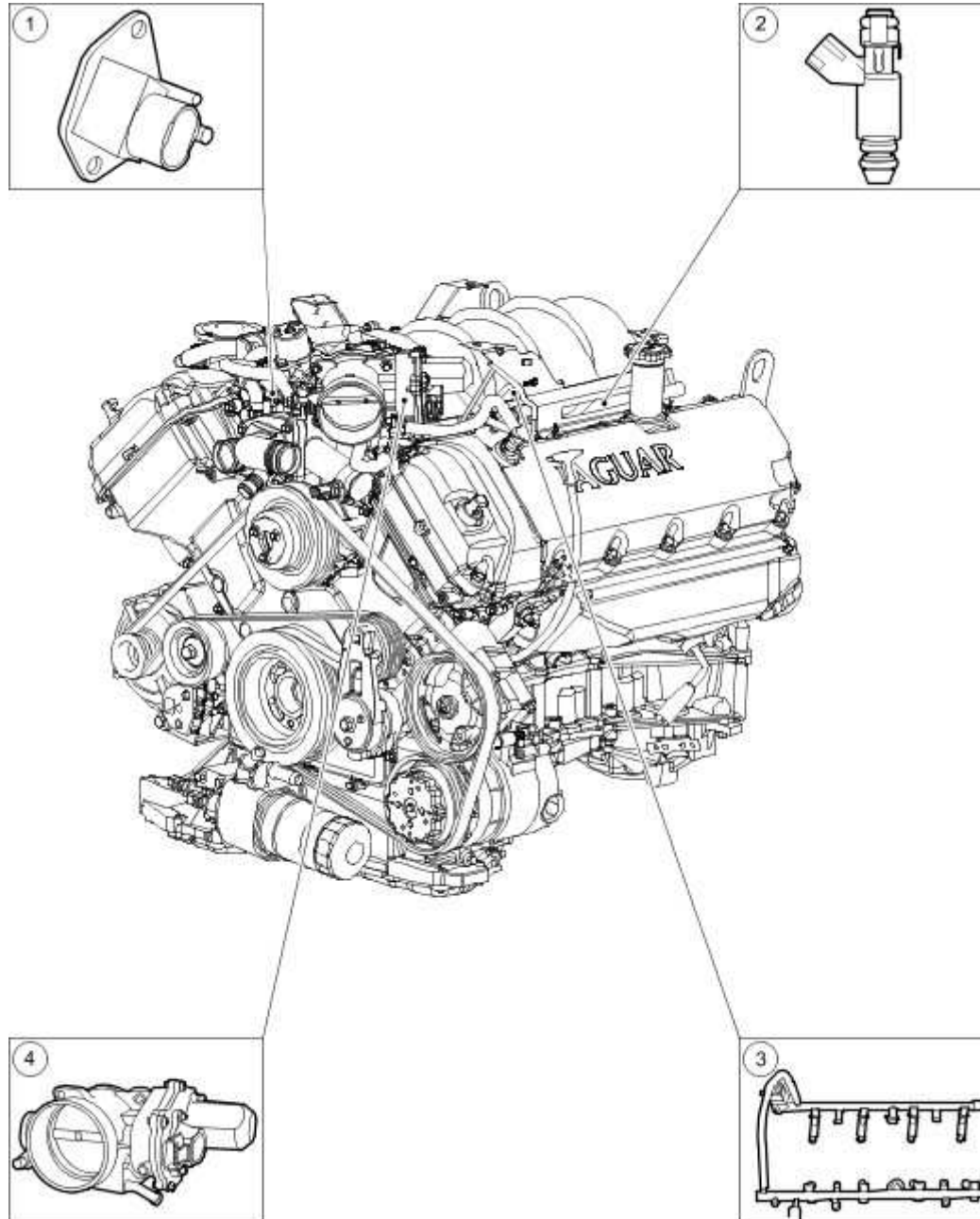
Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Fuel injection supply manifold vehicles with supercharger	7	-	62
Fuel injection supply manifold vehicles without supercharger	22	16	-
Fuel pressure sensor	5	-	44
Throttle body	10	-	89
Engine cover bracket	6	-	53

Fuel Charging and Controls

3.5L/4.2L Engines without Supercharger

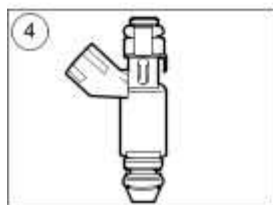
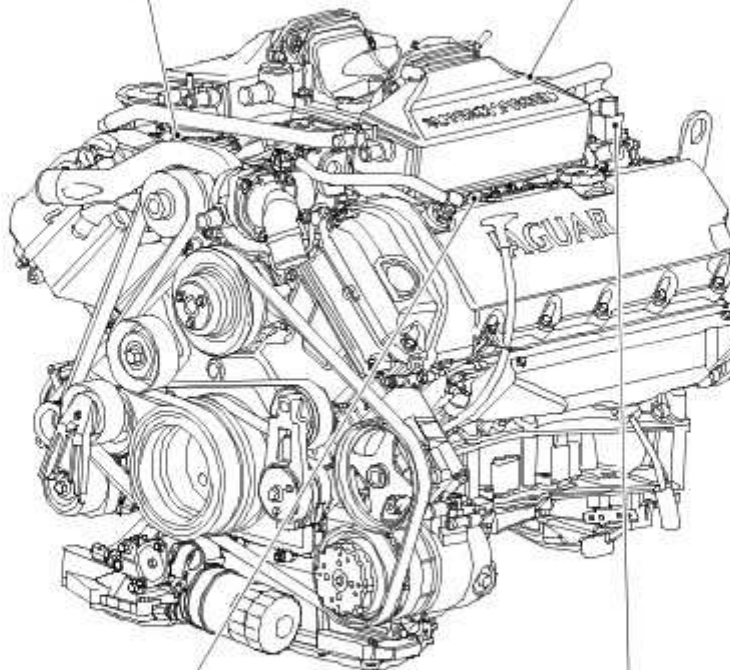
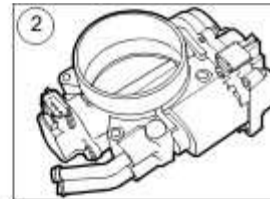
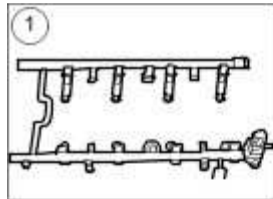


E31187

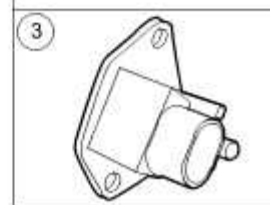
Item	Part Number	Description
1	—	Fuel pressure sensor

2	—	Fuel injector
3	—	Fuel injection supply manifold
4	—	Throttle body

4.2L Engines with Supercharger



E31188



Item	Part Number	Description
------	-------------	-------------

1		Fuel injection supply manifold
2		Throttle body
3		Fuel pressure sensor
4		Fuel injector

The electronic returnless fuel system has the advantages of reduced fuel temperature and fuel tank vapor caused by constant fuel recirculation. The system delivers the correct amount of fuel to the engine under all conditions and at a constant pressure differential with respect to manifold absolute pressure.

Fuel is supplied at high pressure to the fuel injectors via a fuel injection supply manifold which incorporates fuel injectors, a fuel pressure sensor and a fuel temperature sensor. The engine control module (ECM) increases the fuel pressure to minimize fuel vapor formation to maintain fuel flow across the injectors.

The throttle body assembly is calibrated during assembly, no adjustments are required or permitted. The throttle motor is a 12 volt DC motor which, via movement of the throttle blade, controls the amount of air flowing into the engine.

Fuel Charging and Controls - VIN Range: G00442->G45703

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Engine oil level	Fuses
Cooling system coolant level	Wiring harness
Fuel level	Electrical connector(s)
Fuel contamination/grade/quality	Sensor(s)
Throttle body	Engine control module (ECM)
Poly-vee belt	Transmission control module (TCM)

- 1 . Verify the following systems are working correctly:

Air intake system

Cooling system

Charging system

Ignition system

- 2 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 3 . If the cause is not visually evident and the Jaguar approved diagnostic system is not available, use a fault code reader to retrieve the fault codes before proceeding to the diagnostic trouble code (DTC) index chart, or the symptom chart if no DTCs are set.



CAUTION: When probing connectors to take measurements in the course of the pinpoint

tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

Symptom	Possible source	Action
Engine cranks, but does not fire	Engine breather system disconnected/restricted Ignition system Fuel system Harness CKP sensor ECM fault	Check engine breather system, Engine Emission Control - VIN Range: G00442->G45703 For ignition system, Engine Ignition - VIN Range: G00442->G45703 Check fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For CKP tests, Electronic Engine Controls - VIN Range: G00442->G45703 Contact dealer technical support for advice on possible ECM failure.
Engine cranks and fires, but will not start	Purge valve Fuel pump Engine coolant temperature (ECT) sensor Spark plugs HT short to ground (tracking) check rubber boots for cracks/damage Ignition coil failure(s) Harness	For evaporative emissions components, Evaporative Emissions - VIN Range: G00442->G45703 Check fuel pressure. Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For ECT sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703 For ignition system Engine Ignition - VIN Range: G00442->G45703

Difficult to start cold	<p>Check coolant anti-freeze content</p> <p>Battery</p> <p>CKP sensor</p> <p>EGR valve stuck open</p> <p>Fuel pump</p> <p>ECT sensor</p> <p>Purge valve</p>	<p>For battery information, Battery For CKP sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703 For EGR system information, Engine Emission Control - VIN Range: G00442->G45703 Check fuel pressure.</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For ECT sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703 For evaporative emissions components, Evaporative Emissions - VIN Range: G00442->G45703</p>
Difficult to start hot	<p>Injector leak</p> <p>Fuel temperature (FT) sensor</p> <p>IAT sensor</p> <p>MAF sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>ECT sensor</p> <p>EGR valve stuck open</p>	<p>For fuel injector information, Fuel Injectors (18.10.02) For FT sensor, IAT sensor and MAF sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703 For evaporative emissions components, Evaporative Emissions - VIN Range: G00442->G45703 Check fuel pressure.</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For ignition system, Engine Ignition - VIN Range: G00442->G45703 For ECT sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703 For EGR information, Engine Emission Control - VIN Range: G00442->G45703</p>
Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)	<p>Injector leak</p> <p>FT sensor</p> <p>IAT sensor</p>	<p>For fuel injector information, Fuel Injectors (18.10.02) For FT sensor, IAT sensor and MAF sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703 For evaporative emissions components,</p>

	<p>MAF sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>ECT sensor</p> <p>EGR valve stuck open</p>	<p>Evaporative Emissions - VIN Range: G00442->G45703 Check fuel pressure.</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For ignition system,</p> <p>Engine Ignition - VIN Range: G00442->G45703 For ECT sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G00442->G45703 For EGR information,</p> <p>Engine Emission Control - VIN Range: G00442->G45703</p>
Engine stalls soon after start	<p>Breather system disconnected/restricted</p> <p>ECM relay</p> <p>Harness</p> <p>MAF sensor</p> <p>ECT sensor</p> <p>Ignition system</p> <p>Air filter restricted</p> <p>Fuel lines</p> <p>Fuel Rail Pressure (FRP) sensor</p> <p>Air leakage</p>	<p>For breather system,</p> <p>Engine Emission Control - VIN Range: G00442->G45703 For ECM relay, MAF sensor and ECT sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G00442->G45703 For ignition system,</p> <p>Engine Ignition - VIN Range: G00442->G45703 For air filter information,</p> <p>Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For fuel line information,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For FRP sensor tests, GO to Pinpoint Test G290117p2.</p> <p>For intake system information,</p> <p>Intake Air Distribution and Filtering - VIN Range: G00442->G45703</p>
Engine hesitates/poor acceleration	<p>Fuel pump</p> <p>Injector leak</p> <p>Fuel pressure</p> <p>Fuel lines</p> <p>Air leakage</p> <p>Throttle sensors</p>	<p>Check fuel pressure.</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For FRP sensor tests, GO to Pinpoint Test G290117p2.</p> <p>For fuel line information,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For intake system,</p> <p>Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For</p>

	<p>Throttle motor</p> <p>Ignition system</p> <p>EGR system</p> <p>HO2 sensors</p> <p>Transmission malfunction</p> <p>Restricted pedal travel (carpet, etc)</p> <p>APP sensor</p>	<p>throttle position sensor and throttle motor tests,</p> <p>Electronic Engine Controls - VIN Range: G00442->G45703 For ignition system,</p> <p>Engine Ignition - VIN Range: G00442->G45703 For EGR system,</p> <p>Engine Emission Control - VIN Range: G00442->G45703 Check for DTCs relating to HO2 sensors. Refer to the DTC index for pinpoint tests. For transmission information,</p> <p>Check accelerator pedal travel. For APP sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G00442->G45703</p>
Engine backfires	<p>Fuel pump</p> <p>Fuel lines</p> <p>Air leakage</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Ignition system</p> <p>Sticking VCT hub</p> <p>APP sensor</p>	<p>Check fuel pressure.</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For fuel line information,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For intake system,</p> <p>Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For MAF sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G00442->G45703 Check for DTCs relating to HO2 sensors. Refer to the DTC index for pinpoint tests.</p> <p>For ignition system,</p> <p>Engine Ignition - VIN Range: G00442->G45703 For VCT information,</p> <p>Engine For APP sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G00442->G45703</p>
Engine surges	<p>Fuel pump</p> <p>Fuel lines</p> <p>MAF sensor</p>	<p>Check fuel pressure.</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For fuel line information,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For MAF sensor, throttle sensor, and</p>

	<p>Harness</p> <p>Throttle sensors</p> <p>Throttle motor</p> <p>Ignition system</p>	<p>throttle motor relay tests,</p> <p>Electronic Engine Controls - VIN Range: G00442->G45703 For ignition system,</p> <p>Engine Ignition - VIN Range: G00442->G45703</p>
Engine detonates/knocks	<p>KS/circuit malfunction</p> <p>Fuel pump</p> <p>Fuel lines</p> <p>FRP sensor</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Air leakage</p> <p>Sticking VCT hub</p> <p>BARO sensor malfunction</p>	<p>For KS circuit tests,</p> <p>Electronic Engine Controls - VIN Range: G00442->G45703 Check fuel pressure. For fuel line information, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For FRP sensor tests, GO to Pinpoint Test G290117p2.</p> <p>. For MAF and HO2 sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G00442->G45703 For intake system,</p> <p>Intake Air Distribution and Filtering - VIN Range: G00442->G45703 Check DTCs for VCT range/performance fault. For VCT information, Engine For BARO sensor, contact dealer technical support for advice on possible ECM failure.</p>
No throttle response	<p>APP sensor malfunction</p> <p>Throttle sensors</p> <p>Throttle motor</p>	<p>For APP sensor, throttle position sensor and throttle motor relay tests,</p> <p>Electronic Engine Controls - VIN Range: G00442->G45703</p>
Poor throttle response	<p>APP sensor malfunction</p> <p>Throttle sensors</p> <p>ECT sensor</p> <p>MAF sensor</p> <p>Transmission malfunction</p> <p>Traction control event</p> <p>Air leakage</p>	<p>For APP sensor, throttle position sensor, ECT sensor and MAF sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G00442->G45703 For transmission information,</p> <p>For intake system,</p> <p>Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For breather system information,</p> <p>Engine Emission Control - VIN Range: G00442->G45703</p>

	Breather system disconnected/restricted	
--	--	--

Diagnostic Trouble Code (DTC) index

DTC	Condition	Possible Causes	Action
P0171	Right-hand cylinders combustion too lean	<p>Air intake leak between mass air flow (MAF) sensor and cylinder head</p> <p>Fuel filter/system restriction</p> <p>Fuel injector restriction</p> <p>FRP sensor fault (low fuel pressure)</p> <p>Low fuel pump output</p> <p>HO2S/Catalyst monitor sensor harness wiring condition fault</p> <p>EFT sensor fault (low fuel temperature)</p> <p>Mass air flow (MAF) sensor fault (low intake air flow)</p> <p>Exhaust leak (before catalyst)</p> <p>ECM receiving incorrect signal from one or more of the following sensors: ECT, MAF*, IAT, FRP, fuel rail temperature, TP</p>	<p>For intake system, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For fuel injector information, Fuel Injectors (18.10.02) For fuel filter and pump, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For FRP sensor tests, GO to Pinpoint Test G290117p2. For HO2S/catalyst monitor sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703 For exhaust system, For sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703 * If this DTC is flagged, pay particular attention to the MAF sensor.</p>
P0172	Right-hand cylinders combustion too rich	<p>Engine misfire</p> <p>Restricted air filter</p> <p>Leaking fuel injector(s)</p> <p>FRP sensor failure (high fuel pressure)</p> <p>Engine fuel temperature (EFT) sensor fault (high fuel</p>	<p>Check for "misfire detected" DTCs in this section. For intake system, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For fuel injector information, Fuel Injectors (18.10.02) For FRP sensor tests, GO to Pinpoint Test</p>

		<p>temperature)</p> <p>MAF sensor fault (high intake air flow)</p> <p>HO2S/Catalyst monitor sensor harness wiring condition fault</p> <p>ECM receiving incorrect signal from one or more of the following sensors; ECT, MAF, IAT, FRP, EFT</p>	<p>G290117p2.</p> <p>For other sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703</p>
P0174	Left-hand cylinders combustion too lean	<p>Air intake leak between MAF sensor and cylinder head</p> <p>Fuel filter/system restriction</p> <p>Fuel injector restriction</p> <p>FRP sensor failure (low fuel pressure)</p> <p>Low fuel pump output</p> <p>HO2S/Catalyst monitor sensor harness wiring condition fault</p> <p>EFT sensor fault (low fuel temperature)</p> <p>Mass air flow (MAF) sensor fault (low intake air flow)</p> <p>Exhaust leak (before catalyst)</p> <p>ECM receiving incorrect signal from one or more of the following sensors; ECT, MAF*, IAT, FRP, EFT, TP</p>	<p>For intake system, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For fuel injector information, Fuel Injectors (18.10.02) For fuel filter, pump and lines, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For HO2S/catalyst monitor sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703 For exhaust system, For FRP sensor tests, GO to Pinpoint Test G290117p2.</p> <p>For other sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703 * If this DTC is flagged, pay particular attention to the MAF sensor.</p>
P0175	Left-hand cylinders combustion too rich	<p>Engine misfire</p> <p>Restricted air filter</p>	<p>Check for "misfire detected" DTCs in this section. For intake system,</p>

		<p>Leaking fuel injector(s)</p> <p>FRP sensor failure (high fuel pressure)</p> <p>ECM receiving incorrect signal from one or more of the following sensors; ECT, MAF, IAT, FRP, EFT</p>	<p>Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For fuel injectors, Fuel Injectors (18.10.02) For FRP sensor tests, GO to Pinpoint Test G290117p2.</p> <p>For other sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703</p>
P0191	Fuel rail pressure (FRP) sensor circuit range/performance	<p>Fuel filter/system restriction</p> <p>Fuel system leak</p> <p>Incorrect fuel pump output</p> <p>FRP sensor to ECM sensing circuit; high resistance, open circuit, short circuit to high voltage</p> <p>FRP sensor to splice in sensor supply circuit; high resistance, open circuit</p> <p>FRP sensor to splice in sensor ground circuit; high resistance, open circuit, short circuit to ground, short circuit to high voltage</p> <p>FRP sensor failure</p>	<p>For fuel filter, pump and lines, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For FRP sensor tests, GO to Pinpoint Test G290117p2.</p>
P0192	Fuel rail pressure (FRP) sensor circuit low voltage (low pressure)	<p>FRP sensor disconnected</p> <p>FRP sensor to ECM sensing circuit; open circuit or short circuit to ground</p> <p>FRP sensor to splice in sensor supply circuit; high resistance, open circuit</p> <p>FRP sensor failure</p>	<p>For FRP sensor tests, GO to Pinpoint Test G290117p2.</p>
P0193	Fuel rail pressure (FRP) sensor circuit high voltage (high	FRP sensor to ECM wiring (supply/sense); short circuit	For FRP sensor tests, GO to Pinpoint Test

	pressure)	<p>to each other</p> <p>FRP sensor to ECM sense circuit; short circuit to high voltage</p> <p>FRP sensor to splice in sensor ground circuit; open circuit</p> <p>FRP sensor failure</p>	G290117p2.
P0201	Fuel injector circuit malfunction, Cyl 1	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p>
P0202	Fuel injector circuit malfunction, Cyl 3	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p>
P0203	Fuel injector circuit malfunction, Cyl 5	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p>
P0204	Fuel injector circuit malfunction, Cyl 7	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with</p>

			supercharger, GO to Pinpoint Test G290117p3.
P0205	Fuel injector circuit malfunction, Cyl 2	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p>
P0206	Fuel injector circuit malfunction, Cyl 4	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p>
P0207	Fuel injector circuit malfunction, Cyl 6	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p>
P0208	Fuel injector circuit malfunction, Cyl 8	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p>

P0300	Random misfire detected	<p>ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Fuel injector circuit fault(s) (injector DTCs also flagged)</p> <p>Fuel delivery pressure high/low</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Worn camshaft/broken valve springs</p>	<p>For ignition system, Engine Ignition - VIN Range: G00442->G45703 For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p> <p>Check fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For fuel injector information, Fuel Injectors (18.10.02)</p> <p>For engine information, Engine</p>
P0301	Misfire detected, cylinder 1	<p>ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Fuel injector circuit fault(s) (injector DTCs also flagged)</p> <p>Fuel delivery pressure high/low</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Worn camshaft/broken valve springs</p>	<p>For ignition system, Engine Ignition - VIN Range: G00442->G45703 For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p> <p>Check fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For fuel injector information, Fuel Injectors (18.10.02)</p> <p>For engine information, Engine</p>

P0302	Misfire detected, cylinder 2	<p>ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Fuel injector circuit fault(s) (injector DTCs also flagged)</p> <p>Fuel delivery pressure high/low</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Worn camshaft/broken valve springs</p>	<p>For ignition system, Engine Ignition - VIN Range: G00442->G45703 For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p> <p>Check fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For fuel injector information, Fuel Injectors (18.10.02)</p> <p>For engine information, Engine</p>
P0303	Misfire detected, cylinder 3	<p>ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Fuel injector circuit fault(s) (injector DTCs also flagged)</p> <p>Fuel delivery pressure high/low</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Worn camshaft/broken valve springs</p>	<p>For ignition system, Engine Ignition - VIN Range: G00442->G45703 For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p> <p>Check fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For fuel injector information, Fuel Injectors (18.10.02)</p> <p>For engine information, Engine</p>

P0304	Misfire detected, cylinder 4	<p>ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Fuel injector circuit fault(s) (injector DTCs also flagged)</p> <p>Fuel delivery pressure high/low</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Worn camshaft/broken valve springs</p>	<p>For ignition system, Engine Ignition - VIN Range: G00442->G45703 For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p> <p>Check fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For fuel injector information, Fuel Injectors (18.10.02)</p> <p>For engine information, Engine</p>
P0305	Misfire detected, cylinder 5	<p>ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Fuel injector circuit fault(s) (injector DTCs also flagged)</p> <p>Fuel delivery pressure high/low</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Worn camshaft/broken valve springs</p>	<p>For ignition system, Engine Ignition - VIN Range: G00442->G45703 For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p> <p>Check fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For fuel injector information, Fuel Injectors (18.10.02)</p> <p>For engine information, Engine</p>

P0306	Misfire detected, cylinder 6	<p>ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Fuel injector circuit fault(s) (injector DTCs also flagged)</p> <p>Fuel delivery pressure high/low</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Worn camshaft/broken valve springs</p>	<p>For ignition system, Engine Ignition - VIN Range: G00442->G45703 For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p> <p>Check fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For fuel injector information, Fuel Injectors (18.10.02)</p> <p>For engine information, Engine</p>
P0307	Misfire detected, cylinder 7	<p>ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Fuel injector circuit fault(s) (injector DTCs also flagged)</p> <p>Fuel delivery pressure high/low</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Worn camshaft/broken valve springs</p>	<p>For ignition system, Engine Ignition - VIN Range: G00442->G45703 For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p> <p>Check fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For fuel injector information, Fuel Injectors (18.10.02)</p> <p>For engine information, Engine</p>

P0308	Misfire detected, cylinder 8	<p>ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Fuel injector circuit fault(s) (injector DTCs also flagged)</p> <p>Fuel delivery pressure high/low</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Worn camshaft/broken valve springs</p>	<p>For ignition system, Engine Ignition - VIN Range: G00442->G45703 For injector circuit tests for vehicles without supercharger, GO to Pinpoint Test G290117p1.</p> <p>For vehicles with supercharger, GO to Pinpoint Test G290117p3.</p> <p>Check fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703 For fuel injector information, Fuel Injectors (18.10.02) For engine information, Engine</p>
P0460	Fuel level sensor circuit range/performance	<p>Fuel level sensor to rear electronic control module circuit(s); intermittent short circuit, open circuit, high resistance</p> <p>Fuel level sensor failure</p> <p>Rear electronic control module fault (incorrect fuel level data)</p>	<p>For fuel level sensor and circuit tests, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703</p>
P1224	Throttle control position error	<p>Throttle motor failure</p> <p>Throttle body failure</p>	<p>This DTC can only be accurately diagnosed using the Jaguar approved diagnostic system. If this is not available, INSTALL a new throttle body.</p> <p>Throttle Body - VIN Range: G00442->G45703 (19.70.04) CLEAR the DTC, TEST the system for normal operation.</p>

P1229	Throttle motor control circuit malfunction	<p>Throttle motor disconnected</p> <p>Throttle motor to ECM drive circuits; short circuit or open circuit</p> <p>ECM ground circuit fault(s) (EM80-04, 05, 54)</p> <p>Throttle motor failure</p> <p>Throttle body failure</p>	<p>For throttle motor and circuit tests, and for ECM ground tests, Electronic Engine Controls - VIN Range: G00442->G45703 For throttle body, Throttle Body - VIN Range: G00442->G45703 (19.70.04)</p>
P1234	No fuel pump commands received by ECM	<p>ECM to fuel pump module drive circuit; open circuit, short circuit, high resistance</p> <p>Fuel pump module failure</p>	<p>For fuel pump module circuit tests, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703</p>
P1236	Fuel pump not activated when requested by ECM	<p>ECM to fuel pump module drive circuit; open circuit, short circuit, high resistance</p> <p>Fuel pump module failure</p>	<p>For fuel pump module circuit tests, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703</p>
P1250	Throttle return spring failure malfunction	Throttle return spring failure (throttle body failure)	<p>This DTC can only be accurately diagnosed using the Jaguar approved diagnostic system. If this is not available, INSTALL a new throttle body. Throttle Body - VIN Range: G00442->G45703 (19.70.04) CLEAR the DTC, TEST the system for normal operation.</p>
P1251	Throttle motor relay OFF failure	<p>Throttle motor relay coil power supply circuit; open circuit</p> <p>Throttle motor relay failure</p> <p>Throttle motor relay coil to ECM circuit; open circuit</p>	<p>For throttle motor relay tests, Electronic Engine Controls - VIN Range: G00442->G45703</p>

		ECM ground circuit fault (relay coil drive)	
P1254	Throttle limp-home spring malfunction	Throttle body	This DTC can only be accurately diagnosed using the Jaguar approved diagnostic system. If this is not available, INSTALL a new throttle body. Throttle Body - VIN Range: G00442->G45703 (19.70.04) CLEAR the DTC, TEST the system for normal operation.
P1313	Right-hand cylinders misfire rate catalyst damage (Note: this DTC will flag only when accompanied by an individual cylinder misfire DTC; P0300-P0308)	Refer to P0300 possible sources	Refer to P0300 Actions.
P1314	Left-hand cylinders misfire rate catalyst damage (Note: this DTC will flag only when accompanied by an individual cylinder misfire DTC; P0300-P0308)	Refer to P0300 possible sources	Refer to P0300 Actions.
P1316	Misfire excess emission (Note: This DTC will flag only when accompanied by an individual cylinder misfire DTC; P0300 to P0308)	Refer to P0300 possible sources	Refer to P0300 Actions.
P1338	Fuel pump drive circuit low/high voltage	Fuel pump module to fuel pump drive circuit; open circuit, short circuit, high resistance Fuel pump module failure Fuel pump failure	For fuel pump module and pump circuit tests, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G00442->G45703
P1631	Throttle motor power relay coil activation circuit failure	Throttle motor relay coil to ECM circuit; open circuit	For throttle motor relay tests,

		Throttle motor relay failure Throttle motor relay coil to ECM drive circuit; open circuit, short circuit to ground	Electronic Engine Controls - VIN Range: G00442->G45703
P1634	Throttle watchdog circuit malfunction	ECM failure	Contact dealer technical support for advice on possible ECM failure.
P1656	Throttle position (TP) sensor amplifier circuit malfunction	ECM failure	Contact dealer technical support for advice on possible ECM failure.
P1657	Throttle motor relay coil drive circuit ON failure	Throttle motor relay failure Throttle motor relay coil to ECM drive circuit; short circuit to B+ voltage	For throttle motor relay tests, Electronic Engine Controls - VIN Range: G00442->G45703
P1658	Throttle motor relay ON failure	Throttle motor relay failure Throttle motor relay coil to ECM drive circuit; short circuit to B+ voltage	For throttle motor relay tests, Electronic Engine Controls - VIN Range: G00442->G45703

Pinpoint Tests

PINPOINT TEST G290117p1 : DTC P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208; FUEL INJECTORS, VEHICLES WITHOUT SUPERCHARGER

G290117t1 : CHECK THE INJECTOR COIL RESISTANCE

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the relevant injector electrical connector (IS01 to IS04 for right-hand cylinders, IS07 to IS10 for left-hand cylinders). 3. Measure the resistance between the injector pins.

Is the resistance between 12 and 16 ohms?

-> **Yes**

GO to Pinpoint Test G290117t2.

-> **No**

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC. TEST the system for normal operation.

G290117t2 : CHECK THE INJECTOR COIL INSULATION

1. Measure the resistance between the injector pin 01 and the injector body. 2. Measure the resistance between the injector pin 02 and the injector body.

Is either resistance less than 10,000 ohms?

-> **Yes**

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G290117t3.

G290117t3 : CHECK THE INJECTOR SUPPLY VOLTAGE

1. Turn the ignition switch to the **ON** position. 2. Disconnect the relevant injector harness electrical connector (IS01 to IS04 for right-hand cylinders, IS07 to IS10 for left-hand cylinders). 3. Measure the voltage between the relevant injector harness electrical connector (IS01 to IS04 for right-hand cylinders, IS07 to IS10 for left-hand cylinders) pin 02 and GROUND.

Is the voltage less than 10 Volts?

-> **Yes**

REPAIR the circuit between the relevant injector harness electrical connector (IS01 to IS04 for right-hand cylinders, IS07 to IS10 for left-hand cylinders) pin 02 and battery. This circuit includes the front power distribution fuse box, fuse 13, and the EMS control relay. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G290117t4.

G290117t4 : CHECK THE INJECTOR GROUND CIRCUIT

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the battery negative terminal. 3. Disconnect the ECM electrical connector PI01. 4. Measure the resistance between the relevant injector harness electrical connector (IS01 to IS04 for right-hand cylinders, IS07 to IS10 for left-hand cylinders) pin 001 and the ECM electrical connector PI01, pins as follows:

Injector Cyl 1, IS01 pin 01 (BG) and PI01 pin 120 (BG).

Injector Cyl 2, IS07 pin 01 (BR) and PI01 pin 115 (BR).

Injector Cyl 3, IS02 pin 01 (BK) and PI01 pin 114 (BK).

Injector Cyl 4, IS08 pin 01 (BO) and PI01 pin 119 (BO).

Injector Cyl 5, IS03 pin 01 (BG) and PI01 pin 113 (BG).

Injector Cyl 6, IS09 pin 01 (U) and PI01 pin 118 (U).

Injector Cyl 7, IS04 pin 01 (BW) and PI01 pin 117 (BW).

Injector Cyl 8, IS10 pin 01 (UY) and PI01 pin 112 (UY).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the circuit between the relevant injector harness electrical connector pin 01 and the engine control module electrical connector. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290117t5.

G290117t5 : CHECK THE INJECTOR GROUND CIRCUIT FOR SHORT CIRCUIT TO BATTERY

1. Reconnect the battery negative terminal. 2. Measure the voltage between the relevant injector harness electrical connector (PI32 to PI39) pin 01 and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290117t6.

G290117t6 : CHECK THE INJECTOR GROUND CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between the relevant injector harness electrical connector (PI32 to PI39) pin 01 and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

Contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G290117p2 : DTC P0190, P0192, P0193; FUEL PRESSURE (FRP) SENSOR

G290117t7 : CHECK THE FRP SENSOR SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the FRP sensor electrical connector PI28. 3. Disconnect the ECM electrical connector PI01. 4. Measure the resistance between PI28 pin 03 (U) and PI01 pin 73 (U).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290117t8.

G290117t8 : CHECK THE FRP SENSOR SIGNAL CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the **ON** position. 3. Measure the voltage between PI28 pin 03 (U) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290117t9.

G290117t9 : CHECK THE FRP SENSOR SIGNAL CIRCUIT FOR SHORT TO GROUND

1. Disconnect the ECM electrical connector PI01. 2. Measure the resistance between the FRP sensor electrical connector PI28 pin 03 (U) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

Recheck the DTCs. Check the sensor supply and ground circuits.

Electronic Engine Controls - VIN Range: G00442->G45703

PINPOINT TEST G290117p3 : DTC P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208; FUEL INJECTORS, VEHICLES WITH SUPERCHARGER

G290117t10 : CHECK THE INJECTOR COIL RESISTANCE

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the relevant injector electrical connector (PI32 to PI39). 3. Measure the resistance between the injector pins.

Is the resistance between 12 and 16 ohms?

-> Yes

GO to Pinpoint Test G290117t11.

-> No

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC. TEST the system for normal operation.

G290117t11 : CHECK THE INJECTOR COIL INSULATION

1. Measure the resistance between the injector pin 01 and the injector body. 2. Measure the resistance between the injector pin 02 and the injector body.

Is either resistance less than 10,000 ohms?

-> Yes

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G290117t12.

G290117t12 : CHECK THE INJECTOR SUPPLY VOLTAGE

1. Turn the ignition switch to the **ON** position. 2. Disconnect the relevant injector harness electrical connector (PI32 to PI39). 3. Measure the voltage between the relevant injector harness electrical connector (PI32 to PI39) pin 02 and GROUND.

Is the voltage less than 10 Volts?

-> **Yes**

REPAIR the circuit between the relevant injector harness electrical connector (PI32 to PI39) pin 02 and battery. This circuit includes the front power distribution fuse box, fuse 13, and the EMS control relay. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G290117t13.

G290117t13 : CHECK THE INJECTOR GROUND CIRCUIT

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the battery negative terminal. 3. Disconnect the ECM electrical connector PI01. 4. Measure the resistance between the relevant injector harness electrical connector (PI32 to PI39) pin 001 and the ECM electrical connector PI01, pins as follows:

Injector Cyl 1, PI32 pin 01 (BG) and PI01 pin 120 (BG).

Injector Cyl 2, PI36 pin 01 (BR) and PI01 pin 115 (BR).

Injector Cyl 3, PI33 pin 01 (BK) and PI01 pin 114 (BK).

Injector Cyl 4, PI37 pin 01 (BO) and PI01 pin 119 (BO).

Injector Cyl 5, PI34 pin 01 (BG) and PI01 pin 113 (BG).

Injector Cyl 6, PI38 pin 01 (U) and PI01 pin 118 (U).

Injector Cyl 7, PI35 pin 01 (BW) and PI01 pin 117 (BW).

Injector Cyl 8, PI39 pin 01 (UY) and PI01 pin 112 (UY).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the circuit between the relevant injector harness electrical connector pin 01 and the engine

control module electrical connector. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G290117t14.

G290117t14 : CHECK THE INJECTOR GROUND CIRCUIT FOR SHORT CIRCUIT TO BATTERY

1. Reconnect the battery negative terminal. 2. Measure the voltage between the relevant injector harness electrical connector (PI32 to PI39) pin 01 and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G290117t15.

G290117t15 : CHECK THE INJECTOR GROUND CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between the relevant injector harness electrical connector (PI32 to PI39) pin 01 and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

Contact dealer technical support for advice on possible ECM failure.

Fuel Charging and Controls - VIN Range: G45704->G99999

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Fuel leaks	
Damaged fuel lines	Fuses
Damaged push connect fittings	Inertia switch
Fuel level	Loose or corroded electrical connectors
Fuel contamination/grade/quality	Harnesses
Throttle body	Sensor(s)
Damaged fuel tank filler pipe cap	Engine control module (ECM)
Damaged fuel tank filler pipe	

3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the diagnostic trouble code (DTC) Index.

Symptom Chart

Symptom	Possible source	Action
Engine cranks, but does not fire	Engine breather system disconnected/restricted	Check the engine breather system, Engine Emission Control - VIN Range: G45704->G99999 For ignition

	<p>Ignition system</p> <p>Fuel system</p> <p>Harness</p> <p>Crankshaft position (CKP) sensor</p> <p>ECM fault</p>	<p>system tests,</p> <p>Engine Ignition - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For CKP tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
Engine cranks and fires, but will not start	<p>Evaporative emissions purge valve</p> <p>Fuel pump</p> <p>Spark plugs</p> <p>HT short to ground (tracking) check rubber boots for cracks/damage</p> <p>Ignition coil failure(s)</p> <p>Harness</p>	<p>For purge valve tests,</p> <p>Evaporative Emissions - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For ignition system tests,</p> <p>Engine Ignition - VIN Range: G45704->G99999</p>
Difficult to start cold	<p>Check coolant anti-freeze content</p> <p>Battery</p> <p>CKP sensor</p> <p>Exhaust gas recirculation (EGR) valve stuck open</p> <p>Fuel pump</p> <p>Purge valve</p>	<p>Check the engine coolant level and condition. For battery information, Battery For CKP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For EGR system information,</p> <p>Engine Emission Control - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For purge valve tests,</p> <p>Evaporative Emissions - VIN Range: G45704->G99999</p>
Difficult to start hot	<p>Injector leak</p> <p>Engine fuel temperature (EFT) sensor</p> <p>Intake air temperature (IAT)</p>	<p>For fuel injector information, Fuel Injectors (18.10.02) For EFT, IAT and MAF sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 For purge valve tests,</p>

	<p>sensor</p> <p>Mass air flow (MAF) sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>EGR valve stuck open</p>	<p>Evaporative Emissions - VIN Range: G45704->G99999 Check the fuel pressure,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For ignition system tests,</p> <p>Engine Ignition - VIN Range: G45704->G99999 For EGR system information,</p> <p>Engine Emission Control - VIN Range: G45704->G99999</p>
<p>Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)</p>	<p>Injector leak</p> <p>EFT sensor</p> <p>IAT sensor</p> <p>MAF sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>EGR valve stuck open</p>	<p>For fuel injector information,</p> <p>Fuel Charging and Controls - VIN Range: G45704->G99999 For EFT, IAT and MAF sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 For purge valve tests,</p> <p>Evaporative Emissions - VIN Range: G45704->G99999 Check the fuel pressure,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For ignition system tests,</p> <p>Engine Ignition - VIN Range: G45704->G99999 For EGR system information,</p> <p>Engine Emission Control - VIN Range: G45704->G99999</p>
<p>Engine stalls soon after start</p>	<p>Breather system disconnected/restricted</p> <p>ECM relay</p> <p>Harness</p> <p>MAF sensor</p> <p>Fuel rail pressure (FRP) sensor</p> <p>Ignition system</p>	<p>For breather system information,</p> <p>Engine Emission Control - VIN Range: G45704->G99999 For ECM relay, MAF and FRP sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 For ignition system tests,</p> <p>Engine Ignition - VIN Range: G45704->G99999 For air filter and intake system information,</p> <p>Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For fuel line information,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L,</p>

	<p>Air filter restricted</p> <p>Air leakage</p> <p>Fuel lines</p>	VIN Range: G45704->G99999
Engine hesitates/poor acceleration	<p>Fuel pump</p> <p>Fuel pressure</p> <p>Fuel lines</p> <p>Injector leak</p> <p>Air leakage</p> <p>Throttle position (TP) sensors</p> <p>Accelerator pedal position (APP) sensor</p> <p>Throttle motor</p> <p>Restricted pedal travel (carpet, etc)</p> <p>Ignition system</p> <p>EGR valve stuck open</p> <p>HO2 sensors</p> <p>Transmission malfunction</p>	<p>Check the fuel pressure, check the fuel lines,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For injector information,</p> <p>Fuel Injectors (18.10.02) For intake system information,</p> <p>Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For TP, APP sensor and throttle motor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 Check the accelerator pedal travel. For ignition system tests,</p> <p>Engine Ignition - VIN Range: G45704->G99999 For EGR system information,</p> <p>Engine Emission Control - VIN Range: G45704->G99999 Check for DTCs indicating a faulty HO2 sensor. Refer to the DTC index. For transmission information,</p>
Engine backfires	<p>Fuel pump</p> <p>Fuel lines</p> <p>Air leakage</p> <p>MAF sensor</p> <p>APP sensor</p> <p>HO2 sensors</p> <p>Ignition system</p> <p>Sticking variable camshaft timing (VCT) hub</p>	<p>Check the fuel pressure, check the fuel lines,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For intake system,</p> <p>Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For MAF and APP sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 Check for DTCs indicating a faulty HO2 sensor. Refer to the DTC index. For ignition system tests,</p> <p>Engine Ignition - VIN Range: G45704->G99999 Check DTCs for VCT range/performance fault. For VCT</p>

		information, Engine
Engine surges	<p>Fuel pump</p> <p>Fuel lines</p> <p>MAF sensor</p> <p>Harness</p> <p>TP sensors</p> <p>Throttle motor</p> <p>Ignition system</p>	<p>Check the fuel pressure, check the fuel lines,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For MAF, TP sensor and throttle motor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 For ignition system tests,</p> <p>Engine Ignition - VIN Range: G45704->G99999</p>
Engine detonates/knocks	<p>Knock sensor (KS) circuit malfunction</p> <p>FRP sensor</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Fuel pump</p> <p>Fuel lines</p> <p>Air leakage</p> <p>Sticking VCT hub</p> <p>BARO sensor malfunction (internal ECM fault)</p>	<p>For KS, FRP, MAF and HO2 sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check DTCs for VCT range/performance fault. For VCT information, Engine Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
No throttle response	<p>APP sensor malfunction</p> <p>TP sensors</p> <p>Throttle motor</p>	<p>For APP, TP sensor and throttle motor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999</p>
Poor throttle response	<p>APP sensor malfunction</p> <p>TP sensors</p> <p>ECT sensor</p> <p>MAF sensor</p>	<p>For APP, TP, ECT and MAF sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 For transmission information, For intake system, Intake Air Distribution and Filtering -</p>

	Transmission malfunction Traction control event Air leakage Breather system disconnected/restricted	VIN Range: G45704->G99999 For breather system information, Engine Emission Control - VIN Range: G45704->G99999
--	--	--

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of DTCs,
Electronic Engine Controls - VIN Range: G45704->G99999

DTC	Description	Possible Causes	Action
P008700	Fuel rail/system pressure - too low	FRP sensor disconnected FRP sensor to ECM sensing circuit: open circuit or short circuit to ground FRP sensor supply circuit: high resistance FRP sensor failure Fuel pump failure Fuel line leak Restricted fuel line	For FRP sensor circuit tests, Electronic Engine Controls - VIN Range: G45704->G99999 For fuel pump circuit and fuel line tests, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999
P008800	Fuel rail/system pressure - too high	FRP sensor to ECM wiring (supply/sense): short circuit to each other FRP sensor to ECM sense circuit:	For FRP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For fuel pump circuit and fuel line tests,

		<p>short circuit to high voltage</p> <p>FRP sensor ground circuit: high resistance</p> <p>FRP sensor failure</p> <p>Restricted fuel line</p> <p>Fuel pump short circuit to battery</p>	<p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999</p>
P017100	System too lean (right hand bank)	<p>Air intake leak between MAF sensor and cylinder head</p> <p>Fuel filter/system restriction</p> <p>Low fuel pressure</p> <p>Fuel injector restriction</p> <p>MAF sensor fault (low intake air flow)</p> <p>Exhaust leak (before catalyst)</p> <p>Evaporative emission system fault</p>	<p>For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the fuel pressure, check the fuel lines,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For fuel injector information, Fuel Injectors (18.10.02)</p> <p>For MAF sensor circuit tests, Electronic Engine Controls - VIN Range: G45704->G99999 Check the exhaust system (before catalyst) for condition and security, For evaporative emission system tests, Evaporative Emissions - VIN Range: G45704->G99999</p>
P017200	System too rich (right hand bank)	<p>Restricted air filter</p> <p>High fuel pressure</p> <p>Leaking fuel injector(s)</p> <p>Oil contaminated with fuel (too many cold starts with vehicle subsequently not getting hot enough for long enough)</p> <p>MAF sensor fault (high intake air</p>	<p>For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the fuel pressure,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For fuel injector information, Fuel Injectors (18.10.02)</p> <p>Check the oil condition, if</p>

		<p>flow)</p> <p>Evaporative emission system fault</p>	<p>contamination is present, renew the engine oil and filter. For MAF sensor circuit tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 For evaporative emission system tests,</p> <p>Evaporative Emissions - VIN Range: G45704->G99999</p>
P017400	System too lean (left hand bank)	<p>Air intake leak between MAF sensor and cylinder head</p> <p>Fuel filter/system restriction</p> <p>Low fuel pressure</p> <p>Fuel injector restriction</p> <p>MAF sensor fault (low intake air flow)</p> <p>Exhaust leak (before catalyst)</p> <p>Evaporative emission system fault</p>	<p>For intake system information,</p> <p>Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the fuel pressure, check the fuel lines,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For fuel injector information,</p> <p>Fuel Injectors (18.10.02)</p> <p>For MAF sensor circuit tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 Check the exhaust system (before catalyst) for condition and security,</p> <p>For evaporative emission system tests,</p> <p>Evaporative Emissions - VIN Range: G45704->G99999</p>
P017500	System too rich (left hand bank)	<p>Restricted air filter</p> <p>High fuel pressure</p> <p>Leaking fuel injector(s)</p> <p>Oil contaminated with fuel (too many cold starts with vehicle subsequently not getting hot enough for long enough)</p>	<p>For intake system information,</p> <p>Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the fuel pressure,</p> <p>Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range: G45704->G99999 For fuel injector information,</p> <p>Fuel Injectors (18.10.02)</p>

		<p>MAF sensor fault (high intake air flow)</p> <p>Evaporative emission system fault</p>	<p>Check the oil condition, if contamination is present, renew the engine oil and filter. For MAF sensor circuit tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 For evaporative emission system tests,</p> <p>Evaporative Emissions - VIN Range: G45704->G99999</p>
P020100	Cylinder 1 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests on vehicles without supercharger, GO to Pinpoint Test G240048p1. For injector circuit tests on vehicles with supercharger, GO to Pinpoint Test G240048p3.</p>
P020200	Cylinder 2 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests on vehicles without supercharger, GO to Pinpoint Test G240048p1. For injector circuit tests on vehicles with supercharger, GO to Pinpoint Test G240048p3.</p>
P020300	Cylinder 3 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests on vehicles without supercharger, GO to Pinpoint Test G240048p1. For injector circuit tests on vehicles with supercharger, GO to Pinpoint Test G240048p3.</p>
P020400	Cylinder 4 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests on vehicles without supercharger, GO to Pinpoint Test G240048p1. For injector circuit tests on vehicles with supercharger,</p>

			GO to Pinpoint Test G240048p3.
P020500	Cylinder 5 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests on vehicles without supercharger, GO to Pinpoint Test G240048p1.</p> <p>For injector circuit tests on vehicles with supercharger, GO to Pinpoint Test G240048p3.</p>
P020600	Cylinder 6 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests on vehicles without supercharger, GO to Pinpoint Test G240048p1.</p> <p>For injector circuit tests on vehicles with supercharger, GO to Pinpoint Test G240048p3.</p>
P020700	Cylinder 7 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests on vehicles without supercharger, GO to Pinpoint Test G240048p1.</p> <p>For injector circuit tests on vehicles with supercharger, GO to Pinpoint Test G240048p3.</p>
P020800	Cylinder 8 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: short circuit</p> <p>Injector failure</p>	<p>For injector circuit tests on vehicles without supercharger, GO to Pinpoint Test G240048p1.</p> <p>For injector circuit tests on vehicles with supercharger, GO to Pinpoint Test G240048p3.</p>
P131500	Persistent misfire	<p>ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Fuel delivery pressure low</p> <p>Fuel injector circuit fault(s)</p>	<p>For ignition coil circuit tests, Engine Ignition - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 3.0L/3.5L/4.2L, VIN Range:</p>

		<p>(injector DTCs also flagged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Cylinder compression low</p>	<p>G45704->G99999 For injector circuit tests (vehicles without supercharger), GO to Pinpoint Test G240048p1. For injector circuit tests (vehicles with supercharger), GO to Pinpoint Test G240048p3. For spark plug tests, Engine Ignition - VIN Range: G45704->G99999</p>
P131600	Injector driver misfire - emissions damage	Injector driver module codes detected	Check for associated DTCs and refer to the DTC index.
P210129	Throttle range/performance - sub-processor	Jammed throttle blade, gearing or motor	<p>Check for a message in the instrument cluster. Replace the throttle body.</p> <p>Throttle Body - Vehicles With: Supercharger, VIN Range: G45704->G99999 (19.70.04)</p> <p>Throttle Body - Vehicles Without: Supercharger, VIN Range: G45704->G99999 (19.70.04)</p>
P210164	Throttle range/performance	Jammed throttle blade, gearing or motor	<p>Check for a message in the instrument cluster. Replace the throttle body.</p> <p>Throttle Body - Vehicles With: Supercharger, VIN Range: G45704->G99999 (19.70.04)</p> <p>Throttle Body - Vehicles Without: Supercharger, VIN Range: G45704->G99999 (19.70.04)</p>
P210329	Throttle actuator motor control circuit high	<p>Control circuit: short circuit to power</p> <p>ECM fault</p>	For throttle actuator motor circuit tests on vehicles without supercharger, GO to Pinpoint Test G240048p4.

			For throttle actuator motor circuit tests on vehicles with supercharger, GO to Pinpoint Test G240048p5. Refer to the warranty policy and procedures manual if an ECM is suspect.
P210364	Throttle actuator motor control circuit high - signal plausibility failure	Control circuit: short circuit to power ECM fault	For throttle actuator motor circuit tests on vehicles without supercharger, GO to Pinpoint Test G240048p4. For throttle actuator motor circuit tests on vehicles with supercharger, GO to Pinpoint Test G240048p5. Refer to the warranty policy and procedures manual if an ECM is suspect.
P210500	Throttle actuator control system - forced engine shutdown	Throttle MIL request due to fuel cut	Check for DTCs indicating the reason for the fuel cut. Follow the action indicated for those DTCs.
P210629	Throttle actuator control system - forced limited power	Signal invalid	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - Vehicles With: Supercharger, VIN Range: G45704->G99999 (19.70.04) Throttle Body - Vehicles Without: Supercharger, VIN Range: G45704->G99999 (19.70.04)
P210664	Throttle actuator control system - forced limited power	Signal plausibility failure	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - Vehicles With: Supercharger, VIN Range: G45704->G99999 (19.70.04)

			Throttle Body - Vehicles Without: Supercharger, VIN Range: G45704->G99999 (19.70.04)
P211800	Throttle actuator motor control current range/performance	Control circuit: short circuit to power, short circuit to ground, high resistance ECM fault	For throttle actuator motor circuit tests on vehicles without supercharger, GO to Pinpoint Test G240048p4. For throttle actuator motor circuit tests on vehicles with supercharger, GO to Pinpoint Test G240048p5. Refer to the warranty policy and procedures manual if an ECM is suspect.
P211900	Throttle actuator control throttle body range/performance	Throttle spring faulty	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - Vehicles With: Supercharger, VIN Range: G45704->G99999 (19.70.04) Throttle Body - Vehicles Without: Supercharger, VIN Range: G45704->G99999 (19.70.04)

Pinpoint Tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

PINPOINT TEST G240048p1 : FUEL INJECTOR CIRCUITS (VEHICLES WITHOUT SUPERCHARGER)

G240048t1 : CHECK THE INJECTOR COIL RESISTANCE

1. Disconnect the relevant injector electrical connector:

Injector connector
Cylinder 1, PI32
Cylinder 2, PI36
Cylinder 3, PI33
Cylinder 4, PI37
Cylinder 5, PI34
Cylinder 6, PI38
Cylinder 7, PI35
Cylinder 8, PI39

2. Measure the resistance between the injector pins.

Is the resistance between 12 and 16 ohms?

-> Yes

GO to Pinpoint Test G240048t2.

-> No

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC and test the system for normal operation.

G240048t2 : CHECK THE INJECTOR COIL INSULATION

1. Measure the resistance between:

Injector, component side	Injector body
Pin 01	Injector body
Pin 02	Injector body

Is either resistance less than 10,000 ohms?

-> Yes

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t3.

G240048t3 : CHECK THE INJECTOR SUPPLY VOLTAGE

1. Key on, engine off. 2. Make sure the EMS relay is energized. 3. Measure the voltage between:

Injector connector, harness side	Battery
Pin 02	Negative terminal

Is the voltage less than 10 Volts?

-> Yes

REPAIR the circuit between the relevant injector harness electrical connector pin 02 and battery. This circuit includes fuse 13 of the front power distribution box and the EMS relay. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t6.

G240048t6 : CHECK THE INJECTOR CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Injector connector, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t5.

G240048t5 : CHECK THE INJECTOR CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Injector connector, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t4.

G240048t4 : CHECK THE INJECTOR CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector PI300. 2. Measure the resistance between:

Cylinder 1 injector connector, harness side	ECM connector PI300, harness side
PI32, pin 01	Pin 78

Cylinder 2 injector connector, harness side	ECM connector PI300, harness side
PI36, pin 01	Pin 79

Cylinder 3 injector connector, harness side	ECM connector PI300, harness side
PI33, pin 01	Pin 80

Cylinder 4 injector connector, harness side	ECM connector PI300, harness side
PI37, pin 01	Pin 81

Cylinder 5 injector connector, harness side	ECM connector PI300, harness side
PI34, pin 01	Pin 82

Cylinder 6 injector connector, harness side	ECM connector PI300, harness side
PI38, pin 01	Pin 83

Cylinder 7 injector connector, harness side	ECM connector PI300, harness side
PI35, pin 01	Pin 84

Cylinder 8 injector connector, harness side	ECM connector PI300, harness side
PI39, pin 01	Pin 85

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G240048p3 : FUEL INJECTOR CIRCUITS (VEHICLES WITH SUPERCHARGER)

G240048t13 : CHECK THE INJECTOR COIL RESISTANCE

1. Disconnect the relevant injector electrical connector:

Injector connector
Injector Cylinder 1, IS01
Injector Cylinder 2, IS07
Injector Cylinder 3, IS02
Injector Cylinder 4, IS08
Injector Cylinder 5, IS03
Injector Cylinder 6, IS09
Injector Cylinder 7, IS04
Injector Cylinder 8, IS10

2. Measure the resistance between the injector pins.

Is the resistance between 12 and 16 ohms?

-> Yes

GO to Pinpoint Test G240048t14.

-> No

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC and test the system for normal operation.

G240048t14 : CHECK THE INJECTOR COIL INSULATION

1. Measure the resistance between:

Injector, component side	Injector body
--------------------------	---------------

Pin 01	Injector body
Pin 02	Injector body

Is either resistance less than 10,000 ohms?

-> Yes

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t15.

G240048t15 : CHECK THE INJECTOR SUPPLY VOLTAGE

1. Key on, engine off. 2. Make sure the EMS relay is energized. 3. Measure the voltage between:

Injector connector, harness side	Battery
Pin 02	Negative terminal

Is the voltage less than 10 Volts?

-> Yes

REPAIR the circuit between the relevant injector harness electrical connector pin 02 and battery. This circuit includes fuse 13 of the front power distribution box and the EMS relay. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t16.

G240048t16 : CHECK THE INJECTOR CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Injector connector, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t17.

G240048t17 : CHECK THE INJECTOR CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Injector connector, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t18.

G240048t18 : CHECK THE INJECTOR CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector PI300. 2. Measure the resistance between:

Cylinder 1 injector connector, harness side	ECM connector PI300, harness side
IS01, pin 01	Pin 78

Cylinder 2 injector connector, harness side	ECM connector PI300, harness side
IS07, pin 01	Pin 79

Cylinder 3 injector connector, harness side	ECM connector PI300, harness side
IS02, pin 01	Pin 80

Cylinder 4 injector connector, harness side	ECM connector PI300, harness side
IS08, pin 01	Pin 81

Cylinder 5 injector connector, harness side	ECM connector PI300, harness side
IS03, pin 01	Pin 82

Cylinder 6 injector connector, harness side	ECM connector PI300, harness side
IS09, pin 01	Pin 83

Cylinder 7 injector connector, harness side	ECM connector PI300, harness side
IS04, pin 01	Pin 84

Cylinder 8 injector connector, harness side	ECM connector PI300, harness side
IS10, pin 01	Pin 85

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new injector.

Fuel Injectors (18.10.02) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G240048p4 : THROTTLE BODY MOTOR CIRCUIT (VEHICLES WITHOUT SUPERCHARGER)

G240048t19 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the throttle body electrical connector, PI26. 2. Measure the resistance between:

Throttle body connector PI26, harness side	Battery
Pin 05	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t20.

G240048t20 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Throttle body connector PI26, harness side	Battery
Pin 05	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t21.

G240048t21 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR NEGATIVE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Throttle body connector PI26, harness side	Battery
Pin 06	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G240048t22.

G240048t22 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR NEGATIVE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Throttle body connector PI26, harness side	Battery
Pin 06	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G240048t23.

G240048t23 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

Throttle body connector PI26, harness side	ECM connector PI300, harness side
Pin 05	Pin 75

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t24.

G240048t24 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR NEGATIVE CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Throttle body connector PI26, harness side	ECM connector PI300, harness side
Pin 06	Pin 74

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new throttle body assembly

Throttle Body - Vehicles Without: Supercharger, VIN Range: G45704->G99999 (19.70.04) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G240048p5 : THROTTLE BODY MOTOR CIRCUIT (VEHICLES WITH SUPERCHARGER)

G240048t25 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the throttle body electrical connector, PI26. 2. Measure the resistance between:

Throttle body connector PI26, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t26.

G240048t26 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Throttle body connector PI26, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t27.

G240048t27 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR NEGATIVE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Throttle body connector PI26, harness side	Battery
--	---------

Pin 02	Negative terminal
--------	-------------------

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t28.

G240048t28 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR NEGATIVE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Throttle body connector PI26, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G240048t29.

G240048t29 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

Throttle body connector PI26, harness side	ECM connector PI300, harness side
Pin 01	Pin 75

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G240048t30.

G240048t30 : CHECK THE THROTTLE ACTUATOR CONTROL MOTOR NEGATIVE CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Throttle body connector PI26, harness side	ECM connector PI300, harness side
Pin 02	Pin 74

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.


-> **No**


INSTALL a new throttle body assembly

Throttle Body - Vehicles With: Supercharger, VIN Range: G45704->G999999 (19.70.04) CLEAR the DTC and test the system for normal operation.

Fuel Injection Supply Manifold (19.60.13)



Removal

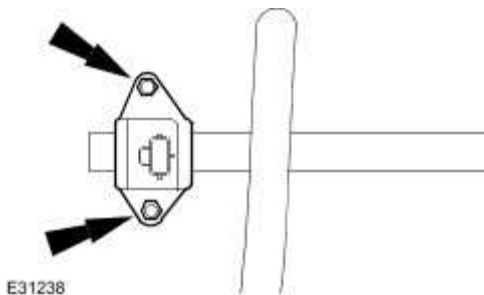
- 1  **WARNING:** Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions can result in personal injury.

 **WARNING:** Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

Remove the fuel injection supply manifold.
For additional information, refer to

- 2 . Remove the fuel pressure sensor.

-  Remove the securing bolts.
-  Remove and discard the O-ring seals.



Installation

1



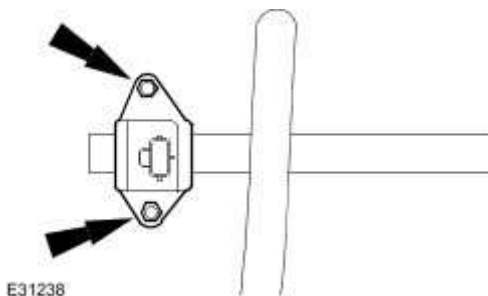
WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions can result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

To install, reverse removal procedure.

- ▶ Install new fuel pressure sensor O-ring seals. Lubricate the O-ring seals with clean engine oil to aid installation.
- ▶ Tighten to 5 Nm.



Fuel Injectors (18.10.02)

Removal

Vehicles with supercharger

- 1 . Remove the charge air coolers. <<303-12B>>

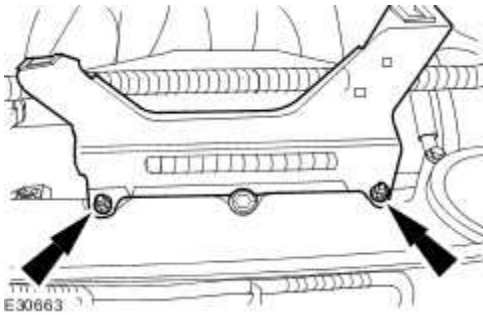
Vehicles without supercharger

- 2 . Remove the engine cover.

- 3 . **NOTE:**

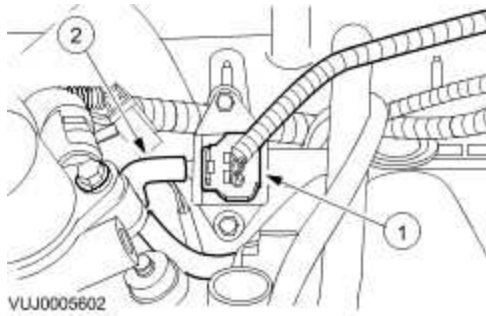
Right-hand shown, left-hand similar.

Remove the engine cover bracket.



All vehicles

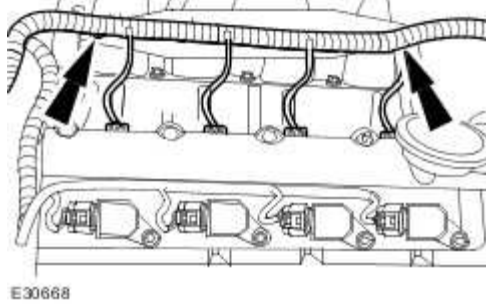
- 4 . Disconnect the fuel line. <<310-00>>
- 5 . Disconnect the fuel pressure sensor.
 - 1) Disconnect the electrical connector.
 - 2) Detach the vacuum hose.



6 . NOTE:

Right-hand shown, left-hand similar.

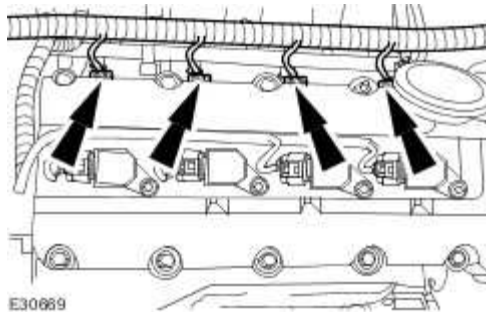
Detach the engine wiring harness.



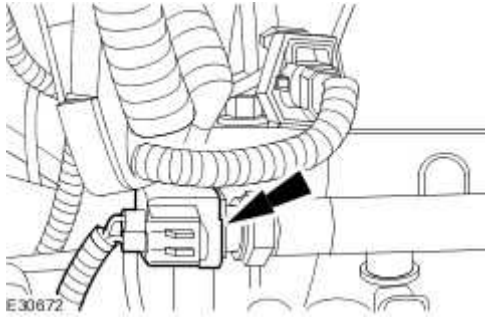
7 . NOTE:

Right-hand shown, left-hand similar.

Disconnect the electrical connectors.

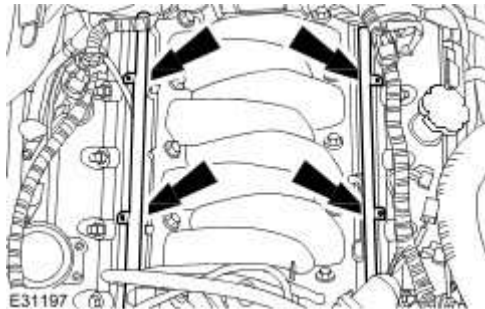


8 . Disconnect the fuel temperature sensor electrical connector.



Vehicles without supercharger

9 . Remove the fuel injection supply manifold.

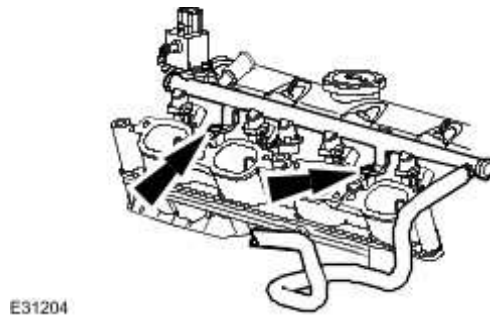


Vehicles with supercharger

10 . **NOTE:**

Left-hand shown, right-hand similar.

Remove the fuel injection supply manifold.

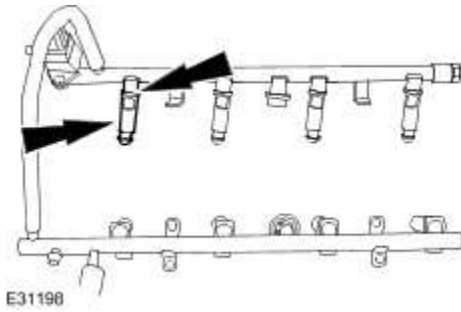


All vehicles

11 . Remove the fuel injectors.

▶ Release the retaining clip.

- ▶ Remove and discard the O-ring seals.



Installation

All vehicles

1



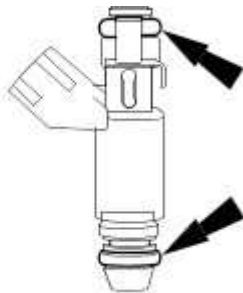
WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

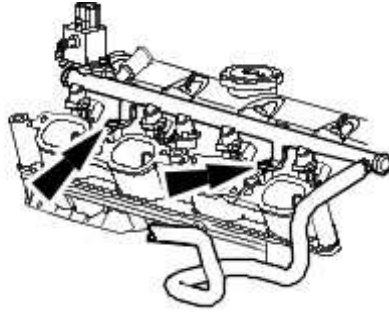
To install, reverse the removal procedure.

- ▶ Install new fuel injector O-ring seals. Lubricate the O-ring seals with clean engine oil to aid installation.



Vehicles with supercharger

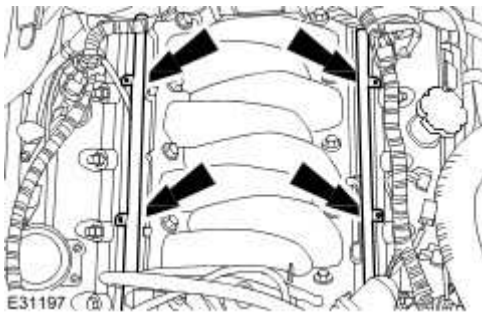
2 . Tighten to 7 Nm.



E31204

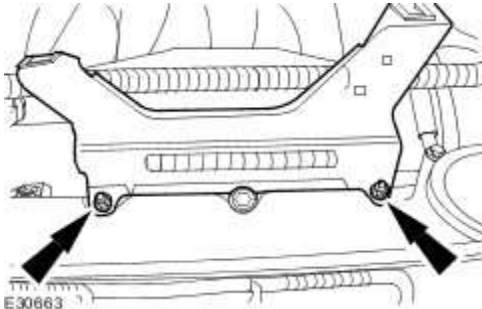
Vehicles without supercharger

3 . Tighten to 22 Nm.



E31197


4 . Tighten to 6 Nm.




E30663

Throttle Body - Vehicles With: Supercharger, VIN Range: G00442- >G45703 (19.70.04)

Removal

- 1  **WARNING:** When relieving cooling system pressure, cover the expansion tank cap with a thick cloth to prevent the possibility of scalding. Failure to follow these instructions may result in personal injury.

Remove the expansion tank cap to relieve the cooling system pressure.

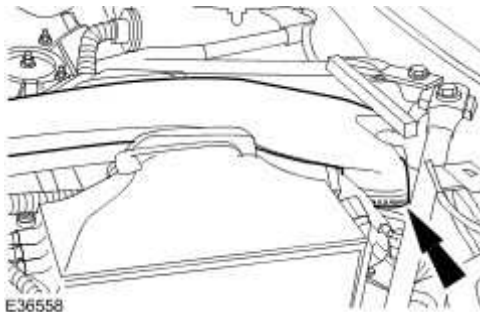
- 2  **CAUTION:** Do not attempt to clean the throttle body. The bore and the throttle plate has a special coating applied during manufacture which should not be removed.

Remove the air outlet pipe.

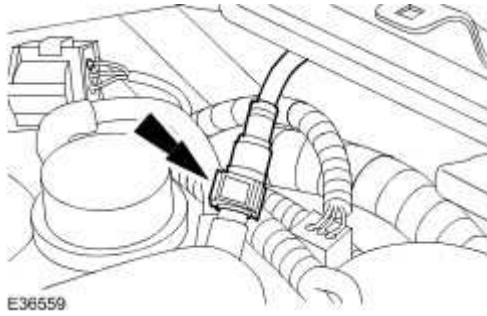
For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

- 3 . Remove the cowl vent screen.
For additional information, refer to Cowl Vent Screen (76.10.01)

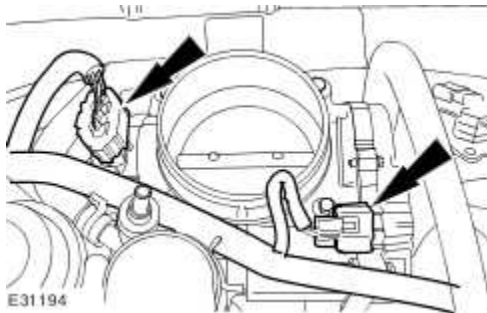
- 4 . Remove the throttle body intake pipe.



- 5 . Detach the brake servo pipe.



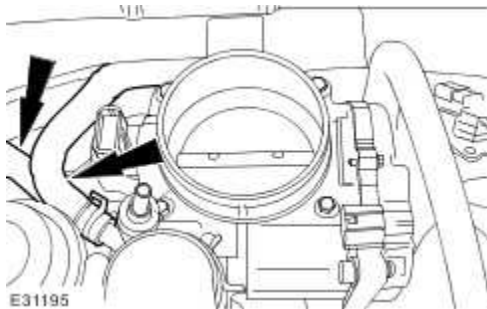
6 . Disconnect the throttle body electrical connectors.



7 . **NOTE:**

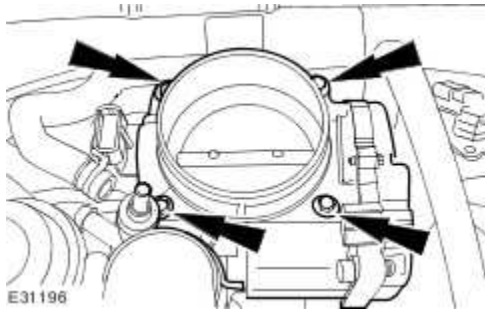
Cap the coolant hoses to minimize coolant loss.

Detach the coolant hoses from the throttle body.



8 . Remove the throttle body.

▶ Remove and discard the gasket.



Installation

1

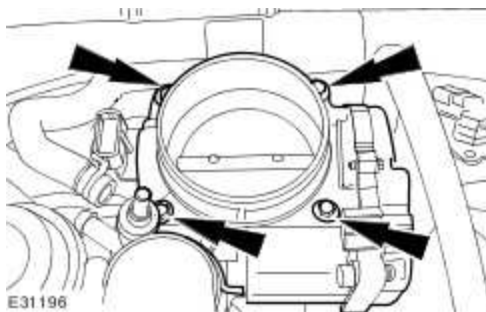


- CAUTION: Do not attempt to clean the throttle body. The bore and the throttle plate has a special coating applied during manufacture which should not be removed.

To install, reverse the removal procedure.

▶ Install a new throttle body gasket.


▶ Tighten to 10 Nm.



2 . Check and top up the cooling system.


Throttle Body - Vehicles With: Supercharger, VIN Range: G45704- >G99999 (19.70.04)

Removal

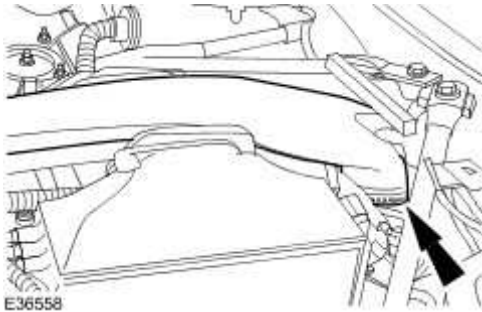
- 1  **WARNING:** When relieving cooling system pressure, cover the expansion tank cap with a thick cloth to prevent the possibility of scalding. Failure to follow these instructions may result in personal injury.

Remove the expansion tank cap to relieve the cooling system pressure.

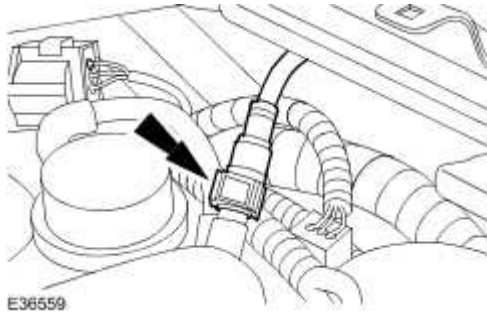
- 2 . Remove the cowl vent screen.
For additional information, refer to Cowl Vent Screen (76.10.01)

- 3  **CAUTION:** Do not attempt to clean the throttle body. The bore and the throttle plate has a special coating applied during manufacture which should not be removed.

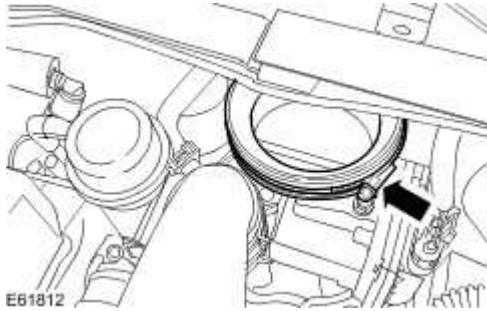
Remove the throttle body intake pipe.



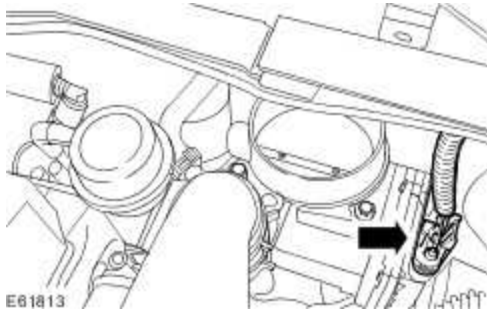
- 4 . Disconnect the brake servo pipe.



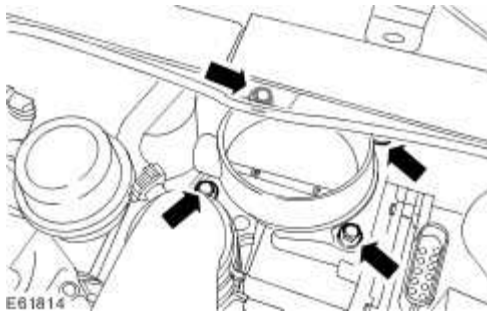
5 . Remove the throttle body intake duct.



6 . Disconnect the throttle body electrical connector.



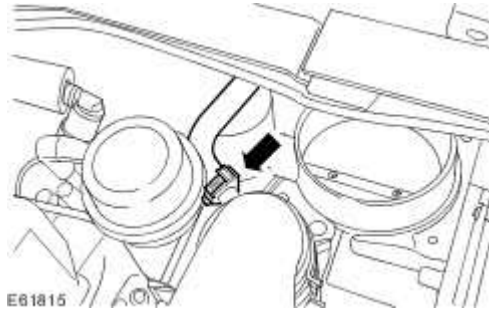
7 . Detach the throttle body.



8 . NOTE:

Cap the coolant hose to minimize coolant loss.

Disconnect the coolant hose.

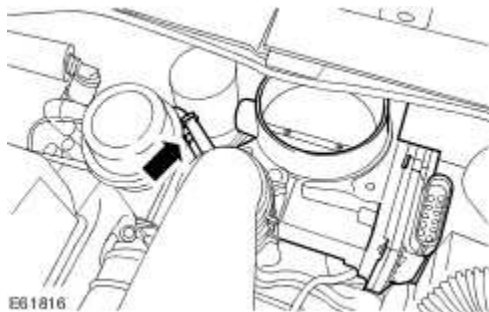


9 . NOTE:

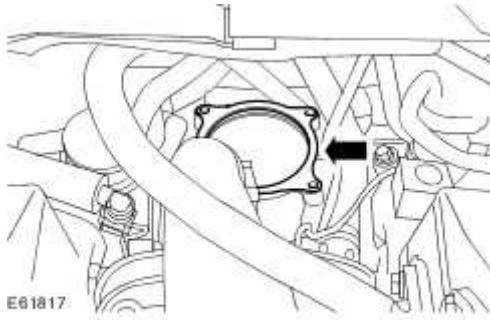
Cap the coolant hose to minimize coolant loss.

Remove the throttle body.

▶ Disconnect the coolant hose.



10 . Remove and discard the gasket.



Installation

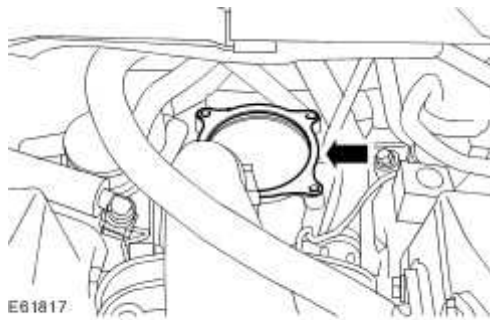
1



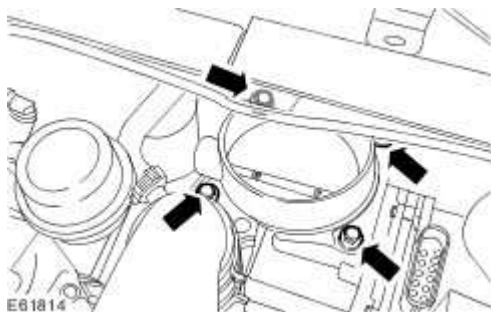
- CAUTION: Do not attempt to clean the throttle body. The bore and the throttle plate has a special coating applied during manufacture which should not be removed.

To install, reverse the removal procedure.

- ▶ Install a new gasket.




2 . Tighten to 10 Nm.




3 . Check and top up the cooling system as required.

Throttle Body - Vehicles Without: Supercharger, VIN Range: G00442- >G45703 (19.70.04)

Removal

- 1  **WARNING:** When relieving cooling system pressure, cover the expansion tank cap with a thick cloth to prevent the possibility of scalding. Failure to follow these instructions may result in personal injury.

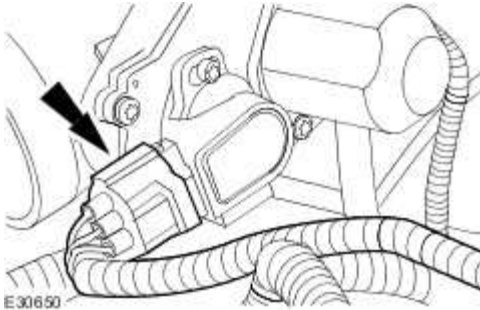
Remove the expansion tank cap to relieve the cooling system pressure.

- 2  **CAUTION:** Do not attempt to clean the throttle body. The bore and the throttle plate has a special coating applied during manufacture which should not be removed.

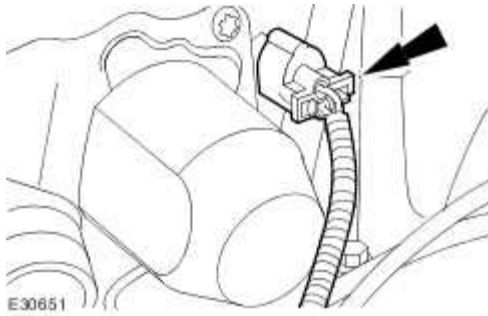
Remove the air outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

- 3 . Disconnect the electrical connector.

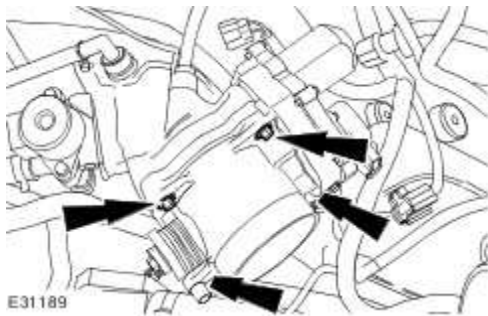


- 4 . Disconnect the electrical connector.



5 . Detach the throttle body.

▶ Remove the retaining bolts.



6 . Remove and discard the gasket.



7 . **NOTE:**

Cap the coolant hoses to minimize coolant loss.

Remove the throttle body.

▶ Detach the coolant hoses from the throttle body.

Installation

1

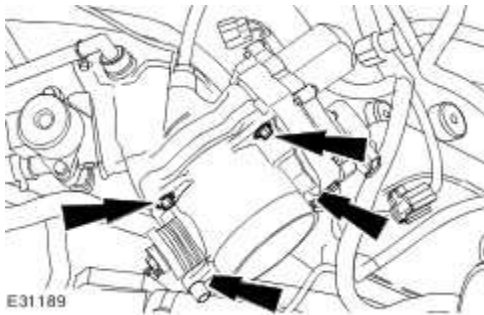


- **CAUTION:** Do not attempt to clean the throttle body. The bore and the throttle plate has a special coating applied during manufacture which should not be removed.

To install, reverse the removal procedure.

▶ Install a new throttle body gasket.


▶ Tighten to 10 Nm.




2 . Check and top up the cooling system.

Throttle Body - Vehicles Without: Supercharger, VIN Range: G45704- >G99999 (19.70.04)

Removal

- 1  **WARNING:** When relieving cooling system pressure, cover the expansion tank cap with a thick cloth to prevent the possibility of scalding. Failure to follow these instructions may result in personal injury.

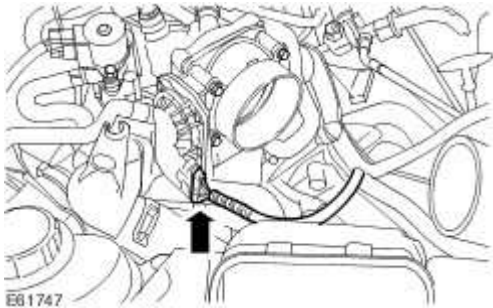
Remove the expansion tank cap to relieve the cooling system pressure.

- 2  **CAUTION:** Do not attempt to clean the throttle body. The bore and the throttle plate has a special coating applied during manufacture which should not be removed.

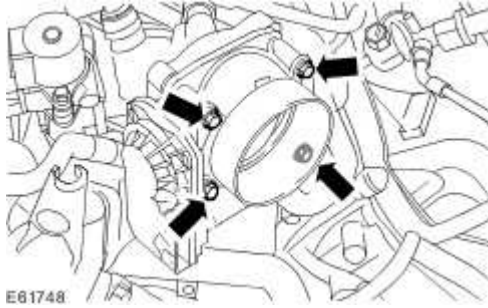
Remove the air outlet tube.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

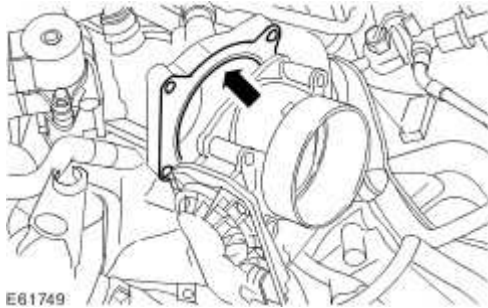
- 3 . Disconnect the throttle body electrical connector.



- 4 . Detach the throttle body.



5 . Remove and discard the gasket.

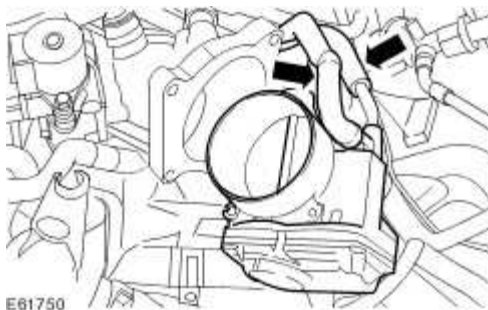


6 . **NOTE:**

Cap the coolant hoses to minimize coolant loss.

Remove the throttle body.

▶ Detach the coolant hoses from the throttle body.



Installation

1

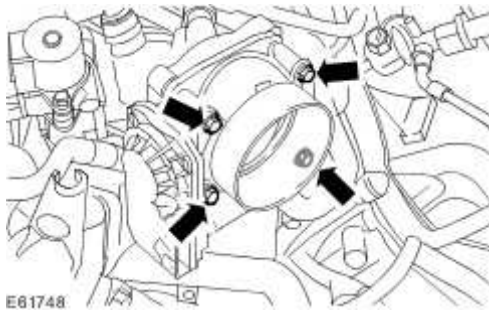


- CAUTION: Do not attempt to clean the throttle body. The bore and the throttle plate has a special coating applied during manufacture which should not be removed.

To install, reverse the removal procedure.

▶ Install the new throttle body gasket.

▶ Tighten to 10 Nm.



2 . Check and top up the cooling system.

303-04C : Fuel Charging and Controls – 2.7L Diesel

Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
High-pressure fuel supply line unions	A	–	–
High-pressure fuel supply line support bracket retaining nut	10	–	89
Fuel injector retaining bolts	10	–	89
Fuel injector high pressure fuel inlet adaptor union	42	31	–
Fuel injection diverter rail retaining bolts	23	16	–
Fuel injection supply manifold retaining bolts	23	16	–
Fuel injection supply manifold support bracket retaining bolts	23	16	–
Fuel pump retaining bolts	23	16	–
Fuel injection pump belt rear cover retaining bolts	7	–	62
Camshaft rear pulley retaining bolt	A	–	–
Fuel injection pump belt tensioner retaining bolt	25	18	–
Fuel injection pump pulley retaining nut	50	37	–
Fuel injection pump high pressure fuel outlet adaptor union	37	27	–
Exhaust gas recirculation (EGR) valve retaining bolts	10	–	89
Intake manifold retaining nuts	15	11	–

A = refer to the procedure for the correct torque sequence

Fuel Injection Component Cleaning



WARNING: Do not carry out any repairs to the fuel system with the engine running. The fuel pressure within the system can be as high as 2000 bar. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek immediate medical attention.



WARNING: Place the vehicle in a well ventilated, quarantined area and arrange 'No Smoking/Petrol Fumes' signs about the vehicle.



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high-pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Wash hands thoroughly after fuel handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



CAUTION: Before using the cleaning fluid, protect all electrical components and connectors with lint-free non-flocking material.



CAUTION: Make sure that all parts removed from the vehicle are placed on the lint-free non-flocking material.



CAUTION: Make sure that any protective clothing worn is clean and made from lint-free non-flocking material.



CAUTION: Make sure that clean non-plated tools are used. Clean tools using a new brush that will not lose its bristles and fresh cleaning fluid, prior to starting work on the vehicle.



CAUTION: Use a steel topped workbench and cover it with clean, lint-free non-flocking material.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.

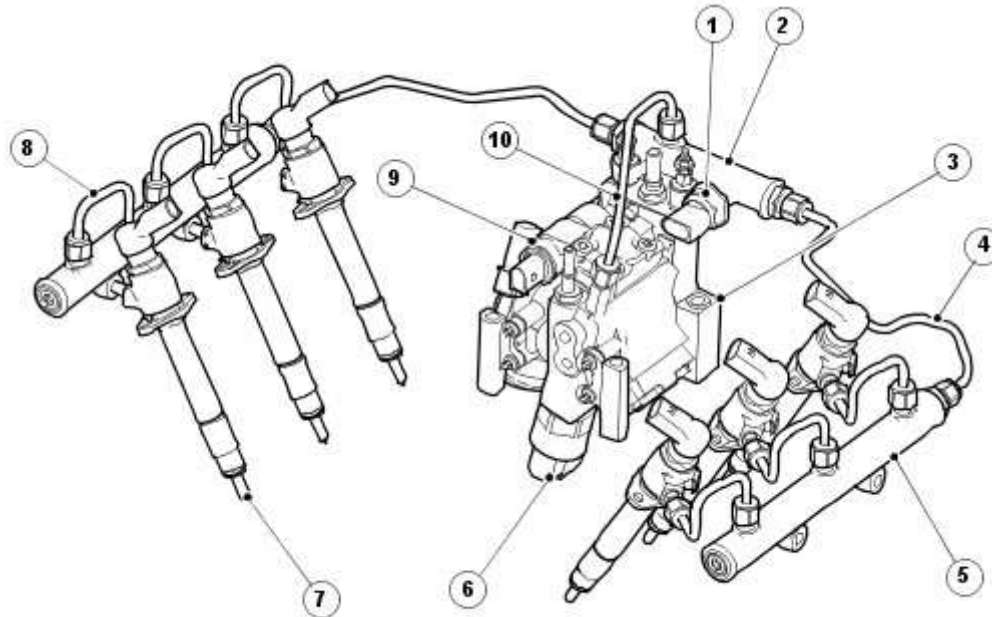
NOTE:

Pneumatic vacuum gun

1. Using a new brush that will not lose its bristles, brush cleaning fluid onto the components being removed and onto the surrounding area.
2. Using a pneumatic vacuum gun, remove all traces of cleaning fluid and foreign material.
3. Dispose of any used cleaning fluid and the brush after completing the repair.

Fuel Charging and Controls

High Pressure Fuel Injection Components



E 52629

Item	Part Number	Description
1	—	Fuel rail pressure pressure sensor
2	—	Fuel injection diverter rail
3	—	Fuel injection pump
4	—	High-pressure fuel supply line (fuel injection diverter rail to fuel injection supply manifold)
5	—	Fuel injection supply manifold
6	—	Pressure control valve (PCV)
7	—	Fuel injector
8	—	High-pressure fuel supply line (fuel injection supply manifold to fuel injector)

9	—	Volume control valve (VCV)
10		High-pressure fuel supply line (fuel injection pump to fuel injection diverter rail)

Fuel Injection Pump

The fuel injection pump is located at the rear of the engine between the cylinder heads and is driven by a toothed drive belt attached to a pulley on the left hand exhaust camshaft. The fuel injection pump is not timed to the engine. The fuel injection pump assembly contains two different types of pump, a transfer pump and a high pressure pump.

Fuel is supplied to the fuel injection pump by an electric fuel pump in the fuel tank via the fuel filter. Fuel then passes through the transfer pump to the high pressure pump. The amount of fuel supplied to the high pressure pump from the transfer pump is determined by the volume control valve (VCV) which is controlled using a pulse width modulated (PWM) signal from the engine control module (ECM). The VCV makes it possible to match the high pressure pump delivery to the requirements of the engine from the low pressure side. This keeps the amount of fuel flowing back to the main supply line to a minimum and reduces the load on the high pressure pump, improving engine efficiency.

The high pressure pump contains three radial pumping elements, capable of generating a fuel pressure of up to 1650 Bar (23,200 lb ft), connected together which leads via a pressure control valve (PCV) to the high pressure outlet of the pump.

The PCV is located between the high pressure and the fuel return line outlet of the pump. The PCV is controlled using a PWM signal from the ECM, and controls the fuel pressure in the fuel diverter rail and fuel injection supply manifolds. Opening of the PCV diverts fuel to the fuel return line and back to the fuel filter. At the same time as the PCV opens to reduce fuel pressure, the ECM closes the VCV to reduce the amount of fuel delivered to the high pressure pump. When the engine is stopped the VCV closes and the PCV opens, this relieves the pressure in the system and returns the fuel to the main fuel supply line.

The PCV and VCV must not be disassembled from fuel injection pump. If either of these components are found to be faulty, the fuel injection pump must be replaced.



CAUTION: If any of the high pressure fuel pipe retaining nuts are loosened, the high pressure fuel pipe it is installed to must be renewed. Failure to follow this instruction may allow metal fragments to enter the fuel system and result in damage to the fuel system components or engine.



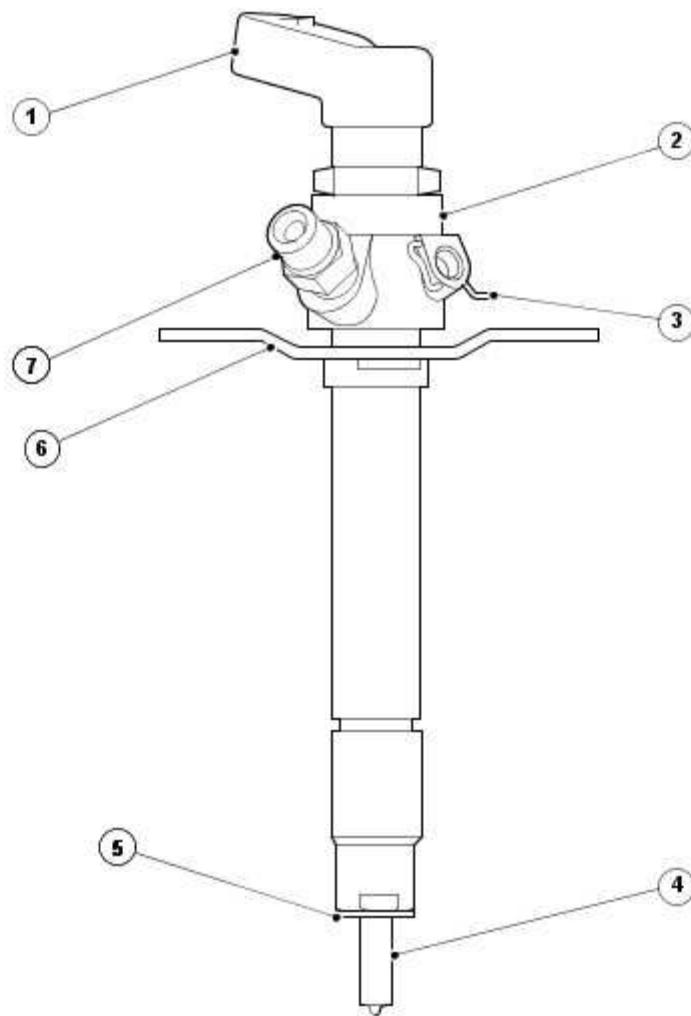
CAUTION: The high pressure fuel line olive end deforms and work hardens during installation. If any of the high pressure fuel pipe retaining nuts are loosened, the high pressure fuel

pipe it is installed to must be renewed. Failure to follow this instruction may allow the high-pressure fuel line to leak.

Fuel Injection Supply Manifold

The fuel injection supply manifolds are reservoirs for the pressurized fuel that is produced by the fuel pump. The two fuel injection supply manifolds are connected by high pressure fuel pipes to a fuel injection diverter rail mounted on the fuel injection pump. The fuel injection diverter rail also incorporates a pressure sensor so that the ECM can monitor/adjust the pressure of the fuel to be injected into the each cylinder. The fuel injection diverter rail and the pressure sensor are serviced as an assembly and must not under any circumstances be disassembled.

Fuel Injector



E52630

Item	Part Number	Description
1	—	Electrical connector
2	—	Fuel injector body
3	—	Fuel injector leak-off retaining clip
4	—	Fuel injector nozzle

5	—	Fuel injector sealing washer
6		Fuel injector retaining clamp
7		High pressure fuel line connection



CAUTION: If any of the high pressure fuel pipe retaining nuts are loosened, the high pressure fuel pipe it is installed to must be renewed. Failure to follow this instruction may allow metal fragments to enter the fuel system and result in damage to the fuel system components or engine.



CAUTION: The high pressure fuel line olive end deforms and work hardens during installation. If any of the high pressure fuel pipe retaining nuts are loosened, the high pressure fuel pipe it is installed to must be renewed. Failure to follow this instruction may allow the high-pressure fuel line to leak.

Fuel Injectors

The fuel injectors are operated electrically by the engine control module (ECM) and inject a precise amount of fuel into the combustion chamber at the required time.

The injectors have been designed to:

- allow pilot and main injections with short intervals between each injection.

- be fully electrically controlled.

Fuel Filter

The diesel fuel filter is located on the left-hand side of the engine compartment. Incorporated in to the fuel filter housing is a bimetallic valve which will start to close at 30°C (86°F) and will fully close at 50°C (122°F).

When the bimetallic valve is open, **warm** fuel is directed in to the fuel filter to prevent waxing. When the fuel temperature increases, the bimetallic valve closes, diverting fuel through the under-floor fuel cooler which then lowers the fuel temperature before returning the fuel back to the fuel filter. This allows fuel to be supplied to the fuel injection pump at the optimum inlet temperature of between -30°C to 80°C.

Fuel Charging and Controls

Principle of operation

Common rail diesel

The 2.7L fuel injection system is a common-rail design, running at the high-pressures (up to 1,650 bar or 23,930 lb/in²) typical of such systems.

The fuel is drawn from the fuel tank by an electric fuel pump module and delivered to the transfer pump side of a fuel injection pump driven by the engine. For additional information on the fuel injection pump,

Fuel Charging and Controls

The fuel volume control valve (FVCV) regulates the amount of fuel supplied to the high-pressure side of the fuel injection pump, while the fuel pressure control valve (FPCV) regulates the pressure.

The high-pressure fuel is delivered to the fuel rail where it is stored, ready for use by the fuel injectors.

The fuel injectors are Piezo type, and are controlled by the engine control module (ECM) from inputs from the engine management sensors.

The fuel injectors operate in stages, giving a pilot injection before the main injection to reduce detonation noise and help improve the efficiency of the engine.

For additional information,

Fuel Charging and Controls

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

Inspection and Verification



WARNING: Do NOT carry out any work on the fuel system with the engine running. The fuel pressure within the system can be as high as 1650 bar (23,930 lb/in²). Failure to follow this instruction may result in personal injury.



WARNING: Eye protection must be worn at all times when working on or near any fuel related components. Failure to follow this instruction may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow this instruction may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. This should be done after the engine has been run, but with the engine switched OFF. Failure to follow this instruction may result in personal injury.



WARNING: If taken internally, DO NOT induce vomiting. Seek immediate medical attention. Failure to follow this instruction may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention. Failure to follow this instruction may result in personal injury.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention. Failure to follow this instruction may result in personal injury.



CAUTION: Before disconnecting any part of the system, it is imperative that all dust, dirt and debris is removed from around components to prevent ingress of foreign matter into the fuel system. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: The fuel pipes between the injectors and the rail must be discarded after each use, and new pipes installed. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: It is essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or lines. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure that the workshop area in which the vehicle is being worked on is as clean and dust-free as possible. Areas in which work on clutches, brakes or where welding or machining are carried out are not suitable in view of the risk of contamination to the fuel system. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure that any protective clothing worn is clean and made from lint-free non-flocking material. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure that any protective gloves worn are new and are of the non-powdered latex type. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure that clean, non-plated tools are used. Clean tools using a new brush that will not lose its bristles and fresh cleaning fluid prior to starting work on the vehicle. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Use a steel-topped work bench and cover it with clean, lint-free, non-flocking material. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

This section contains references to Parameter Identifiers (PIDs). Where the Jaguar approved diagnostic system is not available, a scantool may be used to access these PIDs, all of which give information, and some of which can be used to both read information and to activate components. The format of the information may vary, depending on the tool used.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

NOTE:

If diagnostic trouble codes (DTCs) are recorded and the symptom is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

- 1 . Verify the customer concern.
- 2 . Confirm which, if any, warning lights and/or messages were displayed on the instrument cluster.
- 3 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Fuel level	Glow plug indicator
Contaminated fuel	Inertia fuel shutoff (IFS) switch
Fuel supply line(s)	Fuel pump module

Fuel return line(s)	Sensor(s)
High-pressure fuel supply line(s)	Engine control module (ECM)
Fuel tank filler pipe	Fuel volume control valve (FVCV)
Fuel leak(s)	Fuel pressure control valve (FPCV)
Fuel tank	Fuel rail pressure (FRP) sensor
Fuel filler cap	Fuel temperature sensor
Fuel filter	Fuel injector(s)
Push connect fittings	EGR system
Fuel rail	
Fuel injection pump	
Exhaust gas recirculation (EGR) system	

4 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

5 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC index, or the symptom chart if no DTCs are set.

Symptom Chart

Symptom	Possible source	Action
Engine cranks, but does not start	IFS switch	Check that the inertia switch has not tripped.
	Low/contaminated fuel	Check the fuel level/condition, GO to Pinpoint Test G552275p3.
	Air ingress	Check the low pressure circuit for leaks/damage,
	Low pressure circuit fault	Fuel Tank and Lines - 2.7L Diesel Check the fuel pump module operation, GO to Pinpoint Test G552275p2.
	Fuel pump module fault	Check the fuel filter, GO to Pinpoint Test G552275p4.
	Blocked fuel filter	Check the FVCV and FPCV, GO to Pinpoint Test G552275p5.
	FVCV blocked/contaminated	GO to Pinpoint Test G552275p7.
	FPCV blocked/contaminated	Check the fuel injection pump,
	Fuel injection pump failure	Fuel Injection Pump For CKP sensor circuit

	<p>Crankshaft position (CKP) sensor</p> <p>ECM fault</p>	<p>tests,</p> <p>Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
Difficult to start	<p>Low/Contaminated fuel</p> <p>Fuel pump module fault</p> <p>Air ingress</p> <p>Low pressure circuit fault</p> <p>Blocked fuel filter</p> <p>FVCV blocked/contaminated</p> <p>FPCV blocked/contaminated</p> <p>Low pressure circuit fault</p> <p>EGR valve(s) fault</p>	<p>Check the fuel level/condition, GO to Pinpoint Test G552275p3.</p> <p>Check the fuel pump module operation, GO to Pinpoint Test G552275p2.</p> <p>Check the low pressure circuit for leaks/damage,</p> <p>Fuel Tank and Lines - 2.7L Diesel Check the fuel filter, GO to Pinpoint Test G552275p4.</p> <p>Check the FVCV and FPCV, GO to Pinpoint Test G552275p5.</p> <p>GO to Pinpoint Test G552275p7.</p> <p>For EGR tests,</p> <p>Engine Emission Control</p>
Rough idle	<p>Low/Contaminated fuel</p> <p>Air ingress</p> <p>Low pressure circuit fault</p> <p>Blocked fuel filter</p> <p>FVCV blocked/contaminated</p> <p>FPCV blocked/contaminated</p> <p>EGR valve(s) fault</p>	<p>Check the fuel level/condition, GO to Pinpoint Test G552275p3.</p> <p>Check the low pressure circuit for leaks/damage,</p> <p>Fuel Tank and Lines - 2.7L Diesel Check the fuel filter, GO to Pinpoint Test G552275p4.</p> <p>Check the FVCV and FPCV, GO to Pinpoint Test G552275p5.</p> <p>GO to Pinpoint Test G552275p7.</p> <p>For EGR tests,</p> <p>Engine Emission Control</p>
Lack of power when accelerating	<p>Air intake circuit fault</p> <p>Catalyst converter blocked</p> <p>Low fuel pressure</p> <p>EGR valve(s) fault</p> <p>Turbocharger(s) fault</p>	<p>Check the air intake circuit,</p> <p>Intake Air Distribution and Filtering Check for a blocked catalytic converter,</p> <p>Exhaust System Check the fuel pressure PID, GO to Pinpoint Test G552275p6.</p> <p>For EGR tests,</p> <p>Engine Emission Control For turbocharger tests,</p> <p>Turbocharger</p>
Engine stops/stalls	<p>Low/Contaminated fuel</p>	<p>Check the fuel level/condition, GO to Pinpoint Test G552275p3.</p>

	<p>Air ingress</p> <p>Low pressure circuit fault</p> <p>FVCV blocked/contaminated</p> <p>FPCV blocked/contaminated</p> <p>High pressure fuel leak</p> <p>EGR valve(s) fault</p>	<p>Check the low pressure circuit for leaks/damage, Fuel Tank and Lines - 2.7L Diesel Check the FVCV and FPCV, GO to Pinpoint Test G552275p5.</p> <p>GO to Pinpoint Test G552275p7.</p> <p>Check for fuel system leaks, GO to Pinpoint Test G552275p1.</p> <p>For EGR tests, Engine Emission Control</p>
Engine judders	<p>Low/Contaminated fuel</p> <p>Air ingress</p> <p>Low pressure circuit fault</p> <p>Fuel metering valve blocked/contaminated</p> <p>FVCV blocked/contaminated</p> <p>FPCV blocked/contaminated</p> <p>High pressure fuel leak</p> <p>Fuel injection pump fault</p>	<p>Check the fuel level/condition, GO to Pinpoint Test G552275p3.</p> <p>Check the low pressure circuit for leaks/damage, Fuel Tank and Lines - 2.7L Diesel Check the FVCV and FPCV, GO to Pinpoint Test G552275p5.</p> <p>GO to Pinpoint Test G552275p7.</p> <p>Check for fuel system leaks, GO to Pinpoint Test G552275p1.</p> <p>Check the fuel injection pump, Fuel Injection Pump</p>
Excessive fuel consumption	<p>Low pressure circuit fault</p> <p>FVCV blocked/contaminated</p> <p>FPCV blocked/contaminated</p> <p>Fuel temperature sensor leak</p> <p>High pressure fuel leak</p> <p>Injector(s) failure</p> <p>EGR valve(s) fault</p>	<p>Check the low pressure circuit for leaks/damage, Fuel Tank and Lines - 2.7L Diesel Check the FVCV and FPCV, GO to Pinpoint Test G552275p5.</p> <p>GO to Pinpoint Test G552275p7.</p> <p>Check the fuel temperature sensor, fuel injection pump, etc for leaks, GO to Pinpoint Test G552275p1.</p> <p>Check for injector DTCs. For EGR tests, Engine Emission Control</p>

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last

2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of powertrain DTCs,
Electronic Engine Controls

DTC	Condition	Possible source	Action
P000100	Fuel volume control valve (FVCV) control circuit open	FVCV circuit: high resistance FVCV circuit: short circuit to ground FVCV failure ECM failure	For FVCV tests, GO to Pinpoint Test G552275p5. Refer to the warranty policy and procedures manual if an ECM is suspect.
P000200	Fuel volume control valve (FVCV) circuit range/performance	FVCV circuit: high resistance FVCV circuit: short circuit to ground FVCV circuit: short circuit to power FVCV failure ECM failure	For FVCV tests, GO to Pinpoint Test G552275p5. Refer to the warranty policy and procedures manual if an ECM is suspect.
P000300	Fuel volume control valve (FVCV) control circuit low	FVCV circuit: high resistance FVCV circuit: short circuit to ground FVCV failure ECM failure	For FVCV tests, GO to Pinpoint Test G552275p5. Refer to the warranty policy and procedures manual if an ECM is suspect.
P000400	Fuel volume control valve (FVCV) control circuit high	FVCV circuit: short circuit to power FVCV failure ECM failure	For FVCV tests, GO to Pinpoint Test G552275p5. Refer to the warranty policy and procedures manual if an ECM is suspect.

P008700	Fuel rail/system pressure too low	Pressure too low Fuel rail pressure (FRP) sensor circuit failure Fuel rail pressure (FRP) sensor failure	For FRP tests, GO to Pinpoint Test G552275p6.
P008800	Fuel rail/system pressure too high	Pressure too high Fuel rail pressure (FRP) sensor circuit failure Fuel rail pressure (FRP) sensor failure	For FRP tests, GO to Pinpoint Test G552275p6.
P009000	Fuel pressure control valve (FPCV) control circuit open	FPCV circuit: high resistance FPCV circuit: short circuit to ground FPCV failure ECM failure	For FPCV tests, GO to Pinpoint Test G552275p7. Refer to the warranty policy and procedures manual if an ECM is suspect.
P009100	Fuel pressure control valve (FPCV) control circuit low	FPCV circuit: high resistance FPCV circuit: short circuit to ground FPCV failure ECM failure	For FPCV tests, GO to Pinpoint Test G552275p7. Refer to the warranty policy and procedures manual if an ECM is suspect.
P009200	Fuel pressure control valve (FPCV) control circuit high	FPCV circuit: short circuit to power FPCV failure ECM failure	For FPCV tests, GO to Pinpoint Test G552275p7. Refer to the warranty policy and procedures manual if an ECM is suspect.
P018100	Fuel temperature sensor circuit range/performance	Fuel temperature sensor circuit: high resistance Fuel temperature sensor circuit: short circuit to ground Fuel temperature sensor circuit: short circuit to	For fuel temperature sensor and circuit tests, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.

		<p>power</p> <p>Fuel temperature sensor failure</p> <p>ECM failure</p>	
P018200	Fuel temperature sensor circuit low input	<p>Fuel temperature sensor circuit: high resistance</p> <p>Fuel temperature sensor circuit: short circuit to ground</p> <p>Fuel temperature sensor circuit: short circuit to power</p> <p>Fuel temperature sensor failure</p> <p>ECM failure</p>	<p>For fuel temperature sensor and circuit tests, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P018300	Fuel temperature sensor circuit high input	<p>Fuel temperature sensor circuit: high resistance</p> <p>Fuel temperature sensor circuit: short circuit to ground</p> <p>Fuel temperature sensor circuit: short circuit to power</p> <p>Fuel temperature sensor failure</p> <p>ECM failure</p>	<p>For fuel temperature sensor and circuit tests, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P018400	Fuel temperature sensor circuit intermittent	<p>Fuel temperature sensor circuit: high resistance</p> <p>Fuel temperature sensor circuit: short circuit to ground</p> <p>Fuel temperature sensor circuit: short circuit to power</p> <p>Fuel temperature sensor failure</p>	<p>For fuel temperature sensor and circuit tests, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

		ECM failure	
P019100	Fuel rail pressure (FRP) sensor circuit range/performance	FRP sensor circuit: high resistance FRP sensor circuit: short circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure ECM failure	For FRP sensor tests, GO to Pinpoint Test G552275p6. Refer to the warranty policy and procedures manual if an ECM is suspect.
P019200	Fuel rail pressure (FRP) sensor circuit low input	FRP sensor circuit: high resistance FRP sensor circuit: short circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure ECM failure	For FRP sensor tests, GO to Pinpoint Test G552275p6. Refer to the warranty policy and procedures manual if an ECM is suspect.
P019300	Fuel rail pressure (FRP) sensor circuit high input	FRP sensor circuit: high resistance FRP sensor circuit: short circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure ECM failure	For FRP sensor tests, GO to Pinpoint Test G552275p6. Refer to the warranty policy and procedures manual if an ECM is suspect.
P019400	Fuel rail pressure (FRP) sensor circuit intermittent/erratic	FRP sensor circuit: high resistance FRP sensor circuit: short circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure ECM failure	For FRP sensor tests, GO to Pinpoint Test G552275p6. Refer to the warranty policy and procedures manual if an ECM is suspect.

P020100	Fuel injector high-resistance, cylinder 1	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 1 fuel injector tests, GO to Pinpoint Test G552275p8.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020200	Fuel injector high-resistance, cylinder 2	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 2 fuel injector tests, GO to Pinpoint Test G552275p9.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020300	Fuel injector high-resistance, cylinder 3	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 3 fuel injector tests, GO to Pinpoint Test G552275p10.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020400	Fuel injector high-resistance, cylinder 4	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 4 fuel injector tests, GO to Pinpoint Test G552275p11.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

P020500	Fuel injector high-resistance, cylinder 5	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 5 fuel injector tests, GO to Pinpoint Test G552275p12.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020600	Fuel injector high-resistance, cylinder 6	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 6 fuel injector tests, GO to Pinpoint Test G552275p13.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020A00	Fuel injection timing, cylinder 1	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 1 fuel injector tests, GO to Pinpoint Test G552275p8.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020B00	Fuel injection timing, cylinder 2	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 2 fuel injector tests, GO to Pinpoint Test G552275p9.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

P020C00	Fuel injection timing, cylinder 3	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 3 fuel injector tests, GO to Pinpoint Test G552275p10.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020D00	Fuel injection timing, cylinder 4	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 4 fuel injector tests, GO to Pinpoint Test G552275p11.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020E00	Fuel injection timing, cylinder 5	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 5 fuel injector tests, GO to Pinpoint Test G552275p12.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020F00	Fuel injection timing, cylinder 6	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 6 fuel injector tests, GO to Pinpoint Test G552275p13.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

P026300	Fuel injector circuit, cylinder 1	Fuel injector circuit: range/performance Fuel injector failure	For cylinder 1 fuel injector tests, GO to Pinpoint Test G552275p8.
P026600	Fuel injector circuit, cylinder 2	Fuel injector circuit: range/performance Fuel injector failure	For cylinder 2 fuel injector tests, GO to Pinpoint Test G552275p9.
P026900	Fuel injector circuit, cylinder 3	Fuel injector circuit: range/performance Fuel injector failure	For cylinder 3 fuel injector tests, GO to Pinpoint Test G552275p10.
P027200	Fuel injector circuit, cylinder 4	Fuel injector circuit: range/performance Fuel injector failure	For cylinder 4 fuel injector tests, GO to Pinpoint Test G552275p11.
P027500	Fuel injector circuit, cylinder 5	Fuel injector circuit: range/performance Fuel injector failure	For cylinder 5 fuel injector tests, GO to Pinpoint Test G552275p12.
P027800	Fuel injector circuit, cylinder 6	Fuel injector circuit: range/performance Fuel injector failure	For cylinder 6 fuel injector tests, GO to Pinpoint Test G552275p13.
P062D00	Fuel injector driver circuit performance (right hand bank)	Injector(s) disconnected Injector circuit(s): high resistance, short circuit to ground, short circuit to power Injector failure ECM failure	Identify the fuel injector concerned from the DTC stored in the ECM. Refer to the relevant test for the code logged. Refer to the warranty policy and procedures manual if an ECM is suspect.
P062E00	Fuel injector driver circuit performance (left hand bank)	Injector(s) disconnected Injector circuit(s): high resistance, short circuit to ground, short circuit to power Injector failure ECM failure	Identify the fuel injector concerned from the DTC stored in the ECM. Refer to the relevant test for the code logged. Refer to the warranty policy and procedures manual if an ECM is suspect.
P120E00	Fuel rail pressure (FRP) sensor - excessive fuel	FRP sensor circuit: high resistance	For FRP sensor tests, GO to Pinpoint Test G552275p6. Refer to the warranty policy

	pressure variation	FRP sensor circuit: short circuit to ground FRP sensor failure ECM failure	and procedures manual if an ECM is suspect.
P120F00	Fuel rail pressure (FRP) regulator - fuel pressure low at start	FRP sensor circuit: high resistance FRP sensor circuit: short circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure Restricted fuel line Fuel pump failure ECM failure	For FRP sensor tests, GO to Pinpoint Test G552275p6. Refer to the warranty policy and procedures manual if an ECM is suspect.
P150A00	Fuel injector circuit range/performance cylinder 1	Fuel injector disconnected Fuel injector harness wiring: high resistance, short circuit to ground, short circuit to power Fuel injector failure ECM failure	For cylinder 1 fuel injector tests, GO to Pinpoint Test G552275p8. Refer to the warranty policy and procedures manual if an ECM is suspect.
P150B00	Fuel injector circuit range/performance cylinder 2	Fuel injector disconnected Fuel injector harness wiring: high resistance, short circuit to ground, short circuit to power Fuel injector failure ECM failure	For cylinder 2 fuel injector tests, GO to Pinpoint Test G552275p9. Refer to the warranty policy and procedures manual if an ECM is suspect.
P150C00	Fuel injector circuit range/performance cylinder 3	Fuel injector disconnected Fuel injector harness wiring: high resistance, short	For cylinder 3 fuel injector tests, GO to Pinpoint Test G552275p10. Refer to the warranty policy and procedures manual if an

		<p>circuit to ground, short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	ECM is suspect.
P155400	Fuel injector circuit range/performance cylinder 4	<p>Fuel injector disconnected</p> <p>Fuel injector harness wiring: high resistance, short circuit to ground, short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 4 fuel injector tests, GO to Pinpoint Test G552275p11.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P155500	Fuel injector circuit range/performance cylinder 5	<p>Fuel injector disconnected</p> <p>Fuel injector harness wiring: high resistance, short circuit to ground, short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 5 fuel injector tests, GO to Pinpoint Test G552275p12.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P155600	Fuel injector circuit range/performance cylinder 6	<p>Fuel injector disconnected</p> <p>Fuel injector harness wiring: high resistance, short circuit to ground, short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 6 fuel injector tests, GO to Pinpoint Test G552275p13.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P228800	Injector control pressure too high - fuel pressure control valve (FPCV) minimum limit reached	<p>Fuel injector control pressure: too high</p> <p>FPCV circuit fault</p> <p>FPCV failure</p> <p>Fuel pump module circuit: short circuit to power</p>	<p>For fuel pressure and fuel pump module circuit tests, Fuel Tank and Lines - 2.7L Diesel For FPCV and circuit tests, GO to Pinpoint Test G552275p7.</p> <p>For fuel injection pump, Fuel Injection Pump</p>

		Fuel pump module failure	
		Fuel injection pump failure	
P229000	Injector control pressure too low - fuel pressure control valve (FPCV) maximum limit reached	Fuel injector control pressure: too low Fuel line leak Fuel filter/system restriction FPCV circuit fault FPCV failure Fuel pump module circuit: short circuit to ground Fuel pump module failure Fuel injection pump failure	For fuel lines, fuel pressure and fuel pump module circuit tests, Fuel Tank and Lines - 2.7L Diesel For FPCV and circuit tests, GO to Pinpoint Test G552275p7. For fuel injection pump, Fuel Injection Pump
P229200	Injector control pressure erratic - fuel pressure control valve (FPCV) dynamic	Fuel injector control pressure: erratic FPCV circuit fault FPCV failure Fuel pump module circuit(s): high resistance, short circuit to ground, short circuit to power Fuel pump module failure Fuel injection pump failure	For fuel lines, fuel pressure and fuel pump module circuit tests, Fuel Tank and Lines - 2.7L Diesel For FPCV and circuit tests, GO to Pinpoint Test G552275p7. For fuel injection pump, Fuel Injection Pump

Pinpoint test



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow this instruction may result in personal injury.



CAUTION: It is essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or lines. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

NOTE:

If DTCs are recorded and a fault is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

PINPOINT TEST G552275p1 : CHECK FOR FUEL SYSTEM LEAKS

G552275t1 : CHECK FOR FUEL SYSTEM LEAKS

1. Start and run the engine for five minutes. 2. Key off. 3. Inspect the fuel lines, pump, etc, in the engine bay for cracks/damage. 4. Raise and support the vehicle.

Lifting 5. Inspect the fuel lines for cracks/damage. 6. Check the integrity of the joints in the supply and return lines between the fuel tank and the fuel pump. 7. Carefully check around the fuel pipes, injectors and pump for evidence of leakage. 8. If there is evidence of a significant leak, clean the engine and repeat the test.

Is there any evidence of leakage?

-> Yes

RECTIFY the leak as necessary. Test the system for normal operation.

-> No

CHECK for other possible causes for the customer concern.

PINPOINT TEST G552275p2 : CHECK THE FUEL PUMP MODULE FUNCTION

G552275t2 : CHECK THE FUEL PUMP MODULE FUNCTION

1. After thoroughly cleaning around the connections, disconnect the inlet pipe from the fuel filter. 2. Position a suitable container beneath the fuel filter inlet pipe to collect fuel. 3. Key on, engine off (the pump should run for a short period, depending on temperature, etc). 4. Check that fuel is pumped from the fuel filter inlet pipe.

Is fuel pumped from the fuel filter inlet pipe?

-> Yes

CHECK the drive belt to the fuel injection pump.

Fuel Injection Pump Belt Check for DTCs. Test the system for normal operation.

-> No

CHECK the fuel pump module and circuit,

Fuel Tank and Lines - 2.7L Diesel

PINPOINT TEST G552275p3 : CHECK FOR CONTAMINATED FUEL

G552275t3 : CHECK FOR UNUSUAL ODOURS FROM THE FUEL FILLER

1. Gather as much information as possible from the owner/driver regarding refuelling practices. 2. Remove the fuel filler cap and check for unusual odours.

Are there any unusual odours from the fuel filler neck?

-> Yes

DRAIN the fuel tank and refill with fresh fuel. Install a new fuel filter.

Fuel Filter - 2.7L Diesel (19.25.02) Test the vehicle for normal operation.

-> **No**

GO to Pinpoint Test G552275t4.

G552275t4 : CHECK FOR WATER IN THE FUEL

1. After thoroughly cleaning around the connections, disconnect the inlet pipe from the fuel filter. 2. Position a suitable clear container beneath the fuel filter inlet pipe to collect fuel. 3. Key on, engine off (the pump should run for a short period, depending on temperature, etc. It may be necessary to turn the ignition on and off more than once to obtain the desired amount of fuel). 4. Collect approximately one liter of fuel. 5. Allow the fuel to stand for at least one minute. 6. Without disturbing the fuel, check for separation of the fuel into layers (a significant amount of water in the fuel will result in a clear separation between the two fluids, with the water being at the bottom).

Does the fuel show clear separation?

-> **Yes**

DRAIN the fuel tank and refill with fresh fuel. Install a new fuel filter.

Fuel Filter - 2.7L Diesel (19.25.02) Test the vehicle for normal operation.

-> **No**

CHECK for other contaminants in the fuel.

PINPOINT TEST G552275p4 : CHECK FOR BLOCKED FUEL FILTER

G552275t5 : CHECK THE FLOW OF FUEL THROUGH THE FILTER

1. After thoroughly cleaning around the connections, disconnect the fuel filter outlet pipe to the fuel injection pump. 2.



WARNING: During this test, fuel will flow backwards through the fuel filter because of the fuel cooler circuit.

Position a suitable container beneath the fuel filter outlet to collect fuel. 3. Key on, engine off (the pump should run for a short period, depending on temperature, etc).

Is there an unrestricted flow of fuel through the filter?

-> **Yes**

CHECK for DTCs, check for another cause of customer complaint.

-> **No**

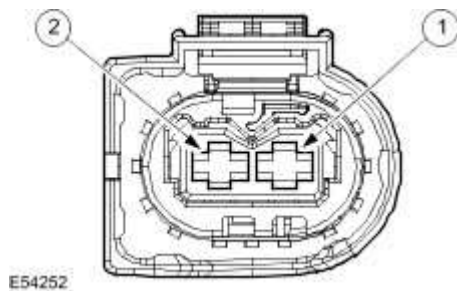
INSTALL a new fuel filter.

Fuel Filter - 2.7L Diesel (19.25.02) Test the vehicle for normal operation.

PINPOINT TEST G552275p5 : FUEL VOLUME CONTROL VALVE AND CIRCUIT

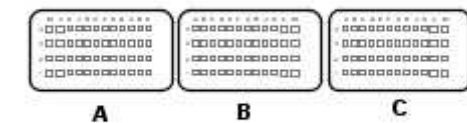
G552275t6 : CHECK FOR POWER TO THE FVCV

1.



Circuit	Pin
Power	01
Signal from ECM	02

2.



Circuit	Pin
Fuel volume control valve - signal	J4

3. Key off. 4. Disconnect the FVCV connector, C42. 5. Key on, engine off. 6. Measure the voltage between:

C42, harness side	Battery
-------------------	---------

Pin 01	Negative terminal
--------	-------------------

Is the voltage between 9 and 15 volts?

-> Yes

GO to Pinpoint Test G552275t12.

-> No

REPAIR the power circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t7 : CHECK THE FVCV CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C42, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t8.

-> No

GO to Pinpoint Test G552275t11.

G552275t8 : CHECK THE FVCV CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C42, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t9.

-> **No**

GO to Pinpoint Test G552275t12.

G552275t9 : CHECK THE FVCV CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C42, harness side	C100, harness side
Pin 02	J4

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G552275t10.

-> **No**

REPAIR the high-resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t10 : CHECK THE COMPONENT RESISTANCE

1. Measure the resistance between:

C42, component side	C42, component side
Pin 02	Pin 01

Is the resistance between 1.5 and 15 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - FVCV connector - FVCV - ECM connector - ECM

-> **No**

INSTALL a new fuel injection pump.

Fuel Injection Pump Clear any DTCs, test the system for normal operation.

G552275t11 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C42, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

Harness is OK. Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t12 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C42, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Harness is OK. Suspect: - ECM

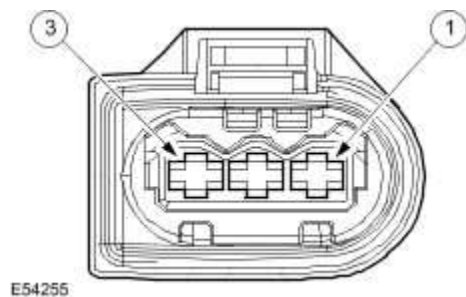
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p6 : FUEL RAIL PRESSURE (FRP) SENSOR AND CIRCUIT

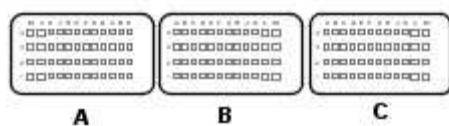
G552275t13 : CHECK THE FRP SENSOR RETURN CIRCUIT

1.



Circuit	Pin
Signal from ECM	01
Ground from ECM	02
Power from ECM	03

2.



E54251

Circuit	Pin
FRP sensor - signal	D1
FRP sensor - ground	E2
FRP sensor - power	D2

3. Key off. 4. Disconnect the FRP sensor connector, C30. 5. Key on, engine off. 6. Measure the resistance between:

C30, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552275t14.

-> No

GO to Pinpoint Test G552275t26.

G552275t14 : CHECK THE POWER SUPPLY TO THE FRP

1. Measure the voltage between:

C30, harness side	Battery
Pin 03	Negative terminal

Is the voltage between 4.8 and 5.2 volts?

-> Yes

GO to Pinpoint Test G552275t15.

-> No

GO to Pinpoint Test G552275t23.

G552275t15 : CHECK THE FRP SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C30, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t16.

-> No

GO to Pinpoint Test G552275t19.

G552275t16 : CHECK THE FRP SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C30, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t17.

-> **No**

GO to Pinpoint Test G552275t21.

G552275t17 : CHECK THE FRP SIGNAL CIRCUIT FOR SHORT CIRCUIT TO SENSOR POWER

1. Measure the resistance between:

C30, harness side	C30, harness side
Pin 01	Pin 03

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t18.

-> **No**

GO to Pinpoint Test G552275t22.

G552275t18 : CHECK THE FRP SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C30, harness side	C100, harness side
Pin 01	Pin D1

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - FRP connector - ECM connector - FRP - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t19 : CHECK FOR SIGNAL AND RETURN CIRCUITS SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C30, harness side	C30, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t20.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t20 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

C30, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t21 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C30, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t22 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C30, harness side	C30, harness side
Pin 01	Pin 03

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t23 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C30, harness side	Battery
Pin 03	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t24.

-> No

GO to Pinpoint Test G552275t29.

G552275t24 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C30, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t25.

-> **No**

GO to Pinpoint Test G552275t31.

G552275t25 : CHECK THE FRP 5 VOLT SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C30, harness side	C100, harness side
Pin 03	Pin D2

Is the resistance less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t26 : CHECK THE FRP SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C30, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t27.

-> **No**

GO to Pinpoint Test G552275t32.

G552275t27 : CHECK FOR 5 VOLT SUPPLY AND SIGNAL RETURN CIRCUITS SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C30, harness side	C30, harness side
Pin 03	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t28.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t28 : CHECK THE FRP SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

C30, harness side	C100, harness side
Pin 02	Pin E2

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t29 : CHECK FOR 5 VOLT SUPPLY AND SIGNAL RETURN CIRCUITS SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C30, harness side	C30, harness side
Pin 03	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t30.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t30 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

C30, harness side	Battery
Pin 03	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t31 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C30, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t32 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C30, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

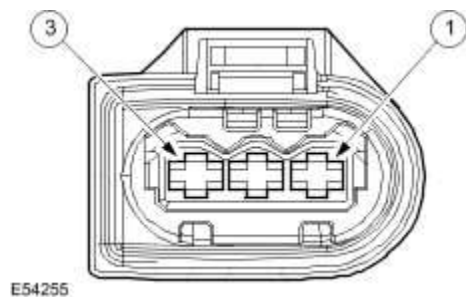
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p7 : FUEL PRESSURE CONTROL VALVE (FPCV) AND CIRCUIT

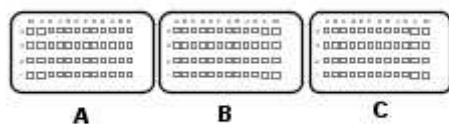
G552275t33 : CHECK THE POWER SUPPLY TO THE FPCV

1.



Circuit	Pin
Power	01
Signal from ECM	02

2.



E54251

Circuit	Pin
Fuel pressure control valve - signal	K3

3. Key off. 4. Disconnect the FPCV connector, C43. 5. Key on, engine off. 6. Measure the voltage between:

C43, harness side	Battery
Pin 01	Negative terminal

Is the voltage between 9 and 15 volts?

-> Yes

GO to Pinpoint Test G552275t34.

-> **No**

No supply to the FPCV circuit. Check and repair the circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t34 : CHECK THE FPCV CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C43, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t35.

-> **No**

GO to Pinpoint Test G552275t38.

G552275t35 : CHECK THE FPCV CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C43, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t36.

-> **No**

GO to Pinpoint Test G552275t39.

G552275t36 : CHECK THE FPCV CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C43, harness side	C100, harness side
Pin 02	Pin K3

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552275t37.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t37 : CHECK THE COMPONENT RESISTANCE

1. Measure the resistance between:

C43, component side	C43, component side
Pin 01	Pin 02

Is the resistance between 0 and 5.5 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - FPCV connector - FPCV - ECM connector - ECM

-> No

INSTALL a new fuel injection pump.

Fuel Injection Pump Clear any DTCs, test the system for normal operation.

G552275t38 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C43, harness side	Battery
--------------------------	----------------

Pin 02	Negative terminal
--------	-------------------

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t39 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C43, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

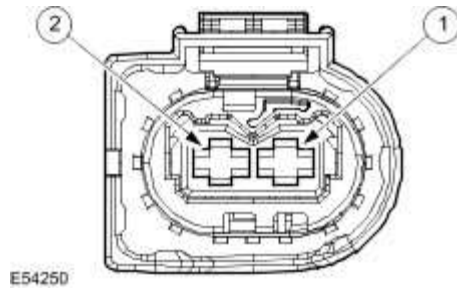
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p8 : FUEL INJECTOR AND CIRCUIT, CYLINDER 1

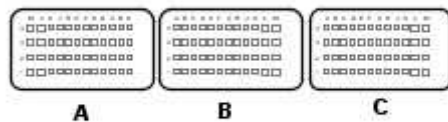
G552275t40 : CHECK THE COMPONENT RESISTANCE

1.



Circuit	Pin
Fuel injector, cylinder 1 - ground	01
Fuel injector, cylinder 1 - control	02

2.



Circuit	Pin
Fuel injector, cylinder 1 - ground	L3
Fuel injector, cylinder 1 - control	M3

3. Key off. 4. Disconnect the fuel injector 1 (INJ0) connector, C44. 5. Measure the resistance between:

C44, component side	C44, component side
Pin 02	Pin 01

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t41.

-> **No**

INSTALL a new fuel injector.

Fuel Injector (18.10.01) Clear any DTCs, test the system for normal operation.

G552275t41 : CHECK THE COMBINED FUEL INJECTOR AND HARNESS RESISTANCE

1. Key off. 2. Connect the fuel injector 1 (INJ0) connector, C44. 3. Disconnect the ECM connector, C101. 4. Measure the resistance between:

C101, harness side	C101, harness side
Pin M3	Pin L3

Is the resistance between 180 and 220 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t44.

-> **No**

GO to Pinpoint Test G552275t42.

G552275t42 : CHECK FOR SIGNAL AND RETURN CIRCUITS SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin M3	Pin L3

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t43.

-> **No**

GO to Pinpoint Test G552275t48.

G552275t43 : CHECK THE FUEL INJECTOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel injector 1 (INJ0) connector, C44. 2. Measure the resistance between:

C44, harness side	C101, harness side
Pin 02	Pin M3
Pin 01	Pin L3

Are the resistances less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 1 (INJ0) connector - ECM connector - Fuel injector 1 (INJ0)

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t44 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

C101, harness side	Battery
Pin M3	Negative terminal
Pin L3	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t46.

-> No

GO to Pinpoint Test G552275t45.

G552275t45 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 1 (INJ0) connector, C44. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	Battery
Pin M3	Negative terminal
Pin L3	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 1 (INJ0)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t46 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C101, harness side	Battery
Pin M3	Positive terminal
Pin L3	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 1 (INJ0) connector - Fuel injector 1 (INJ0) - ECM connector - ECM

-> No

GO to Pinpoint Test G552275t47.

G552275t47 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 1 (INJ0) connector, C44. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	Battery
Pin M3	Positive terminal
Pin L3	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 1 (INJ0)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t48 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 1 (INJ0) connector, C44. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	C101, harness side
Pin M3	Pin L3

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 1 (INJ0)

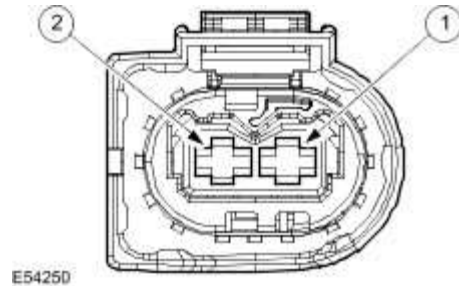
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p9 : FUEL INJECTOR AND CIRCUIT, CYLINDER 2

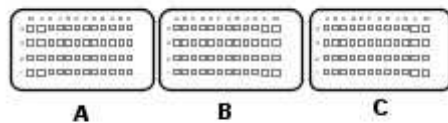
G552275t49 : CHECK THE COMPONENT RESISTANCE

1.



Circuit	Pin
Fuel injector, cylinder 2 - ground	01
Fuel injector, cylinder 2 - control	02

2.



Circuit	Pin
Fuel injector, cylinder 2 - ground	L2
Fuel injector, cylinder 2 - control	M2

3. Key off. 4. Disconnect the fuel injector 2 (INJ2) connector, C46. 5. Measure the resistance between:

C46, component side	C46, component side
Pin 02	Pin 01

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t50.

-> No

INSTALL a new fuel injector.

Fuel Injector (18.10.01) Clear any DTCs, test the system for normal operation.

G552275t50 : CHECK THE COMBINED FUEL INJECTOR AND HARNESS RESISTANCE

1. Key off. 2. Connect the fuel injector 2 (INJ2) connector, C46 connected. 3. Disconnect the ECM connector, C101. 4. Measure the resistance between:

C101, harness side	C101, harness side
Pin M2	Pin L2

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t53.

-> No

GO to Pinpoint Test G552275t51.

G552275t51 : CHECK for short CIRCUIT BETWEEN THE SIGNAL AND RETURN CIRCUITS

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin M2	Pin L2

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t52.

-> **No**

GO to Pinpoint Test G552275t57.

G552275t52 : CHECK THE FUEL INJECTOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel injector 2 (INJ2) connector, C46. 2. Measure the resistance between:

C46, harness side	C101, harness side
Pin 02	Pin M2
Pin 01	Pin L2

Are the resistances less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 2 (INJ2) connector - ECM connector - Fuel injector 2 (INJ2)

-> **No**

REPAIR the high-resistance. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t53 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

C101, harness side	Battery
Pin M2	Negative terminal
Pin L2	Negative terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t55.

-> **No**

GO to Pinpoint Test G552275t54.

G552275t54 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 2 (INJ2) connector, C46. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	Battery
Pin M2	Negative terminal
Pin L2	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 2 (INJ2)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t55 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C101, harness side	Battery
Pin M2	Positive terminal
Pin L2	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 2 (INJ2) connector - Fuel injector 2 (INJ2) - ECM connector - ECM

-> **No**

GO to Pinpoint Test G552275t56.

G552275t56 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 2 (INJ2) connector, C46. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	Battery
Pin M2	Positive terminal
Pin L2	Positive terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 2 (INJ2)

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t57 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 2 (INJ2) connector, C46. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	C101, harness side
Pin M2	Pin L2

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 2 (INJ2)

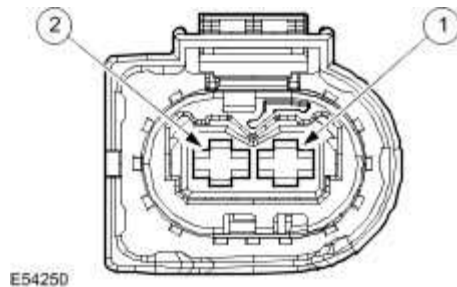
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p10 : FUEL INJECTOR AND CIRCUIT, CYLINDER 3

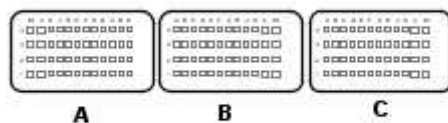
G552275t58 : CHECK THE COMPONENT RESISTANCE

1.



Circuit	Pin
Fuel injector, cylinder 2 - ground	01
Fuel injector, cylinder 2 - control	02

2.



Circuit	Pin
Fuel injector, cylinder 3 - ground	L4
Fuel injector, cylinder 3 - control	M4

3. Key off. 4. Disconnect the fuel injector 3 (INJ4) connector, C48. 5. Measure the resistance between:

C48, component side	C48, component side
---------------------	---------------------

Pin 02	Pin 01
--------	--------

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t59.

-> No

INSTALL a new fuel injector.

Fuel Injector (18.10.01) Clear any DTCs, test the system for normal operation.

G552275t59 : CHECK THE COMBINED FUEL INJECTOR AND HARNESS RESISTANCE

1. Key off. 2. Connect the fuel injector 3 (INJ4) connector, C48. 3. Disconnect the ECM connector, C101. 4. Measure the resistance between:

C101, harness side	C101, harness side
Pin M4	Pin L4

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t62.

-> No

GO to Pinpoint Test G552275t60.

G552275t60 : CHECK FOR SIGNAL AND RETURN CIRCUITS SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin M4	Pin L4

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t61.

-> **No**

GO to Pinpoint Test G552275t66.

G552275t61 : CHECK THE FUEL INJECTOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel injector 3 (INJ4) connector, C48. 2. Measure the resistance between:

C48, harness side	C101, harness side
Pin 02	Pin M4
Pin 01	Pin L4

Are the resistances less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 3 (INJ4) connector - ECM connector - Fuel injector 3 (INJ4)

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t62 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

C101, harness side	Battery
Pin M4	Negative terminal
Pin L4	Negative terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t64.

-> **No**

GO to Pinpoint Test G552275t63.

G552275t63 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 3 (INJ4) connector, C48. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	Battery
Pin M4	Negative terminal
Pin L4	Negative terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 3 (INJ4)

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t64 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C101, harness side	Battery
Pin M4	Positive terminal
Pin L4	Positive terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other

physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 3 (INJ4) connector - Fuel injector 3 (INJ4) - ECM connector - ECM

-> **No**

GO to Pinpoint Test G552275t65.

G552275t65 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 3 (INJ4) connector, C48. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	Battery
Pin M4	Positive terminal
Pin L4	Positive terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 3 (INJ4)

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t66 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 3 (INJ4) connector, C48. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	C101, harness side
Pin M4	Pin L4

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other

physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 3 (INJ4)

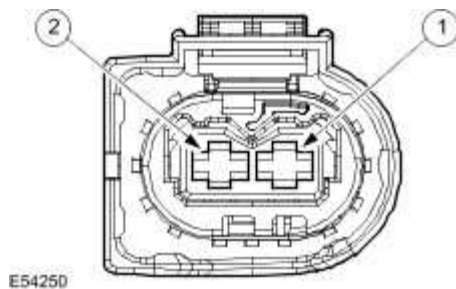
-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p11 : FUEL INJECTOR AND CIRCUIT, CYLINDER 4

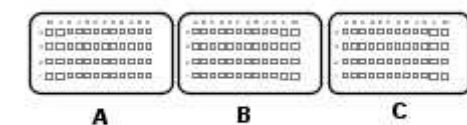
G552275t67 : CHECK THE COMPONENT RESISTANCE

1.



Circuit	Pin
Fuel injector, cylinder 4 - ground	01
Fuel injector, cylinder 4 - control	02

2.



Circuit	Pin
Fuel injector, cylinder 4 - ground	L2
Fuel injector, cylinder 4 - control	L1

3. Key off. 4. Disconnect the fuel injector 4 (INJ1) connector, C45. 5. Measure the resistance between:

C45, component side	C45, component side
Pin 02	Pin 01

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t68.

-> No

INSTALL a new fuel injector.

Fuel Injector (18.10.01) Clear any DTCs, test the system for normal operation.

G552275t68 : CHECK THE COMBINED FUEL INJECTOR AND HARNESS RESISTANCE

1. Key off. 2. Connect the fuel injector 4 (INJ1) connector, C45. 3. Disconnect the ECM connector, C100. 4. Measure the resistance between:

C100, harness side	C100, harness side
Pin L1	Pin L2

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t71.

-> No

GO to Pinpoint Test G552275t69.

G552275t69 : CHECK FOR SIGNAL AND RETURN CIRCUITS SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

C100, harness side	C100, harness side
Pin L1	Pin L2

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t70.

-> No

GO to Pinpoint Test G552275t75.

G552275t70 : CHECK THE FUEL INJECTOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel injector 4 (INJ1) connector, C45. 2. Measure the resistance between:

C45, harness side	C100, harness side
Pin 02	Pin L1
Pin 01	Pin L2

Are the resistances less than 10 ohm?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 4 (INJ1) connector - ECM connector - Fuel injector 4 (INJ1)

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t71 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

C100, harness side	Battery
Pin L1	Negative terminal
Pin L2	Negative terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t73.

-> **No**

GO to Pinpoint Test G552275t72.

G552275t72 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 4 (INJ1) connector, C45. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	Battery
Pin L1	Negative terminal
Pin L2	Negative terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 4 (INJ1)

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t73 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C100, harness side	Battery
Pin L1	Positive terminal
Pin L2	Positive terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 4 (INJ1) connector - Fuel Injector 4 (INJ1) - ECM connector - ECM

-> **No**

GO to Pinpoint Test G552275t74.

G552275t74 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 4 (INJ1) connector, C45. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	Battery
Pin L1	Positive terminal
Pin L2	Positive terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 4 (INJ1)

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t75 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 4 (INJ1) connector, C45. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	C100, harness side
Pin L1	Pin L2

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 4 (INJ1)

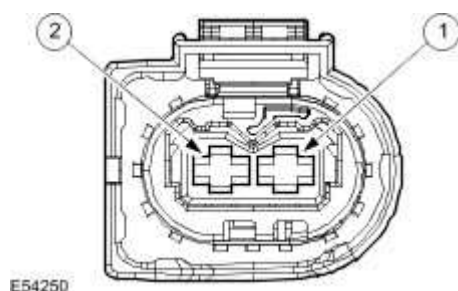
-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p12 : FUEL INJECTOR AND CIRCUIT, CYLINDER 5

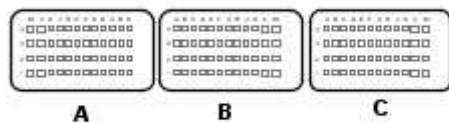
G552275t76 : CHECK THE COMPONENT RESISTANCE

1.



Circuit	Pin
Fuel injector, cylinder 5 - ground	01
Fuel injector, cylinder 5 - control	02

2.



E54251

Circuit	Pin
Fuel injector, cylinder 5 - ground	L3

Fuel injector, cylinder 5 - control	M1
-------------------------------------	----

3. Key off. 4. Disconnect the fuel injector 5 (INJ3) connector, C47. 5. Measure the resistance between:

C47, component side	C47, component side
Pin 02	Pin 01

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t77.

-> No

INSTALL a new fuel injector.

Fuel Injector (18.10.01) Clear any DTCs, test the system for normal operation.

G552275t77 : CHECK THE COMBINED FUEL INJECTOR AND HARNESS RESISTANCE

1. Key off. 2. Connect the fuel injector 5 (INJ3) connector, C47. 3. Disconnect the ECM connector, C100. 4. Measure the resistance between:

C100, harness side	C100, harness side
Pin M1	Pin L3

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t80.

-> No

GO to Pinpoint Test G552275t78.

G552275t78 : CHECK FOR SHORT CIRCUIT BETWEEN THE SIGNAL AND RETURN CIRCUITS

1. Measure the resistance between:

C100, harness side	C100, harness side
Pin M1	Pin L3

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t79.

-> No

GO to Pinpoint Test G552275t84.

G552275t79 : CHECK THE FUEL INJECTOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel injector 5 (INJ3) connector, C47. 2. Measure the resistance between:

C47, harness side	C100, harness side
Pin 02	Pin M1
Pin 01	Pin L3

Are the resistances less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 5 (INJ3) connector - ECM connector - Fuel injector 5 (INJ3)

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t80 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

C100, harness side	Battery
Pin M1	Negative terminal

Pin L3	Negative terminal
--------	-------------------

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t82.

-> No

GO to Pinpoint Test G552275t81.

G552275t81 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 5 (INJ3) connector, C47. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	Battery
Pin M1	Negative terminal
Pin L3	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 5 (INJ3)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t82 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C100, harness side	Battery
Pin M1	Positive terminal

Pin L3	Positive terminal
--------	-------------------

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 5 (INJ3) connector - Fuel injector 5 (INJ3) - ECM connector - ECM

-> No

GO to Pinpoint Test G552275t83.

G552275t83 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 5 (INJ3) connector, C47. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	Battery
Pin M1	Positive terminal
Pin L3	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 5 (INJ3)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t84 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 5 (INJ3) connector, C47. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	C100, harness side
---------------------------	---------------------------

Pin M1	Pin L3
--------	--------

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 5 (INJ3)

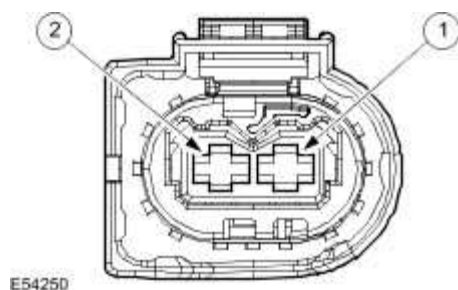
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p13 : FUEL INJECTOR AND CIRCUIT, CYLINDER 6

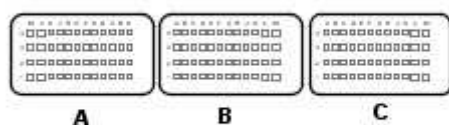
G552275t85 : CHECK THE COMPONENT RESISTANCE

1.



Circuit	Pin
Fuel injector, cylinder 6 - ground	01
Fuel injector, cylinder 6 - control	02

2.



E54251

Circuit	Pin
Fuel injector, cylinder 6 - ground	M3
Fuel injector, cylinder 6 - control	M2

3. Key off. 4. Disconnect the fuel injector 6 (INJ5) connector, C49. 5. Measure the resistance between:

C49, component side	C49, component side
Pin 02	Pin 01

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t86.

-> No

INSTALL a new fuel injector.

Fuel Injector (18.10.01) Clear any DTCs, test the system for normal operation.

G552275t86 : CHECK THE COMBINED FUEL INJECTOR AND HARNESS RESISTANCE

1. Key off. 2. Connect the fuel injector 6 (INJ5) connector, C49. 3. Disconnect the ECM connector, C100. 4. Measure the resistance between:

C100, harness side	C100, harness side
Pin M2	Pin M3

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t89.

-> No

GO to Pinpoint Test G552275t87.

G552275t87 : CHECK FOR SHORT CIRCUIT BETWEEN THE SIGNAL AND RETURN CIRCUITS

1. Measure the resistance between:

C100, harness side	C100, harness side
Pin M2	Pin M3

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t88.

-> No

GO to Pinpoint Test G552275t93.

G552275t88 : CHECK THE FUEL INJECTOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel injector 6 (INJ5) connector, C49. 2. Measure the resistance between:

C49, harness side	C100, harness side
Pin 02	Pin M2
Pin 01	Pin M3

Are the resistances less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 6 (INJ5) connector - ECM connector - Fuel injector 6 (INJ5)

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t89 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

C100, harness side	Battery
Pin M2	Negative terminal
Pin M3	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t91.

-> No

GO to Pinpoint Test G552275t90.

G552275t90 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR the Fuel injector

1. Key off. 2. Disconnect the fuel injector 6 (INJ5) connector, C49. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	Battery
Pin M2	Negative terminal
Pin M3	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 6 (INJ5)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t91 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C100, harness side	Battery
Pin M2	Positive terminal
Pin M3	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 6 (INJ5) connector - Fuel injector 6 (INJ5) - ECM connector - ECM

-> No

GO to Pinpoint Test G552275t92.

G552275t92 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 6 (INJ5) connector, C49. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	Battery
Pin M2	Positive terminal
Pin M3	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 6 (INJ5)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t93 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 6 (INJ5) connector, C49. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	C100, harness side
Pin M2	Pin M3

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 6 (INJ5)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

Fuel Charging and Controls

Principle of operation

Common rail diesel

The 2.7L fuel injection system is a common-rail design, running at the high-pressures (up to 1,650 bar or 23,930 lb/in²) typical of such systems.

The fuel is drawn from the fuel tank by an electric fuel pump module and delivered to the transfer pump side of a fuel injection pump driven by the engine. For additional information on the fuel injection pump,

Fuel Charging and Controls

The fuel volume control valve (FVCV) regulates the amount of fuel supplied to the high-pressure side of the fuel injection pump, while the fuel pressure control valve (FPCV) regulates the pressure.

The high-pressure fuel is delivered to the fuel rail where it is stored, ready for use by the fuel injectors.

The fuel injectors are Piezo type, and are controlled by the engine control module (ECM) from inputs from the engine management sensors.

The fuel injectors operate in stages, giving a pilot injection before the main injection to reduce detonation noise and help improve the efficiency of the engine.

For additional information,
Fuel Charging and Controls

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

Inspection and Verification



WARNING: Do NOT carry out any work on the fuel system with the engine running. The fuel pressure within the system can be as high as 1650 bar (23,930 lb/in²). Failure to follow this instruction may result in personal injury.



WARNING: Eye protection must be worn at all times when working on or near any fuel

related components. Failure to follow this instruction may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow this instruction may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. This should be done after the engine has been run, but with the engine switched OFF. Failure to follow this instruction may result in personal injury.



WARNING: If taken internally, DO NOT induce vomiting. Seek immediate medical attention. Failure to follow this instruction may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention. Failure to follow this instruction may result in personal injury.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention. Failure to follow this instruction may result in personal injury.



CAUTION: Before disconnecting any part of the system, it is imperative that all dust, dirt and debris is removed from around components to prevent ingress of foreign matter into the fuel system. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: The fuel pipes between the injectors and the rail must be discarded after each use, and new pipes installed. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: It is essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or lines. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure that the workshop area in which the vehicle is being worked on is as clean and dust-free as possible. Areas in which work on clutches, brakes or where welding or machining are carried out are not suitable in view of the risk of contamination to the fuel system. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure that any protective clothing worn is clean and made from lint-free non-flocking material. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure that any protective gloves worn are new and are of the non-powdered latex type. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure that clean, non-plated tools are used. Clean tools using a new brush that will not lose its bristles and fresh cleaning fluid prior to starting work on the vehicle. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Use a steel-topped work bench and cover it with clean, lint-free, non-flocking material. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

This section contains references to Parameter Identifiers (PIDs). Where the Jaguar approved diagnostic system is not available, a scantool may be used to access these PIDs, all of which give information, and some of which can be used to both read information and to activate components. The format of the information may vary, depending on the tool used.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

NOTE:

If diagnostic trouble codes (DTCs) are recorded and the symptom is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

- 1 . Verify the customer concern.
- 2 . Confirm which, if any, warning lights and/or messages were displayed on the instrument cluster.
- 3 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Fuel level	Glow plug indicator
Contaminated fuel	Inertia fuel shutoff (IFS) switch
Fuel supply line(s)	Fuel pump module
Fuel return line(s)	Sensor(s)
High-pressure fuel supply line(s)	Engine control module (ECM)
Fuel tank filler pipe	Fuel volume control valve (FVCV)

Fuel leak(s)	Fuel pressure control valve (FPCV)
Fuel tank	Fuel rail pressure (FRP) sensor
Fuel filler cap	Fuel temperature sensor
Fuel filter	Fuel injector(s)
Push connect fittings	EGR system
Fuel rail	
Fuel injection pump	
Exhaust gas recirculation (EGR) system	

4 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

5 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC index, or the symptom chart if no DTCs are set.

Symptom Chart

Symptom	Possible source	Action
Engine cranks, but does not start	IFS switch	Check that the inertia switch has not tripped.
	Low/contaminated fuel	Check the fuel level/condition, GO to Pinpoint Test G552275p3.
	Air ingress	Check the low pressure circuit for leaks/damage,
	Low pressure circuit fault	Fuel Tank and Lines - 2.7L Diesel Check the fuel pump module operation, GO to Pinpoint Test G552275p2.
	Fuel pump module fault	Check the fuel filter, GO to Pinpoint Test G552275p4.
	Blocked fuel filter	Check the FPCV and FPCV, GO to Pinpoint Test G552275p5.
	FVCV blocked/contaminated	GO to Pinpoint Test G552275p7.
	FPCV blocked/contaminated	Check the fuel injection pump,
	Fuel injection pump failure	Fuel Injection Pump For CKP sensor circuit tests,
	Crankshaft position (CKP) sensor	Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
	ECM fault	

Difficult to start	<p>Low/Contaminated fuel</p> <p>Fuel pump module fault</p> <p>Air ingress</p> <p>Low pressure circuit fault</p> <p>Blocked fuel filter</p> <p>FVCV blocked/contaminated</p> <p>FPCV blocked/contaminated</p> <p>Low pressure circuit fault</p> <p>EGR valve(s) fault</p>	<p>Check the fuel level/condition, GO to Pinpoint Test G552275p3.</p> <p>Check the fuel pump module operation, GO to Pinpoint Test G552275p2.</p> <p>Check the low pressure circuit for leaks/damage,</p> <p>Fuel Tank and Lines - 2.7L Diesel Check the fuel filter, GO to Pinpoint Test G552275p4.</p> <p>Check the FVCV and FPCV, GO to Pinpoint Test G552275p5.</p> <p>GO to Pinpoint Test G552275p7.</p> <p>For EGR tests,</p> <p>Engine Emission Control</p>
Rough idle	<p>Low/Contaminated fuel</p> <p>Air ingress</p> <p>Low pressure circuit fault</p> <p>Blocked fuel filter</p> <p>FVCV blocked/contaminated</p> <p>FPCV blocked/contaminated</p> <p>EGR valve(s) fault</p>	<p>Check the fuel level/condition, GO to Pinpoint Test G552275p3.</p> <p>Check the low pressure circuit for leaks/damage,</p> <p>Fuel Tank and Lines - 2.7L Diesel Check the fuel filter, GO to Pinpoint Test G552275p4.</p> <p>Check the FVCV and FPCV, GO to Pinpoint Test G552275p5.</p> <p>GO to Pinpoint Test G552275p7.</p> <p>For EGR tests,</p> <p>Engine Emission Control</p>
Lack of power when accelerating	<p>Air intake circuit fault</p> <p>Catalyst converter blocked</p> <p>Low fuel pressure</p> <p>EGR valve(s) fault</p> <p>Turbocharger(s) fault</p>	<p>Check the air intake circuit,</p> <p>Intake Air Distribution and Filtering Check for a blocked catalytic converter,</p> <p>Exhaust System Check the fuel pressure PID, GO to Pinpoint Test G552275p6.</p> <p>For EGR tests,</p> <p>Engine Emission Control For turbocharger tests,</p> <p>Turbocharger</p>
Engine stops/stalls	<p>Low/Contaminated fuel</p> <p>Air ingress</p> <p>Low pressure circuit fault</p> <p>FVCV blocked/contaminated</p>	<p>Check the fuel level/condition, GO to Pinpoint Test G552275p3.</p> <p>Check the low pressure circuit for leaks/damage,</p> <p>Fuel Tank and Lines - 2.7L Diesel Check the FVCV and FPCV, GO to Pinpoint Test G552275p5.</p>

	<p>FPCV blocked/contaminated</p> <p>High pressure fuel leak</p> <p>EGR valve(s) fault</p>	<p>GO to Pinpoint Test G552275p7.</p> <p>Check for fuel system leaks, GO to Pinpoint Test G552275p1.</p> <p>For EGR tests, Engine Emission Control</p>
Engine judders	<p>Low/Contaminated fuel</p> <p>Air ingress</p> <p>Low pressure circuit fault</p> <p>Fuel metering valve blocked/contaminated</p> <p>FVCV blocked/contaminated</p> <p>FPCV blocked/contaminated</p> <p>High pressure fuel leak</p> <p>Fuel injection pump fault</p>	<p>Check the fuel level/condition, GO to Pinpoint Test G552275p3.</p> <p>Check the low pressure circuit for leaks/damage, Fuel Tank and Lines - 2.7L Diesel Check the FVCV and FPCV, GO to Pinpoint Test G552275p5.</p> <p>GO to Pinpoint Test G552275p7.</p> <p>Check for fuel system leaks, GO to Pinpoint Test G552275p1.</p> <p>Check the fuel injection pump, Fuel Injection Pump</p>
Excessive fuel consumption	<p>Low pressure circuit fault</p> <p>FVCV blocked/contaminated</p> <p>FPCV blocked/contaminated</p> <p>Fuel temperature sensor leak</p> <p>High pressure fuel leak</p> <p>Injector(s) failure</p> <p>EGR valve(s) fault</p>	<p>Check the low pressure circuit for leaks/damage, Fuel Tank and Lines - 2.7L Diesel Check the FVCV and FPCV, GO to Pinpoint Test G552275p5.</p> <p>GO to Pinpoint Test G552275p7.</p> <p>Check the fuel temperature sensor, fuel injection pump, etc for leaks, GO to Pinpoint Test G552275p1.</p> <p>Check for injector DTCs. For EGR tests, Engine Emission Control</p>

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of powertrain DTCs,
Electronic Engine Controls

DTC	Condition	Possible source	Action
P000100	Fuel volume control valve (FVCV) control circuit open	FVCV circuit: high resistance FVCV circuit: short circuit to ground FVCV failure ECM failure	For FVCV tests, GO to Pinpoint Test G552275p5. Refer to the warranty policy and procedures manual if an ECM is suspect.
P000200	Fuel volume control valve (FVCV) circuit range/performance	FVCV circuit: high resistance FVCV circuit: short circuit to ground FVCV circuit: short circuit to power FVCV failure ECM failure	For FVCV tests, GO to Pinpoint Test G552275p5. Refer to the warranty policy and procedures manual if an ECM is suspect.
P000300	Fuel volume control valve (FVCV) control circuit low	FVCV circuit: high resistance FVCV circuit: short circuit to ground FVCV failure ECM failure	For FVCV tests, GO to Pinpoint Test G552275p5. Refer to the warranty policy and procedures manual if an ECM is suspect.
P000400	Fuel volume control valve (FVCV) control circuit high	FVCV circuit: short circuit to power FVCV failure ECM failure	For FVCV tests, GO to Pinpoint Test G552275p5. Refer to the warranty policy and procedures manual if an ECM is suspect.
P008700	Fuel rail/system pressure too low	Pressure too low Fuel rail pressure (FRP) sensor circuit failure	For FRP tests, GO to Pinpoint Test G552275p6.

		Fuel rail pressure (FRP) sensor failure	
P008800	Fuel rail/system pressure too high	Pressure too high Fuel rail pressure (FRP) sensor circuit failure Fuel rail pressure (FRP) sensor failure	For FRP tests, GO to Pinpoint Test G552275p6.
P009000	Fuel pressure control valve (FPCV) control circuit open	FPCV circuit: high resistance FPCV circuit: short circuit to ground FPCV failure ECM failure	For FPCV tests, GO to Pinpoint Test G552275p7. Refer to the warranty policy and procedures manual if an ECM is suspect.
P009100	Fuel pressure control valve (FPCV) control circuit low	FPCV circuit: high resistance FPCV circuit: short circuit to ground FPCV failure ECM failure	For FPCV tests, GO to Pinpoint Test G552275p7. Refer to the warranty policy and procedures manual if an ECM is suspect.
P009200	Fuel pressure control valve (FPCV) control circuit high	FPCV circuit: short circuit to power FPCV failure ECM failure	For FPCV tests, GO to Pinpoint Test G552275p7. Refer to the warranty policy and procedures manual if an ECM is suspect.
P018100	Fuel temperature sensor circuit range/performance	Fuel temperature sensor circuit: high resistance Fuel temperature sensor circuit: short circuit to ground Fuel temperature sensor circuit: short circuit to power Fuel temperature sensor failure ECM failure	For fuel temperature sensor and circuit tests, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.

P018200	Fuel temperature sensor circuit low input	<p>Fuel temperature sensor circuit: high resistance</p> <p>Fuel temperature sensor circuit: short circuit to ground</p> <p>Fuel temperature sensor circuit: short circuit to power</p> <p>Fuel temperature sensor failure</p> <p>ECM failure</p>	<p>For fuel temperature sensor and circuit tests, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P018300	Fuel temperature sensor circuit high input	<p>Fuel temperature sensor circuit: high resistance</p> <p>Fuel temperature sensor circuit: short circuit to ground</p> <p>Fuel temperature sensor circuit: short circuit to power</p> <p>Fuel temperature sensor failure</p> <p>ECM failure</p>	<p>For fuel temperature sensor and circuit tests, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P018400	Fuel temperature sensor circuit intermittent	<p>Fuel temperature sensor circuit: high resistance</p> <p>Fuel temperature sensor circuit: short circuit to ground</p> <p>Fuel temperature sensor circuit: short circuit to power</p> <p>Fuel temperature sensor failure</p> <p>ECM failure</p>	<p>For fuel temperature sensor and circuit tests, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P019100	Fuel rail pressure (FRP) sensor circuit range/performance	<p>FRP sensor circuit: high resistance</p> <p>FRP sensor circuit: short</p>	<p>For FRP sensor tests, GO to Pinpoint Test G552275p6. Refer to the warranty policy and procedures manual if an</p>

		circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure ECM failure	ECM is suspect.
P019200	Fuel rail pressure (FRP) sensor circuit low input	FRP sensor circuit: high resistance FRP sensor circuit: short circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure ECM failure	For FRP sensor tests, GO to Pinpoint Test G552275p6. Refer to the warranty policy and procedures manual if an ECM is suspect.
P019300	Fuel rail pressure (FRP) sensor circuit high input	FRP sensor circuit: high resistance FRP sensor circuit: short circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure ECM failure	For FRP sensor tests, GO to Pinpoint Test G552275p6. Refer to the warranty policy and procedures manual if an ECM is suspect.
P019400	Fuel rail pressure (FRP) sensor circuit intermittent/erratic	FRP sensor circuit: high resistance FRP sensor circuit: short circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure ECM failure	For FRP sensor tests, GO to Pinpoint Test G552275p6. Refer to the warranty policy and procedures manual if an ECM is suspect.
P020100	Fuel injector high-resistance, cylinder 1	Fuel injector circuit: high resistance Fuel injector circuit: short	For cylinder 1 fuel injector tests, GO to Pinpoint Test G552275p8. Refer to the warranty policy

		<p>circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	and procedures manual if an ECM is suspect.
P020200	Fuel injector high-resistance, cylinder 2	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 2 fuel injector tests, GO to Pinpoint Test G552275p9.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020300	Fuel injector high-resistance, cylinder 3	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 3 fuel injector tests, GO to Pinpoint Test G552275p10.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020400	Fuel injector high-resistance, cylinder 4	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 4 fuel injector tests, GO to Pinpoint Test G552275p11.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020500	Fuel injector high-resistance, cylinder 5	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short</p>	<p>For cylinder 5 fuel injector tests, GO to Pinpoint Test G552275p12.</p> <p>Refer to the warranty policy</p>

		<p>circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	and procedures manual if an ECM is suspect.
P020600	Fuel injector high-resistance, cylinder 6	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 6 fuel injector tests, GO to Pinpoint Test G552275p13.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020A00	Fuel injection timing, cylinder 1	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 1 fuel injector tests, GO to Pinpoint Test G552275p8.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020B00	Fuel injection timing, cylinder 2	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 2 fuel injector tests, GO to Pinpoint Test G552275p9.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020C00	Fuel injection timing, cylinder 3	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short</p>	<p>For cylinder 3 fuel injector tests, GO to Pinpoint Test G552275p10.</p> <p>Refer to the warranty policy</p>

		<p>circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	and procedures manual if an ECM is suspect.
P020D00	Fuel injection timing, cylinder 4	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 4 fuel injector tests, GO to Pinpoint Test G552275p11.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020E00	Fuel injection timing, cylinder 5	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 5 fuel injector tests, GO to Pinpoint Test G552275p12.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P020F00	Fuel injection timing, cylinder 6	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For cylinder 6 fuel injector tests, GO to Pinpoint Test G552275p13.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P026300	Fuel injector circuit, cylinder 1	<p>Fuel injector circuit: range/performance</p> <p>Fuel injector failure</p>	For cylinder 1 fuel injector tests, GO to Pinpoint Test G552275p8.

P026600	Fuel injector circuit, cylinder 2	Fuel injector circuit: range/performance Fuel injector failure	For cylinder 2 fuel injector tests, GO to Pinpoint Test G552275p9.
P026900	Fuel injector circuit, cylinder 3	Fuel injector circuit: range/performance Fuel injector failure	For cylinder 3 fuel injector tests, GO to Pinpoint Test G552275p10.
P027200	Fuel injector circuit, cylinder 4	Fuel injector circuit: range/performance Fuel injector failure	For cylinder 4 fuel injector tests, GO to Pinpoint Test G552275p11.
P027500	Fuel injector circuit, cylinder 5	Fuel injector circuit: range/performance Fuel injector failure	For cylinder 5 fuel injector tests, GO to Pinpoint Test G552275p12.
P027800	Fuel injector circuit, cylinder 6	Fuel injector circuit: range/performance Fuel injector failure	For cylinder 6 fuel injector tests, GO to Pinpoint Test G552275p13.
P062D00	Fuel injector driver circuit performance (right hand bank)	Injector(s) disconnected Injector circuit(s): high resistance, short circuit to ground, short circuit to power Injector failure ECM failure	Identify the fuel injector concerned from the DTC stored in the ECM. Refer to the relevant test for the code logged. Refer to the warranty policy and procedures manual if an ECM is suspect.
P062E00	Fuel injector driver circuit performance (left hand bank)	Injector(s) disconnected Injector circuit(s): high resistance, short circuit to ground, short circuit to power Injector failure ECM failure	Identify the fuel injector concerned from the DTC stored in the ECM. Refer to the relevant test for the code logged. Refer to the warranty policy and procedures manual if an ECM is suspect.
P120E00	Fuel rail pressure (FRP) sensor - excessive fuel pressure variation	FRP sensor circuit: high resistance FRP sensor circuit: short circuit to ground	For FRP sensor tests, GO to Pinpoint Test G552275p6. Refer to the warranty policy and procedures manual if an ECM is suspect.

		FRP sensor failure ECM failure	
P120F00	Fuel rail pressure (FRP) regulator - fuel pressure low at start	FRP sensor circuit: high resistance FRP sensor circuit: short circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure Restricted fuel line Fuel pump failure ECM failure	For FRP sensor tests, GO to Pinpoint Test G552275p6. Refer to the warranty policy and procedures manual if an ECM is suspect.
P150A00	Fuel injector circuit range/performance cylinder 1	Fuel injector disconnected Fuel injector harness wiring: high resistance, short circuit to ground, short circuit to power Fuel injector failure ECM failure	For cylinder 1 fuel injector tests, GO to Pinpoint Test G552275p8. Refer to the warranty policy and procedures manual if an ECM is suspect.
P150B00	Fuel injector circuit range/performance cylinder 2	Fuel injector disconnected Fuel injector harness wiring: high resistance, short circuit to ground, short circuit to power Fuel injector failure ECM failure	For cylinder 2 fuel injector tests, GO to Pinpoint Test G552275p9. Refer to the warranty policy and procedures manual if an ECM is suspect.
P150C00	Fuel injector circuit range/performance cylinder 3	Fuel injector disconnected Fuel injector harness wiring: high resistance, short circuit to ground, short circuit to power	For cylinder 3 fuel injector tests, GO to Pinpoint Test G552275p10. Refer to the warranty policy and procedures manual if an ECM is suspect.

		Fuel injector failure ECM failure	
P155400	Fuel injector circuit range/performance cylinder 4	Fuel injector disconnected Fuel injector harness wiring: high resistance, short circuit to ground, short circuit to power Fuel injector failure ECM failure	For cylinder 4 fuel injector tests, GO to Pinpoint Test G552275p11. Refer to the warranty policy and procedures manual if an ECM is suspect.
P155500	Fuel injector circuit range/performance cylinder 5	Fuel injector disconnected Fuel injector harness wiring: high resistance, short circuit to ground, short circuit to power Fuel injector failure ECM failure	For cylinder 5 fuel injector tests, GO to Pinpoint Test G552275p12. Refer to the warranty policy and procedures manual if an ECM is suspect.
P155600	Fuel injector circuit range/performance cylinder 6	Fuel injector disconnected Fuel injector harness wiring: high resistance, short circuit to ground, short circuit to power Fuel injector failure ECM failure	For cylinder 6 fuel injector tests, GO to Pinpoint Test G552275p13. Refer to the warranty policy and procedures manual if an ECM is suspect.
P228800	Injector control pressure too high - fuel pressure control valve (FPCV) minimum limit reached	Fuel injector control pressure: too high FPCV circuit fault FPCV failure Fuel pump module circuit: short circuit to power Fuel pump module failure Fuel injection pump failure	For fuel pressure and fuel pump module circuit tests, Fuel Tank and Lines - 2.7L Diesel For FPCV and circuit tests, GO to Pinpoint Test G552275p7. For fuel injection pump, Fuel Injection Pump

P229000	Injector control pressure too low - fuel pressure control valve (FPCV) maximum limit reached	<p>Fuel injector control pressure: too low</p> <p>Fuel line leak</p> <p>Fuel filter/system restriction</p> <p>FPCV circuit fault</p> <p>FPCV failure</p> <p>Fuel pump module circuit: short circuit to ground</p> <p>Fuel pump module failure</p> <p>Fuel injection pump failure</p>	<p>For fuel lines, fuel pressure and fuel pump module circuit tests,</p> <p>Fuel Tank and Lines - 2.7L Diesel For FPCV and circuit tests, GO to Pinpoint Test G552275p7.</p> <p>For fuel injection pump, Fuel Injection Pump</p>
P229200	Injector control pressure erratic - fuel pressure control valve (FPCV) dynamic	<p>Fuel injector control pressure: erratic</p> <p>FPCV circuit fault</p> <p>FPCV failure</p> <p>Fuel pump module circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>Fuel pump module failure</p> <p>Fuel injection pump failure</p>	<p>For fuel lines, fuel pressure and fuel pump module circuit tests,</p> <p>Fuel Tank and Lines - 2.7L Diesel For FPCV and circuit tests, GO to Pinpoint Test G552275p7.</p> <p>For fuel injection pump, Fuel Injection Pump</p>

Pinpoint test



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow this instruction may result in personal injury.



CAUTION: It is essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or lines. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

NOTE:

If DTCs are recorded and a fault is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

PINPOINT TEST G552275p1 : CHECK FOR FUEL SYSTEM LEAKS

G552275t1 : CHECK FOR FUEL SYSTEM LEAKS

1. Start and run the engine for five minutes. 2. Key off. 3. Inspect the fuel lines, pump, etc, in the engine bay for cracks/damage. 4. Raise and support the vehicle.

Lifting 5. Inspect the fuel lines for cracks/damage. 6. Check the integrity of the joints in the supply and return lines between the fuel tank and the fuel pump. 7. Carefully check around the fuel pipes, injectors and pump for evidence of leakage. 8. If there is evidence of a significant leak, clean the engine and repeat the test.

Is there any evidence of leakage?

-> Yes

RECTIFY the leak as necessary. Test the system for normal operation.

-> No

CHECK for other possible causes for the customer concern.

PINPOINT TEST G552275p2 : CHECK THE FUEL PUMP MODULE FUNCTION

G552275t2 : CHECK THE FUEL PUMP MODULE FUNCTION

1. After thoroughly cleaning around the connections, disconnect the inlet pipe from the fuel filter. 2. Position a suitable container beneath the fuel filter inlet pipe to collect fuel. 3. Key on, engine off (the pump should run for a short period, depending on temperature, etc). 4. Check that fuel is pumped from the fuel filter inlet pipe.

Is fuel pumped from the fuel filter inlet pipe?

-> Yes

CHECK the drive belt to the fuel injection pump.

Fuel Injection Pump Belt Check for DTCs. Test the system for normal operation.

-> No

CHECK the fuel pump module and circuit,

Fuel Tank and Lines - 2.7L Diesel

PINPOINT TEST G552275p3 : CHECK FOR CONTAMINATED FUEL

G552275t3 : CHECK FOR UNUSUAL ODOURS FROM THE FUEL FILLER

1. Gather as much information as possible from the owner/driver regarding refuelling practices. 2. Remove the fuel filler cap and check for unusual odours.

Are there any unusual odours from the fuel filler neck?

-> Yes

DRAIN the fuel tank and refill with fresh fuel. Install a new fuel filter.

Fuel Filter - 2.7L Diesel (19.25.02) Test the vehicle for normal operation.

-> No

GO to Pinpoint Test G552275t4.

G552275t4 : CHECK FOR WATER IN THE FUEL

1. After thoroughly cleaning around the connections, disconnect the inlet pipe from the fuel filter. 2. Position a suitable clear container beneath the fuel filter inlet pipe to collect fuel. 3. Key on, engine off (the pump should run for a short period, depending on temperature, etc. It may be necessary to turn the ignition on and off more than once to obtain the desired amount of fuel). 4. Collect approximately one liter of fuel. 5. Allow the fuel to stand for at least one minute. 6. Without disturbing the fuel, check for separation of the fuel into layers (a significant amount of water in the fuel will result in a clear separation between the two fluids, with the water being at the bottom).

Does the fuel show clear separation?

-> Yes

DRAIN the fuel tank and refill with fresh fuel. Install a new fuel filter.

Fuel Filter - 2.7L Diesel (19.25.02) Test the vehicle for normal operation.

-> No

CHECK for other contaminants in the fuel.

PINPOINT TEST G552275p4 : CHECK FOR BLOCKED FUEL FILTER

G552275t5 : CHECK THE FLOW OF FUEL THROUGH THE FILTER

1. After thoroughly cleaning around the connections, disconnect the fuel filter outlet pipe to the fuel injection pump. 2.



WARNING: During this test, fuel will flow backwards through the fuel filter because of the fuel cooler circuit.

Position a suitable container beneath the fuel filter outlet to collect fuel. 3. Key on, engine off (the pump should run for a short period, depending on temperature, etc).

Is there an unrestricted flow of fuel through the filter?

-> Yes

CHECK for DTCs, check for another cause of customer complaint.

-> No

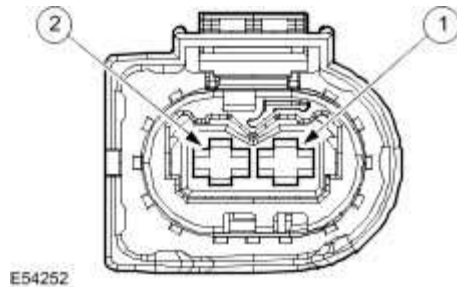
INSTALL a new fuel filter.

Fuel Filter - 2.7L Diesel (19.25.02) Test the vehicle for normal operation.

PINPOINT TEST G552275p5 : FUEL VOLUME CONTROL VALVE AND CIRCUIT

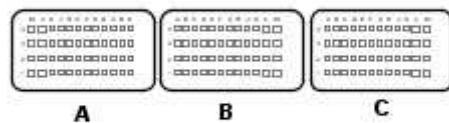
G552275t6 : CHECK FOR POWER TO THE FVCV

1.



Circuit	Pin
Power	01
Signal from ECM	02

2.



Circuit	Pin
Fuel volume control valve - signal	J4

3. Key off. 4. Disconnect the FVCV connector, C42. 5. Key on, engine off. 6. Measure the voltage between:

C42, harness side	Battery
Pin 01	Negative terminal

Is the voltage between 9 and 15 volts?

-> Yes

GO to Pinpoint Test G552275t12.

-> No

REPAIR the power circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t7 : CHECK THE FVCV CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C42, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t8.

-> No

GO to Pinpoint Test G552275t11.

G552275t8 : CHECK THE FVCV CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C42, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t9.

-> **No**

GO to Pinpoint Test G552275t12.

G552275t9 : CHECK THE FVCV CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C42, harness side	C100, harness side
Pin 02	J4

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G552275t10.

-> **No**

REPAIR the high-resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t10 : CHECK THE COMPONENT RESISTANCE

1. Measure the resistance between:

C42, component side	C42, component side
Pin 02	Pin 01

Is the resistance between 1.5 and 15 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - FVCV connector - FVCV - ECM connector - ECM

-> **No**

INSTALL a new fuel injection pump.

Fuel Injection Pump Clear any DTCs, test the system for normal operation.

G552275t11 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C42, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

Harness is OK. Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t12 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C42, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Harness is OK. Suspect: - ECM

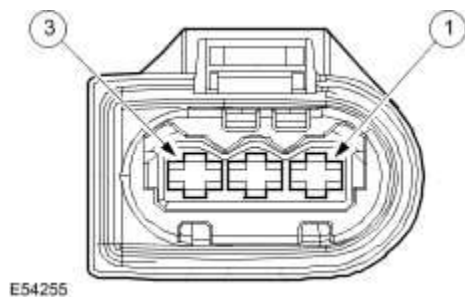
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p6 : FUEL RAIL PRESSURE (FRP) SENSOR AND CIRCUIT

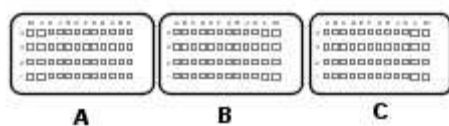
G552275t13 : CHECK THE FRP SENSOR RETURN CIRCUIT

1.



Circuit	Pin
Signal from ECM	01
Ground from ECM	02
Power from ECM	03

2.



E54251

Circuit	Pin
FRP sensor - signal	D1
FRP sensor - ground	E2
FRP sensor - power	D2

3. Key off. 4. Disconnect the FRP sensor connector, C30. 5. Key on, engine off. 6. Measure the resistance between:

C30, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552275t14.

-> No

GO to Pinpoint Test G552275t26.

G552275t14 : CHECK THE POWER SUPPLY TO THE FRP

1. Measure the voltage between:

C30, harness side	Battery
Pin 03	Negative terminal

Is the voltage between 4.8 and 5.2 volts?

-> Yes

GO to Pinpoint Test G552275t15.

-> No

GO to Pinpoint Test G552275t23.

G552275t15 : CHECK THE FRP SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C30, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t16.

-> No

GO to Pinpoint Test G552275t19.

G552275t16 : CHECK THE FRP SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C30, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t17.

-> **No**

GO to Pinpoint Test G552275t21.

G552275t17 : CHECK THE FRP SIGNAL CIRCUIT FOR SHORT CIRCUIT TO SENSOR POWER

1. Measure the resistance between:

C30, harness side	C30, harness side
Pin 01	Pin 03

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t18.

-> **No**

GO to Pinpoint Test G552275t22.

G552275t18 : CHECK THE FRP SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C30, harness side	C100, harness side
Pin 01	Pin D1

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - FRP connector - ECM connector - FRP - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t19 : CHECK FOR SIGNAL AND RETURN CIRCUITS SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C30, harness side	C30, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t20.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t20 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

C30, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t21 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C30, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t22 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C30, harness side	C30, harness side
Pin 01	Pin 03

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t23 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C30, harness side	Battery
Pin 03	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t24.

-> No

GO to Pinpoint Test G552275t29.

G552275t24 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C30, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t25.

-> **No**

GO to Pinpoint Test G552275t31.

G552275t25 : CHECK THE FRP 5 VOLT SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C30, harness side	C100, harness side
Pin 03	Pin D2

Is the resistance less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t26 : CHECK THE FRP SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C30, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t27.

-> **No**

GO to Pinpoint Test G552275t32.

G552275t27 : CHECK FOR 5 VOLT SUPPLY AND SIGNAL RETURN CIRCUITS SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C30, harness side	C30, harness side
Pin 03	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t28.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t28 : CHECK THE FRP SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

C30, harness side	C100, harness side
Pin 02	Pin E2

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t29 : CHECK FOR 5 VOLT SUPPLY AND SIGNAL RETURN CIRCUITS SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C30, harness side	C30, harness side
Pin 03	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t30.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t30 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

C30, harness side	Battery
Pin 03	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t31 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C30, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t32 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C30, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

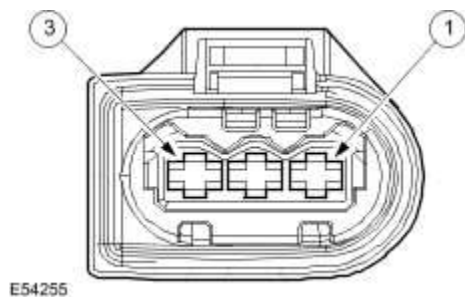
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p7 : FUEL PRESSURE CONTROL VALVE (FPCV) AND CIRCUIT

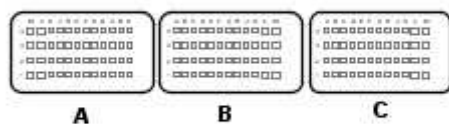
G552275t33 : CHECK THE POWER SUPPLY TO THE FPCV

1.



Circuit	Pin
Power	01
Signal from ECM	02

2.



E54251

Circuit	Pin
Fuel pressure control valve - signal	K3

3. Key off. 4. Disconnect the FPCV connector, C43. 5. Key on, engine off. 6. Measure the voltage between:

C43, harness side	Battery
Pin 01	Negative terminal

Is the voltage between 9 and 15 volts?

-> Yes

GO to Pinpoint Test G552275t34.

-> **No**

No supply to the FPCV circuit. Check and repair the circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t34 : CHECK THE FPCV CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C43, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t35.

-> **No**

GO to Pinpoint Test G552275t38.

G552275t35 : CHECK THE FPCV CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C43, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t36.

-> **No**

GO to Pinpoint Test G552275t39.

G552275t36 : CHECK THE FPCV CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C43, harness side	C100, harness side
Pin 02	Pin K3

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552275t37.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t37 : CHECK THE COMPONENT RESISTANCE

1. Measure the resistance between:

C43, component side	C43, component side
Pin 01	Pin 02

Is the resistance between 0 and 5.5 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - FPCV connector - FPCV - ECM connector - ECM

-> No

INSTALL a new fuel injection pump.

Fuel Injection Pump Clear any DTCs, test the system for normal operation.

G552275t38 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C43, harness side	Battery
--------------------------	----------------

Pin 02	Negative terminal
--------	-------------------

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t39 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C43, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

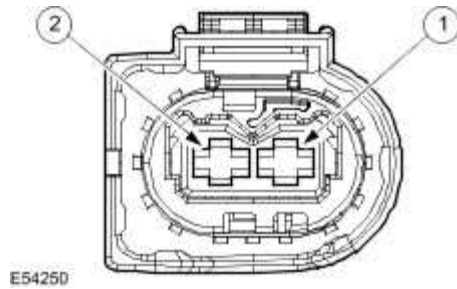
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p8 : FUEL INJECTOR AND CIRCUIT, CYLINDER 1

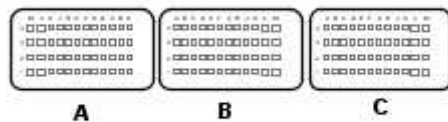
G552275t40 : CHECK THE COMPONENT RESISTANCE

1.



Circuit	Pin
Fuel injector, cylinder 1 - ground	01
Fuel injector, cylinder 1 - control	02

2.



Circuit	Pin
Fuel injector, cylinder 1 - ground	L3
Fuel injector, cylinder 1 - control	M3

3. Key off. 4. Disconnect the fuel injector 1 (INJ0) connector, C44. 5. Measure the resistance between:

C44, component side	C44, component side
Pin 02	Pin 01

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t41.

-> **No**

INSTALL a new fuel injector.

Fuel Injector (18.10.01) Clear any DTCs, test the system for normal operation.

G552275t41 : CHECK THE COMBINED FUEL INJECTOR AND HARNESS RESISTANCE

1. Key off. 2. Connect the fuel injector 1 (INJ0) connector, C44. 3. Disconnect the ECM connector, C101. 4. Measure the resistance between:

C101, harness side	C101, harness side
Pin M3	Pin L3

Is the resistance between 180 and 220 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t44.

-> **No**

GO to Pinpoint Test G552275t42.

G552275t42 : CHECK FOR SIGNAL AND RETURN CIRCUITS SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin M3	Pin L3

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t43.

-> **No**

GO to Pinpoint Test G552275t48.

G552275t43 : CHECK THE FUEL INJECTOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel injector 1 (INJ0) connector, C44. 2. Measure the resistance between:

C44, harness side	C101, harness side
Pin 02	Pin M3
Pin 01	Pin L3

Are the resistances less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 1 (INJ0) connector - ECM connector - Fuel injector 1 (INJ0)

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t44 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

C101, harness side	Battery
Pin M3	Negative terminal
Pin L3	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t46.

-> No

GO to Pinpoint Test G552275t45.

G552275t45 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 1 (INJ0) connector, C44. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	Battery
Pin M3	Negative terminal
Pin L3	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 1 (INJ0)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t46 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C101, harness side	Battery
Pin M3	Positive terminal
Pin L3	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 1 (INJ0) connector - Fuel injector 1 (INJ0) - ECM connector - ECM

-> No

GO to Pinpoint Test G552275t47.

G552275t47 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 1 (INJ0) connector, C44. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	Battery
Pin M3	Positive terminal
Pin L3	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 1 (INJ0)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t48 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 1 (INJ0) connector, C44. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	C101, harness side
Pin M3	Pin L3

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 1 (INJ0)

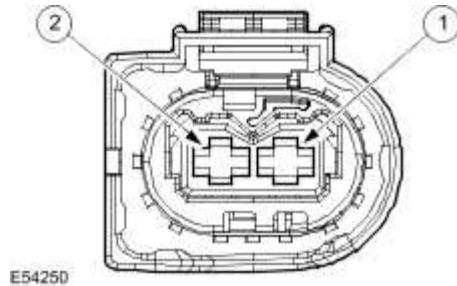
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p9 : FUEL INJECTOR AND CIRCUIT, CYLINDER 2

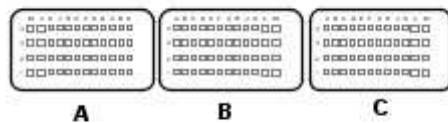
G552275t49 : CHECK THE COMPONENT RESISTANCE

1.



Circuit	Pin
Fuel injector, cylinder 2 - ground	01
Fuel injector, cylinder 2 - control	02

2.



Circuit	Pin
Fuel injector, cylinder 2 - ground	L2
Fuel injector, cylinder 2 - control	M2

3. Key off. 4. Disconnect the fuel injector 2 (INJ2) connector, C46. 5. Measure the resistance between:

C46, component side	C46, component side
Pin 02	Pin 01

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t50.

-> No

INSTALL a new fuel injector.

Fuel Injector (18.10.01) Clear any DTCs, test the system for normal operation.

G552275t50 : CHECK THE COMBINED FUEL INJECTOR AND HARNESS RESISTANCE

1. Key off. 2. Connect the fuel injector 2 (INJ2) connector, C46 connected. 3. Disconnect the ECM connector, C101. 4. Measure the resistance between:

C101, harness side	C101, harness side
Pin M2	Pin L2

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t53.

-> No

GO to Pinpoint Test G552275t51.

G552275t51 : CHECK for short CIRCUIT BETWEEN THE SIGNAL AND RETURN CIRCUITS

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin M2	Pin L2

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t52.

-> **No**

GO to Pinpoint Test G552275t57.

G552275t52 : CHECK THE FUEL INJECTOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel injector 2 (INJ2) connector, C46. 2. Measure the resistance between:

C46, harness side	C101, harness side
Pin 02	Pin M2
Pin 01	Pin L2

Are the resistances less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 2 (INJ2) connector - ECM connector - Fuel injector 2 (INJ2)

-> **No**

REPAIR the high-resistance. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t53 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

C101, harness side	Battery
Pin M2	Negative terminal
Pin L2	Negative terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t55.

-> **No**

GO to Pinpoint Test G552275t54.

G552275t54 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 2 (INJ2) connector, C46. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	Battery
Pin M2	Negative terminal
Pin L2	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 2 (INJ2)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t55 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C101, harness side	Battery
Pin M2	Positive terminal
Pin L2	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 2 (INJ2) connector - Fuel injector 2 (INJ2) - ECM connector - ECM

-> **No**

GO to Pinpoint Test G552275t56.

G552275t56 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 2 (INJ2) connector, C46. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	Battery
Pin M2	Positive terminal
Pin L2	Positive terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 2 (INJ2)

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t57 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 2 (INJ2) connector, C46. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	C101, harness side
Pin M2	Pin L2

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 2 (INJ2)

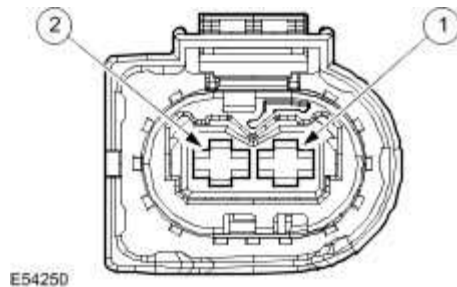
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p10 : FUEL INJECTOR AND CIRCUIT, CYLINDER 3

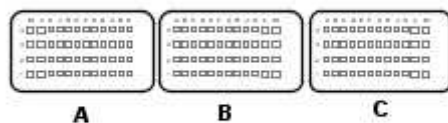
G552275t58 : CHECK THE COMPONENT RESISTANCE

1.



Circuit	Pin
Fuel injector, cylinder 2 - ground	01
Fuel injector, cylinder 2 - control	02

2.



Circuit	Pin
Fuel injector, cylinder 3 - ground	L4
Fuel injector, cylinder 3 - control	M4

3. Key off. 4. Disconnect the fuel injector 3 (INJ4) connector, C48. 5. Measure the resistance between:

C48, component side	C48, component side
---------------------	---------------------

Pin 02	Pin 01
--------	--------

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t59.

-> No

INSTALL a new fuel injector.

Fuel Injector (18.10.01) Clear any DTCs, test the system for normal operation.

G552275t59 : CHECK THE COMBINED FUEL INJECTOR AND HARNESS RESISTANCE

1. Key off. 2. Connect the fuel injector 3 (INJ4) connector, C48. 3. Disconnect the ECM connector, C101. 4. Measure the resistance between:

C101, harness side	C101, harness side
Pin M4	Pin L4

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t62.

-> No

GO to Pinpoint Test G552275t60.

G552275t60 : CHECK FOR SIGNAL AND RETURN CIRCUITS SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin M4	Pin L4

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t61.

-> **No**

GO to Pinpoint Test G552275t66.

G552275t61 : CHECK THE FUEL INJECTOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel injector 3 (INJ4) connector, C48. 2. Measure the resistance between:

C48, harness side	C101, harness side
Pin 02	Pin M4
Pin 01	Pin L4

Are the resistances less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 3 (INJ4) connector - ECM connector - Fuel injector 3 (INJ4)

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t62 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

C101, harness side	Battery
Pin M4	Negative terminal
Pin L4	Negative terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t64.

-> **No**

GO to Pinpoint Test G552275t63.

G552275t63 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 3 (INJ4) connector, C48. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	Battery
Pin M4	Negative terminal
Pin L4	Negative terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 3 (INJ4)

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t64 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C101, harness side	Battery
Pin M4	Positive terminal
Pin L4	Positive terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other

physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 3 (INJ4) connector - Fuel injector 3 (INJ4) - ECM connector - ECM

-> **No**

GO to Pinpoint Test G552275t65.

G552275t65 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 3 (INJ4) connector, C48. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	Battery
Pin M4	Positive terminal
Pin L4	Positive terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 3 (INJ4)

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t66 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 3 (INJ4) connector, C48. 3. Key on, engine off. 4. Measure the resistance between:

C101, harness side	C101, harness side
Pin M4	Pin L4

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other

physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 3 (INJ4)

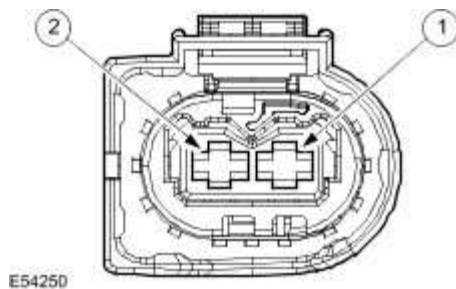
-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p11 : FUEL INJECTOR AND CIRCUIT, CYLINDER 4

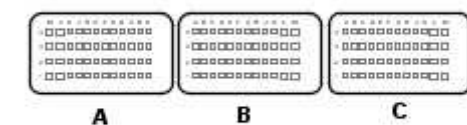
G552275t67 : CHECK THE COMPONENT RESISTANCE

1.



Circuit	Pin
Fuel injector, cylinder 4 - ground	01
Fuel injector, cylinder 4 - control	02

2.



Circuit	Pin
Fuel injector, cylinder 4 - ground	L2
Fuel injector, cylinder 4 - control	L1

3. Key off. 4. Disconnect the fuel injector 4 (INJ1) connector, C45. 5. Measure the resistance between:

C45, component side	C45, component side
Pin 02	Pin 01

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t68.

-> No

INSTALL a new fuel injector.

Fuel Injector (18.10.01) Clear any DTCs, test the system for normal operation.

G552275t68 : CHECK THE COMBINED FUEL INJECTOR AND HARNESS RESISTANCE

1. Key off. 2. Connect the fuel injector 4 (INJ1) connector, C45. 3. Disconnect the ECM connector, C100. 4. Measure the resistance between:

C100, harness side	C100, harness side
Pin L1	Pin L2

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t71.

-> No

GO to Pinpoint Test G552275t69.

G552275t69 : CHECK FOR SIGNAL AND RETURN CIRCUITS SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

C100, harness side	C100, harness side
Pin L1	Pin L2

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t70.

-> No

GO to Pinpoint Test G552275t75.

G552275t70 : CHECK THE FUEL INJECTOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel injector 4 (INJ1) connector, C45. 2. Measure the resistance between:

C45, harness side	C100, harness side
Pin 02	Pin L1
Pin 01	Pin L2

Are the resistances less than 10 ohm?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 4 (INJ1) connector - ECM connector - Fuel injector 4 (INJ1)

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t71 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

C100, harness side	Battery
Pin L1	Negative terminal
Pin L2	Negative terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552275t73.

-> **No**

GO to Pinpoint Test G552275t72.

G552275t72 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 4 (INJ1) connector, C45. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	Battery
Pin L1	Negative terminal
Pin L2	Negative terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 4 (INJ1)

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t73 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C100, harness side	Battery
Pin L1	Positive terminal
Pin L2	Positive terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 4 (INJ1) connector - Fuel Injector 4 (INJ1) - ECM connector - ECM

-> **No**

GO to Pinpoint Test G552275t74.

G552275t74 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 4 (INJ1) connector, C45. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	Battery
Pin L1	Positive terminal
Pin L2	Positive terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 4 (INJ1)

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t75 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 4 (INJ1) connector, C45. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	C100, harness side
Pin L1	Pin L2

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 4 (INJ1)

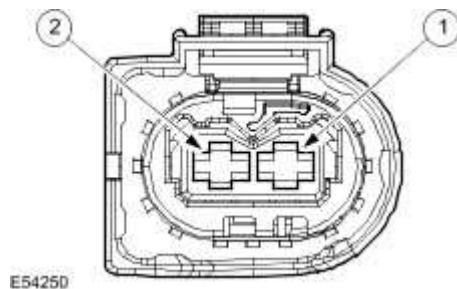
-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p12 : FUEL INJECTOR AND CIRCUIT, CYLINDER 5

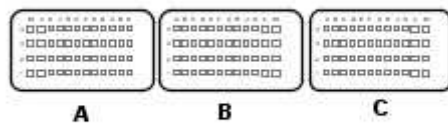
G552275t76 : CHECK THE COMPONENT RESISTANCE

1.



Circuit	Pin
Fuel injector, cylinder 5 - ground	01
Fuel injector, cylinder 5 - control	02

2.



Circuit	Pin
Fuel injector, cylinder 5 - ground	L3

Fuel injector, cylinder 5 - control	M1
-------------------------------------	----

3. Key off. 4. Disconnect the fuel injector 5 (INJ3) connector, C47. 5. Measure the resistance between:

C47, component side	C47, component side
Pin 02	Pin 01

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t77.

-> No

INSTALL a new fuel injector.

Fuel Injector (18.10.01) Clear any DTCs, test the system for normal operation.

G552275t77 : CHECK THE COMBINED FUEL INJECTOR AND HARNESS RESISTANCE

1. Key off. 2. Connect the fuel injector 5 (INJ3) connector, C47. 3. Disconnect the ECM connector, C100. 4. Measure the resistance between:

C100, harness side	C100, harness side
Pin M1	Pin L3

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t80.

-> No

GO to Pinpoint Test G552275t78.

G552275t78 : CHECK FOR SHORT CIRCUIT BETWEEN THE SIGNAL AND RETURN CIRCUITS

1. Measure the resistance between:

C100, harness side	C100, harness side
Pin M1	Pin L3

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t79.

-> No

GO to Pinpoint Test G552275t84.

G552275t79 : CHECK THE FUEL INJECTOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel injector 5 (INJ3) connector, C47. 2. Measure the resistance between:

C47, harness side	C100, harness side
Pin 02	Pin M1
Pin 01	Pin L3

Are the resistances less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 5 (INJ3) connector - ECM connector - Fuel injector 5 (INJ3)

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t80 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

C100, harness side	Battery
Pin M1	Negative terminal

Pin L3	Negative terminal
--------	-------------------

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t82.

-> No

GO to Pinpoint Test G552275t81.

G552275t81 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 5 (INJ3) connector, C47. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	Battery
Pin M1	Negative terminal
Pin L3	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 5 (INJ3)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t82 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C100, harness side	Battery
Pin M1	Positive terminal

Pin L3	Positive terminal
--------	-------------------

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 5 (INJ3) connector - Fuel injector 5 (INJ3) - ECM connector - ECM

-> No

GO to Pinpoint Test G552275t83.

G552275t83 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 5 (INJ3) connector, C47. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	Battery
Pin M1	Positive terminal
Pin L3	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 5 (INJ3)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t84 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 5 (INJ3) connector, C47. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	C100, harness side
---------------------------	---------------------------

Pin M1	Pin L3
--------	--------

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 5 (INJ3)

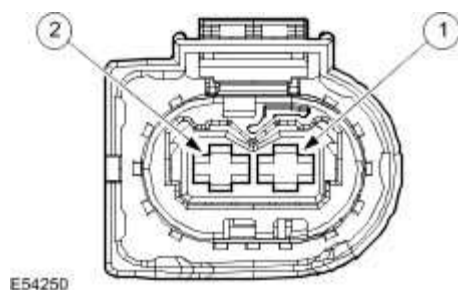
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552275p13 : FUEL INJECTOR AND CIRCUIT, CYLINDER 6

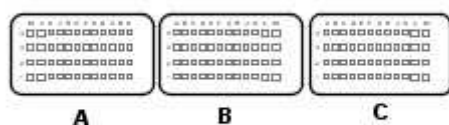
G552275t85 : CHECK THE COMPONENT RESISTANCE

1.



Circuit	Pin
Fuel injector, cylinder 6 - ground	01
Fuel injector, cylinder 6 - control	02

2.



E54251

Circuit	Pin
Fuel injector, cylinder 6 - ground	M3
Fuel injector, cylinder 6 - control	M2

3. Key off. 4. Disconnect the fuel injector 6 (INJ5) connector, C49. 5. Measure the resistance between:

C49, component side	C49, component side
Pin 02	Pin 01

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t86.

-> No

INSTALL a new fuel injector.

Fuel Injector (18.10.01) Clear any DTCs, test the system for normal operation.

G552275t86 : CHECK THE COMBINED FUEL INJECTOR AND HARNESS RESISTANCE

1. Key off. 2. Connect the fuel injector 6 (INJ5) connector, C49. 3. Disconnect the ECM connector, C100. 4. Measure the resistance between:

C100, harness side	C100, harness side
Pin M2	Pin M3

Is the resistance between 180 and 220 Kohms?

-> Yes

GO to Pinpoint Test G552275t89.

-> No

GO to Pinpoint Test G552275t87.

G552275t87 : CHECK FOR SHORT CIRCUIT BETWEEN THE SIGNAL AND RETURN CIRCUITS

1. Measure the resistance between:

C100, harness side	C100, harness side
Pin M2	Pin M3

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t88.

-> No

GO to Pinpoint Test G552275t93.

G552275t88 : CHECK THE FUEL INJECTOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel injector 6 (INJ5) connector, C49. 2. Measure the resistance between:

C49, harness side	C100, harness side
Pin 02	Pin M2
Pin 01	Pin M3

Are the resistances less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 6 (INJ5) connector - ECM connector - Fuel injector 6 (INJ5)

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t89 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

C100, harness side	Battery
Pin M2	Negative terminal
Pin M3	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552275t91.

-> No

GO to Pinpoint Test G552275t90.

G552275t90 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR the Fuel injector

1. Key off. 2. Disconnect the fuel injector 6 (INJ5) connector, C49. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	Battery
Pin M2	Negative terminal
Pin M3	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 6 (INJ5)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t91 : CHECK THE FUEL INJECTOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C100, harness side	Battery
Pin M2	Positive terminal
Pin M3	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 6 (INJ5) connector - Fuel injector 6 (INJ5) - ECM connector - ECM

-> No

GO to Pinpoint Test G552275t92.

G552275t92 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 6 (INJ5) connector, C49. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	Battery
Pin M2	Positive terminal
Pin M3	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 6 (INJ5)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552275t93 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE FUEL INJECTOR

1. Key off. 2. Disconnect the fuel injector 6 (INJ5) connector, C49. 3. Key on, engine off. 4. Measure the resistance between:

C100, harness side	C100, harness side
Pin M2	Pin M3

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel injector 6 (INJ5)

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

Fuel Diverter Rail

Removal



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry out any repairs to the fuel system with the engine running. The fuel pressure within the high-pressure system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking caps to any open orifices or lines.



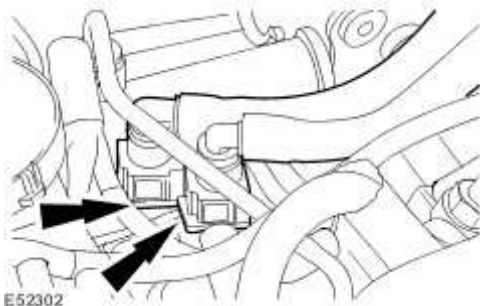
CAUTION: Do not remove the fuel rail pressure sensor from the fuel injection diverter rail.

NOTE:

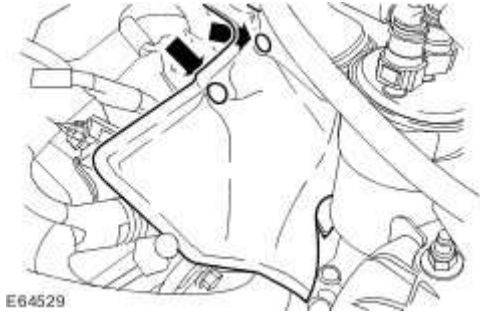
If a new fuel rail pressure sensor is to be installed, a new fuel injection diverter rail and fuel rail pressure sensor must be installed as an assembly.

- 1 . Remove the secondary bulkhead center panel.
For additional information, refer to Secondary Bulkhead Center Panel
- 2 Clean around the low pressure fuel inlet and return lines, high-pressure fuel supply lines and surrounding areas.
For additional information, refer to Fuel Injection Component Cleaning
- 3 . Disconnect the low-pressure fuel inlet and return lines.

▶ Install suitable blanking caps to the fuel lines and unions.



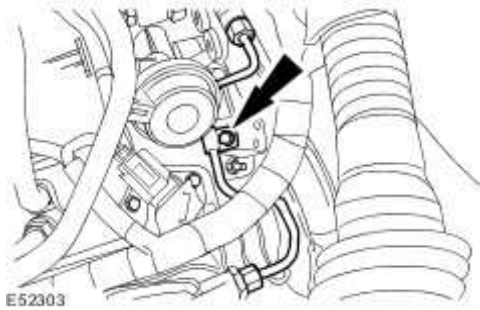
- 4 . Remove the injector sound proofing.



5 . NOTE:

Left-hand shown, right-hand similar.

Detach the high-pressure fuel supply line clamps.



6

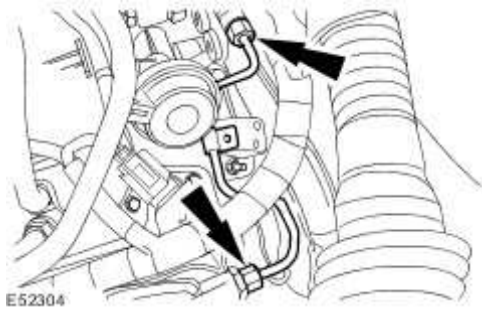


CAUTION: Make sure that the high-pressure fuel supply line remains in contact with the fuel injection supply manifold and fuel injection diverter rail until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

NOTE:

Left-hand shown, right-hand similar.

Loosen the high-pressure fuel supply lines.



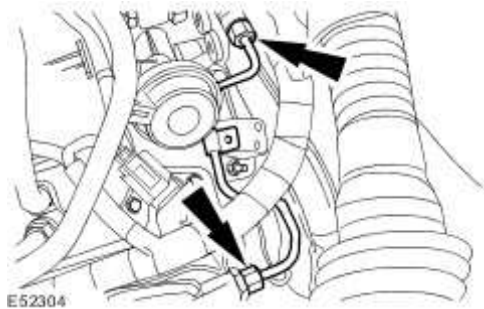
- 7 Using the pneumatic vacuum gun, vacuum foreign material from the high-pressure fuel supply lines, the fuel injection diverter rail and the fuel injection supply manifolds.
For additional information, refer to Fuel Injection Component Cleaning


8 **NOTE:**

Left-hand shown, right-hand similar.

Remove and discard the high-pressure fuel supply lines.

- ▶ Install suitable blanking caps to the open threaded ports on the fuel injection diverter rail and fuel injection supply manifold.

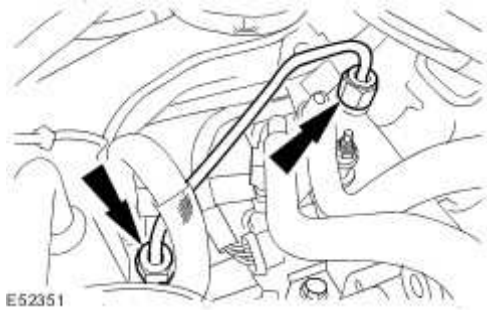


- 9  **CAUTION:** Make sure that the high-pressure fuel supply line remains in contact with the fuel injection pump and fuel injection diverter rail until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Make sure the tool used to loosen the high-pressure fuel supply line unions is used at the top of the unions as this is where there is most material. Failure to follow this instruction may result in damage to the unions.

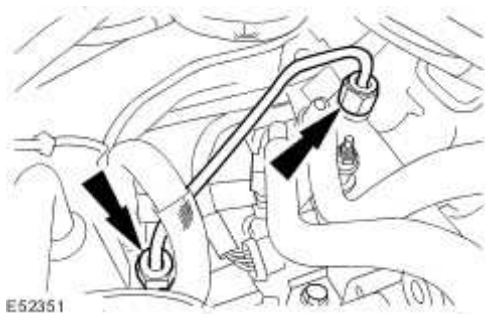
Loosen the high-pressure fuel supply line.



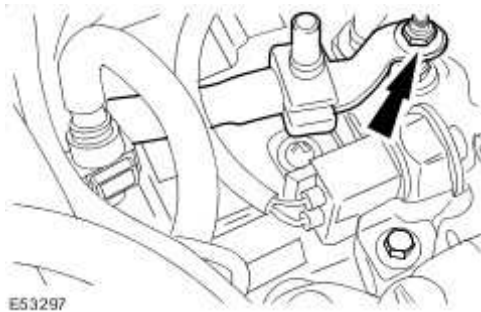
- 10 Using the pneumatic vacuum gun, vacuum foreign material from the high-pressure fuel supply lines, the fuel injection diverter rail and the fuel injection pump.
For additional information, refer to Fuel Injection Component Cleaning

- 11 Remove and discard the high-pressure fuel supply line.

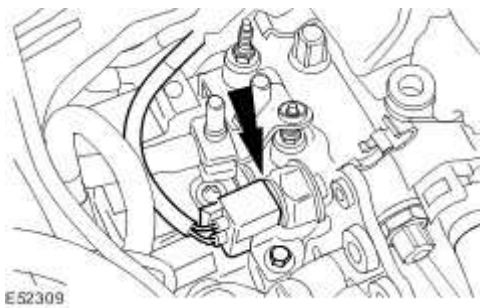
- ▶ Install suitable blanking caps to the open threaded ports on the fuel injection diverter rail and fuel injection pump.



- 12 . Remove the low-pressure fuel line retaining nut.

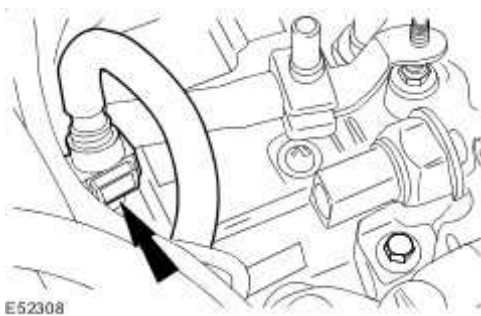


13 . Disconnect the fuel rail pressure (FRP) sensor electrical connector.



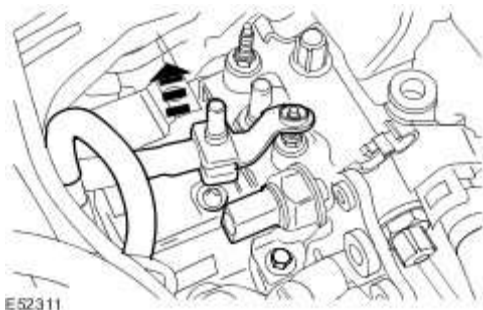
14 . Disconnect the low-pressure fuel line.

▶ Install suitable blanking caps to the fuel line and union.



15 . Detach the low-pressure fuel line.

▶ Install suitable blanking caps to the fuel line and union.



16

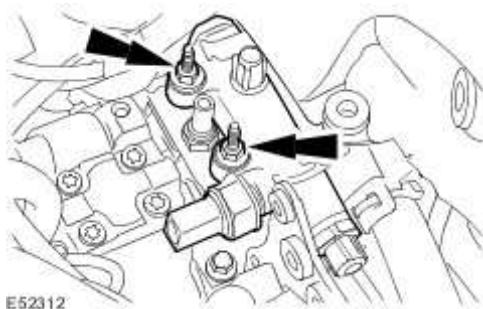


CAUTION: Do not remove the fuel rail pressure sensor from the fuel injection diverter rail.

NOTE:

If a new fuel rail pressure sensor is to be installed, a new fuel injection diverter rail and fuel rail pressure sensor must be installed as an assembly.

Remove the fuel injection diverter rail.



Installation

1



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions

may result in personal injury.



WARNING: Do not carry out any repairs to the fuel injection system with the engine running. The fuel pressure within the system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking caps to any open orifices or lines. Failure to follow this instruction may result in damage to the vehicle.



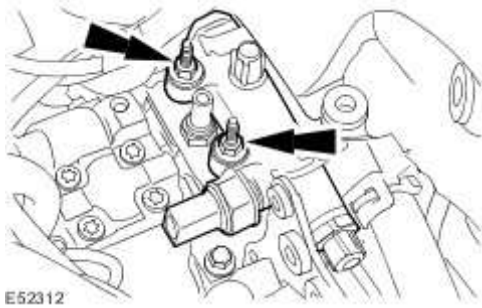
CAUTION: Do not remove the fuel rail pressure sensor from the fuel injection diverter rail.

NOTE:

If a new fuel rail pressure sensor is to be installed, a new fuel injection diverter rail and fuel rail pressure sensor must be installed as an assembly. Failure to follow this instruction may result in damage to the vehicle.

Install the fuel injection diverter rail.

- ▶ Do not fully tighten the fuel injection diverter rail retaining studs at this stage.



2 . NOTE:

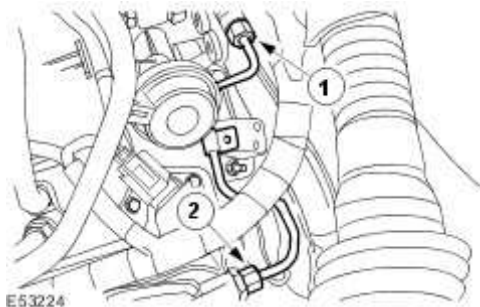
Remove the blanking caps.

NOTE:

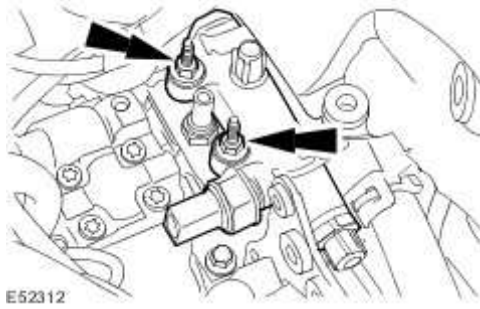
Left-hand shown, right-hand similar.

Install new high-pressure fuel supply lines.

- ▶ Tighten the high-pressure fuel supply line in the sequence shown:
- ▶ Tighten the high-pressure fuel supply line union 1 to diverter rail to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 2 to fuel rail to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 1 to diverter rail to 30 Nm.
- ▶ Tighten the high-pressure fuel supply line union 2 to fuel rail to 30 Nm.



3 . Tighten the fuel injection diverter rail retaining studs to 23 Nm.

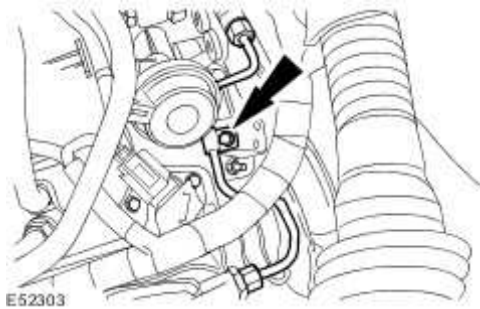


4 . **NOTE:**

Left-hand shown, right-hand similar.

Attach the high-pressure fuel supply line clamps.

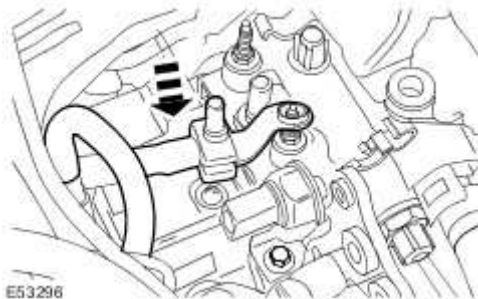
▶ Tighten to 10 Nm.



5 . **NOTE:**

Remove the blanking caps.

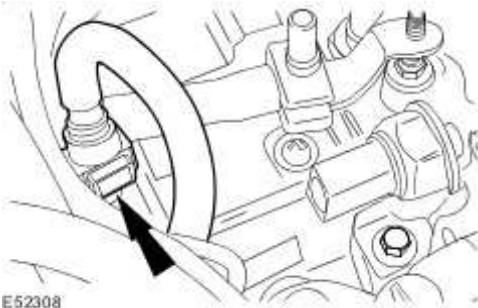
Attach the low-pressure fuel line.



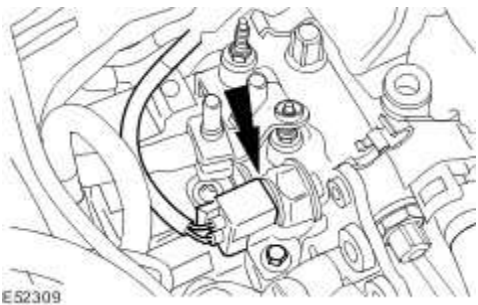
6 . NOTE:

Remove the blanking caps.

Connect the low-pressure fuel line.

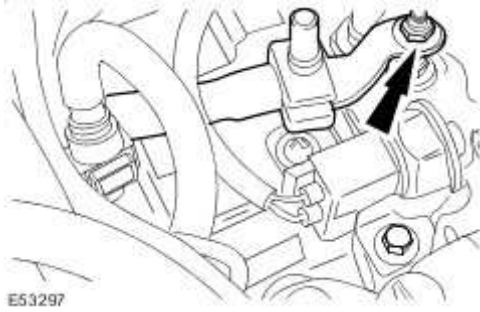


7 . Connect the FRP sensor electrical connector.



8 . Install the low-pressure fuel line retaining nut.

► Tighten to 7 Nm.

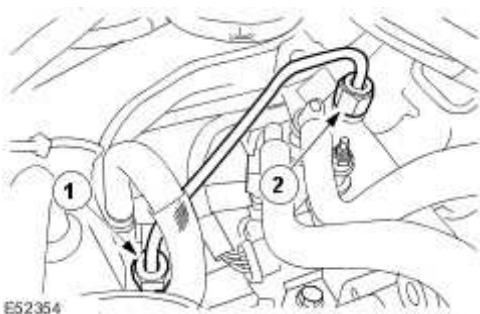


9 NOTE:

Remove the blanking caps.

Install a new high-pressure fuel supply line.

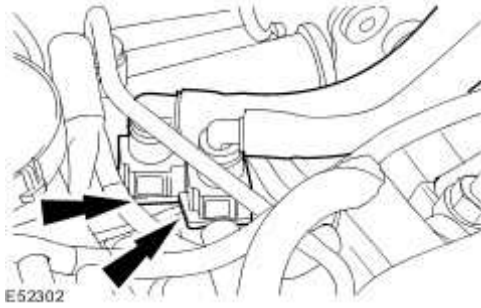
- ▶ Install but do not tighten the high-pressure fuel supply line.
- ▶ Tighten the high-pressure fuel supply line in the sequence shown in four stages:
- ▶ Tighten the high-pressure fuel supply line union 1 to fuel injection pump to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 2 to diverter rail to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 1 to fuel injection pump to 30 Nm.
- ▶ Tighten the high-pressure fuel supply line union 2 to diverter rail to 30 Nm.



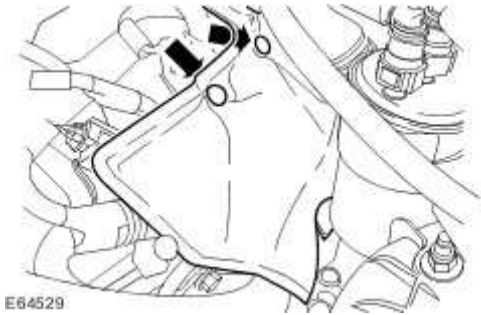
10 . NOTE:

Remove the blanking caps.

Connect the low-pressure fuel inlet and return lines.



11 . Install the fuel injector sound proofing.



12 . Install the secondary bulkhead center panel.

For additional information, refer to Secondary Bulkhead Center Panel

Fuel Injection Pump

Special Service Tools



Reaction Arm - Fuel Pump Pulley
310-138



Holder - Fuel Pump Pulley
310-139



Holder - Camshaft Pulley Rear
303-1125

Removal

1



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry out any repairs to the fuel system with the engine running. The fuel pressure within the high-pressure system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking caps to any open orifices or lines.



CAUTION: Do not disassemble or clean inside the fuel pump, even with an ultrasonic cleaner. Always install a new fuel pump when required.

NOTE:

If the fuel pump has suffered a major mechanical failure, new fuel injectors should also be installed.

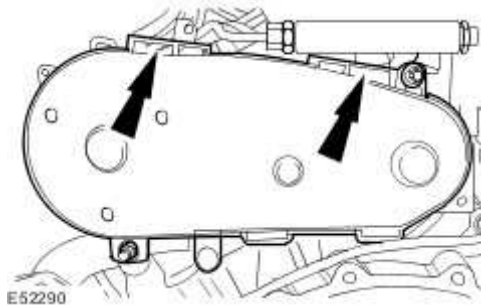
Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

- 2 . Remove the secondary bulkhead center panel.

For additional information, refer to Secondary Bulkhead Center Panel

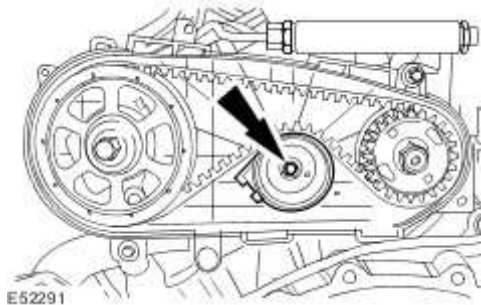
- 3 . Remove the fuel injection pump belt cover.



- 4 . **NOTE:**

The fuel injection pump belt is not timed to the engine.

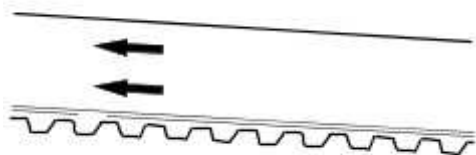
Remove and discard the fuel injection pump belt tensioner.



- 5 **NOTE:**

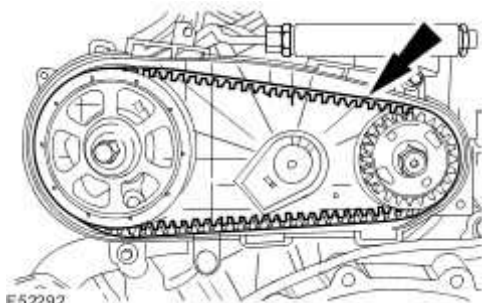
The fuel injection pump rotates in an anti-clockwise direction when viewed from the rear of the engine.

Note the direction of rotation of the fuel injection pump belt.



E52241

6 . Remove and discard the fuel injection pump belt.

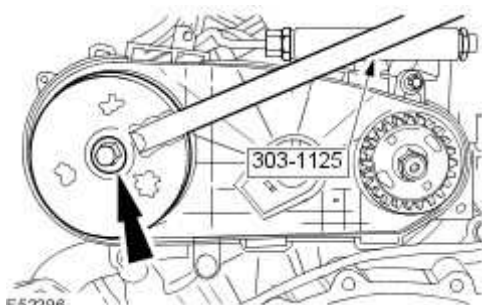


E52292

7 . Remove the camshaft rear pulley retaining bolt.

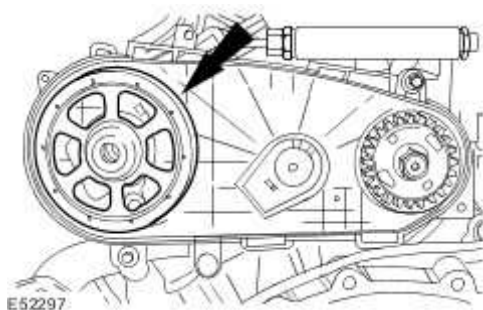
► Using the special tool, retain the camshaft rear pulley.

► Remove and discard the camshaft rear pulley retaining bolt.



E52296

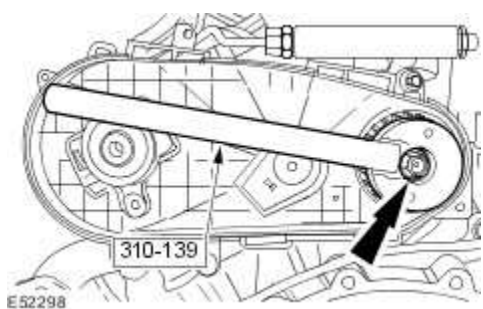
8 . Remove the camshaft rear pulley.



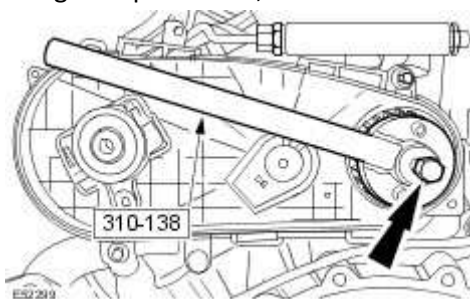
9 . Remove the injection pump pulley retaining nut.

► Using the special tool, retain the fuel injection pump pulley.

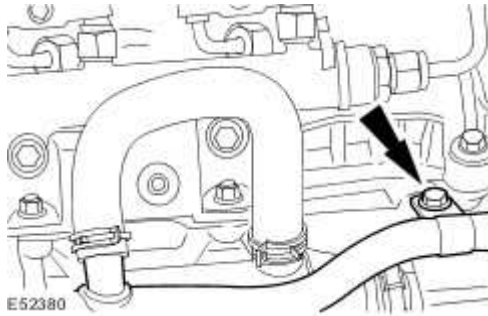
► Remove the injection pump pulley retaining nut.



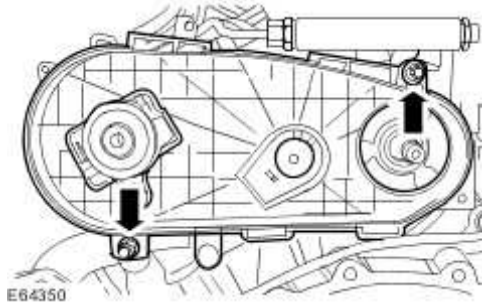
10 . Using the special tool, remove the fuel injection pump pulley.



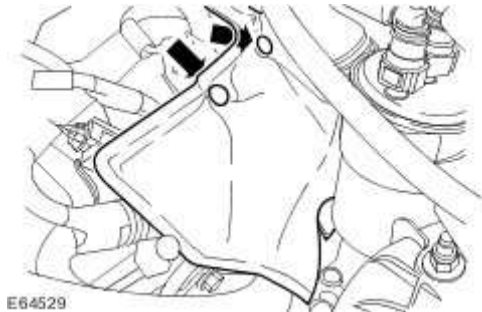
11 . Detach the exhaust gas recirculation (EGR) coolant outlet tube.



12 . Remove the fuel injection pump belt rear cover.



13 . Remove the injector sound proofing.

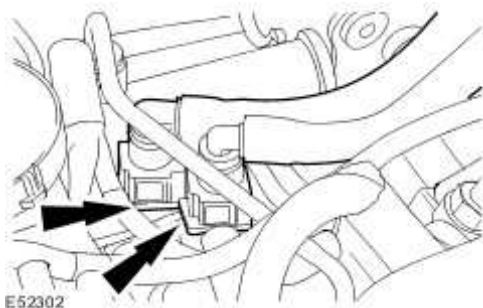


14 Clean around the low pressure fuel inlet and return lines, high-pressure fuel supply lines and surrounding areas.

For additional information, refer to Fuel Injection Component Cleaning

15 . Disconnect the low pressure fuel inlet and return lines.

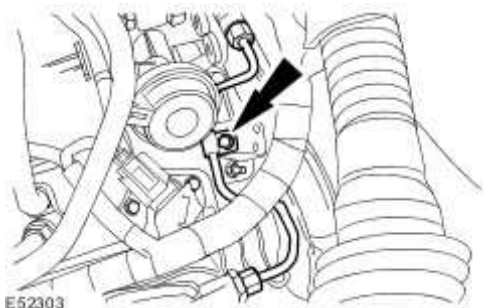
▶ Install suitable blanking caps to the fuel lines and unions.



16 . **NOTE:**

Left-hand shown, right-hand similar.

Detach the high pressure fuel supply line clamps.



17



CAUTION: Make sure that the high-pressure fuel supply line remains in contact with the fuel injection supply manifold and fuel injection diverter rail until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

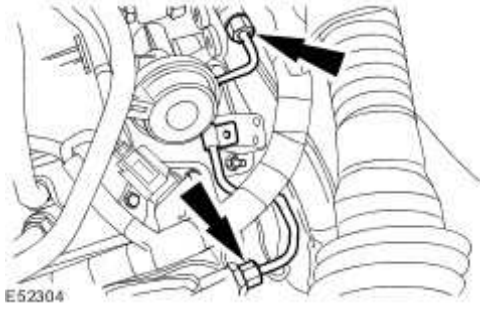


CAUTION: Make sure the tool used to loosen the high-pressure fuel supply line unions is used at the top of the unions as this is where there is most material. Failure to follow this instruction may result in damage to the unions.

NOTE:

Left-hand shown, right-hand similar.

Loosen the high pressure fuel supply lines.



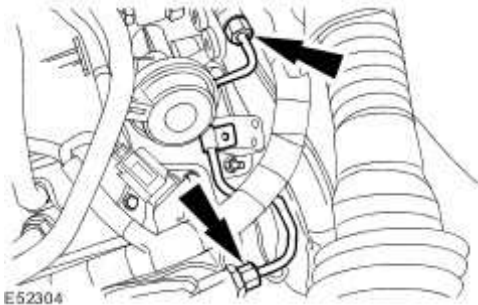
- 18 Using the pneumatic vacuum gun, vacuum foreign material from the high-pressure fuel supply lines, the fuel injection diverter rail and the fuel injection supply manifolds. For additional information, refer to Fuel Injection Component Cleaning

19 **NOTE:**

Left-hand shown, right-hand similar.

Remove and discard the high pressure fuel supply lines.

- ▶ Install suitable blanking caps to the open threaded ports on the fuel injection diverter rail and fuel rail.



20

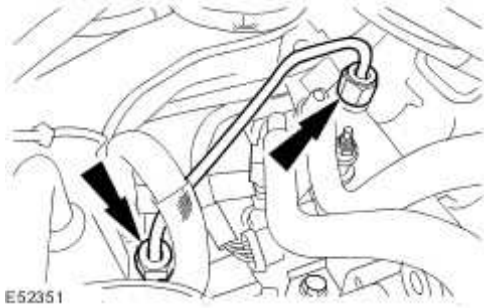


CAUTION: Make sure that the high-pressure fuel supply line remains in contact with the fuel injection pump and fuel injection diverter rail until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Make sure the tool used to loosen the high-pressure fuel supply line unions is used at the top of the unions as this is where there is most material. Failure to follow this instruction may result in damage to the unions.

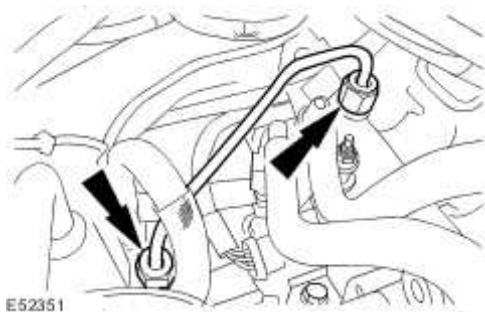
Loosen the high pressure fuel supply line.



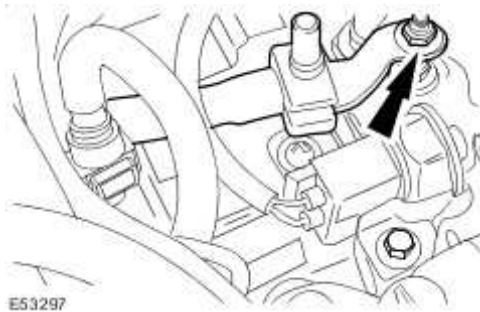
- 21 Using the pneumatic vacuum gun, vacuum foreign material from the high-pressure fuel supply lines, the fuel injection diverter rail and the fuel injection pump.
For additional information, refer to Fuel Injection Component Cleaning

- 22 Remove and discard the high pressure fuel supply line.

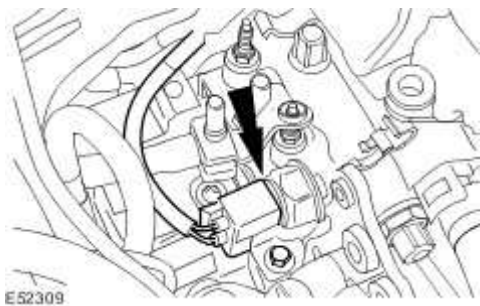
- ▶ Install suitable blanking caps to the open threaded ports on the fuel injection diverter rail and fuel injection pump.



- 23 . Remove the fuel line retaining nut.

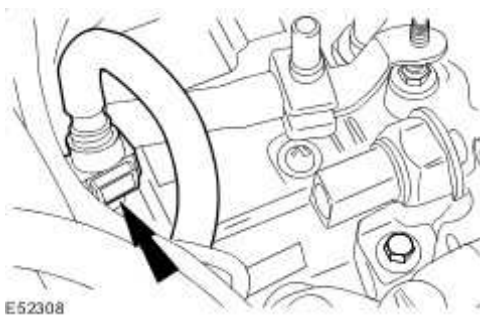


24 . Disconnect the fuel rail pressure (FRP) sensor electrical connector.



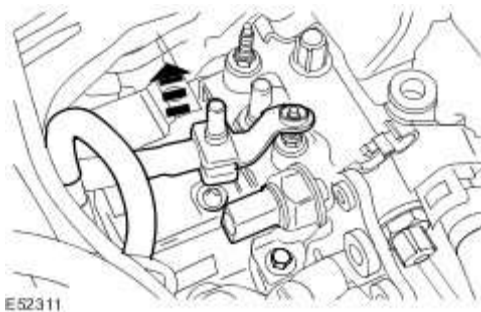
25 . Disconnect the fuel line.

▶ Install suitable blanking caps to the fuel line and union.



26 . Detach the fuel line.

▶ Install suitable blanking caps to the fuel line and union.

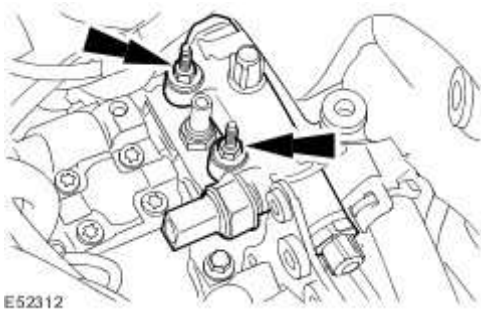


27

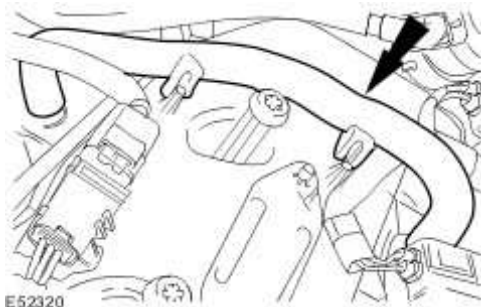


CAUTION: Do not remove the fuel rail pressure sensor from the fuel injection diverter rail.

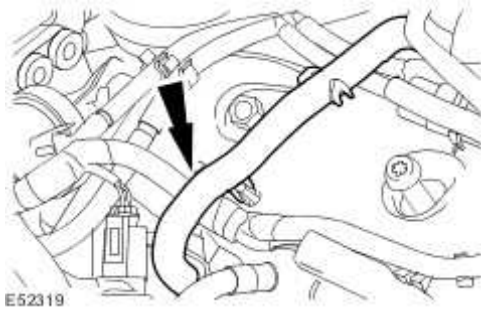
Remove the fuel injection diverter rail.



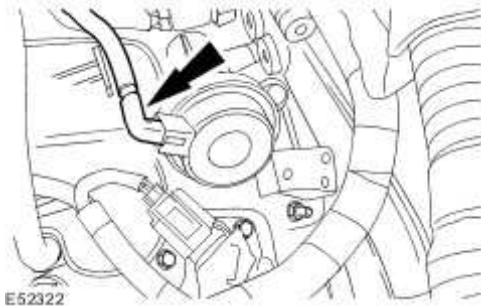
28 . Disconnect the left-hand camshaft cover breather hose.



29 . Disconnect the right-hand camshaft cover breather hose.

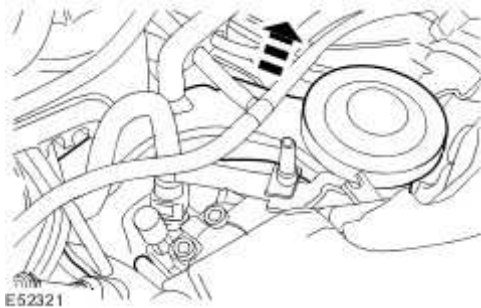


30 . Disconnect the left-hand inlet port deactivation vacuum hose.

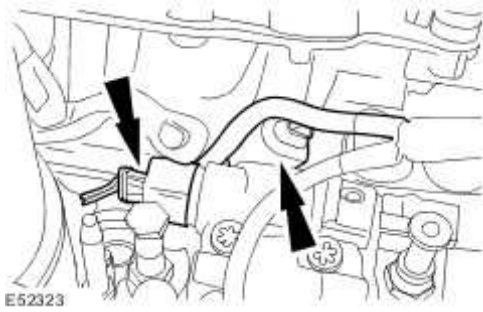


31 Remove the crankcase vent oil separator.

➤ Remove and discard the crankcase vent oil separator and engine block seals.



32 . Disconnect the fuel injection pump electrical connectors.

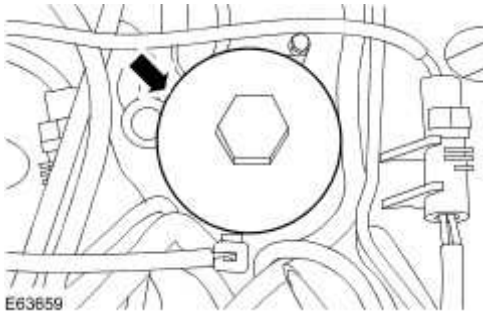


33 **NOTE:**

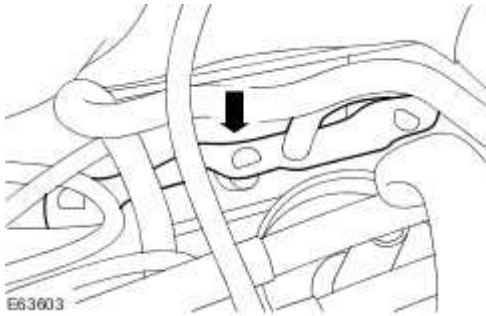
Remove and discard the O-ring seal.

Remove the oil filter element housing.

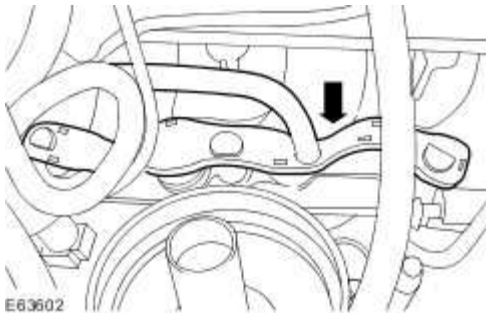
- ▶ Rotate the oil filter element housing five complete turns counter-clockwise.
- ▶ Allow the engine oil to drain from the oil filter element housing for two minutes.
- ▶ Remove the oil filter element housing.



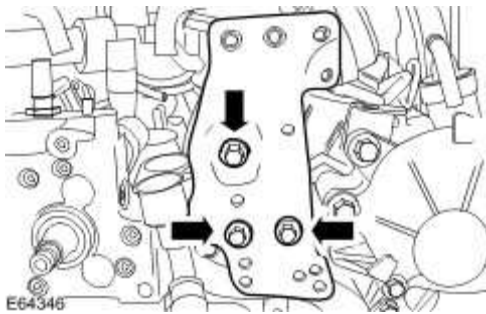
34 . Detach the left-hand glow plug electrical connector.



35 . Detach the right-hand glow plug electrical connector.

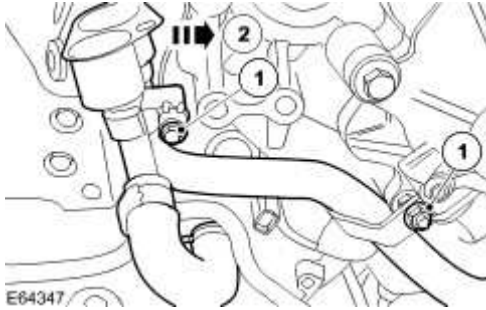


36 . Remove the right-hand rear engine lifting bracket.

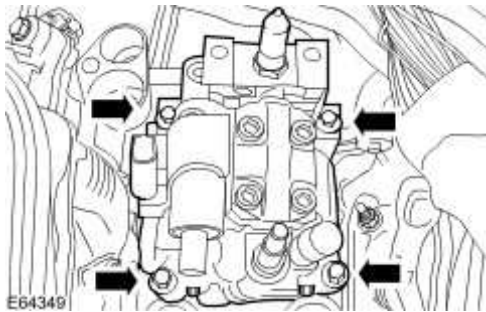


37 . Reposition the crankcase vent oil separator pipes.

- 1) Detach the crankcase vent oil separator pipes.
- 2) Reposition the crankcase vent oil separator pipes.



38 . Remove the fuel injection pump.



Installation

1



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or lines.



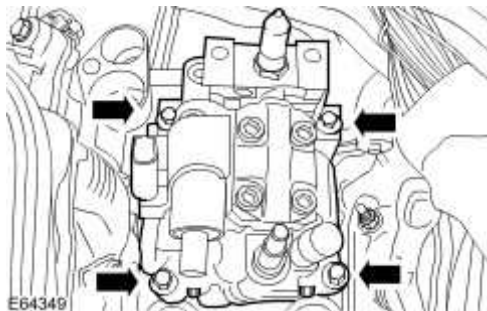
CAUTION: Do not disassemble or clean inside the fuel pump, even with an ultrasonic cleaner. Always install a new fuel pump when required.



CAUTION: Install new high pressure fuel supply lines. Failure to follow this instruction may result in damage to the vehicle.

Install the fuel injection pump.

▶ Tighten to 23 Nm.

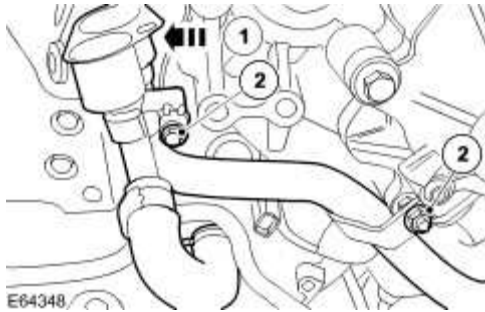


2 . Attach the crankcase vent oil separator pipes.

1) Reposition the crankcase vent oil separator pipes.

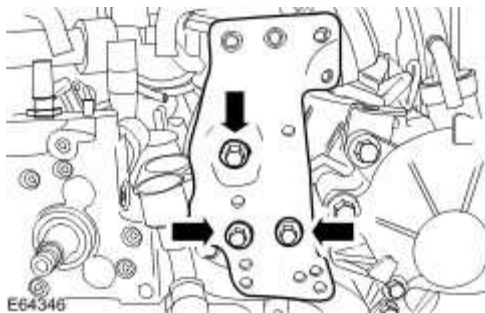
2) Attach the crankcase vent oil separator pipes.

▶ Tighten to 10 Nm.



3 . Install the right-hand rear engine lifting bracket.

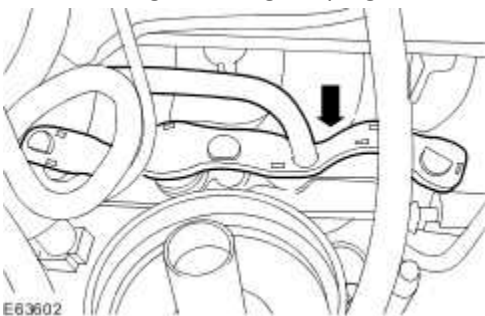
▶ Tighten to 10 Nm.



4 NOTE:

Make sure glow plug electrical connector is correctly fitted to all glow plugs on the right-hand bank.

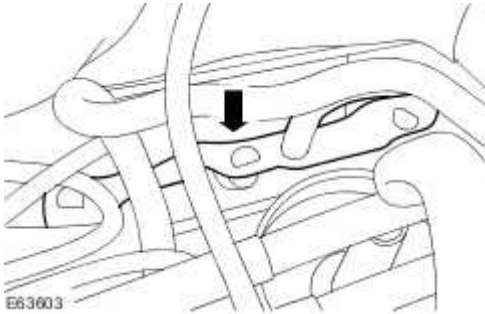
Attach the right-hand glow plug electrical connector.



5 **NOTE:**

Make sure glow plug electrical connector is correctly fitted to all glow plugs on the left-hand bank.

Attach the left-hand glow plug electrical connector.

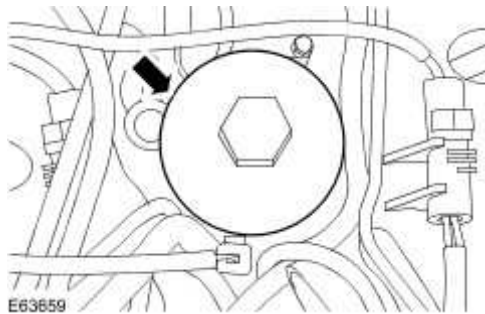


6 . **NOTE:**

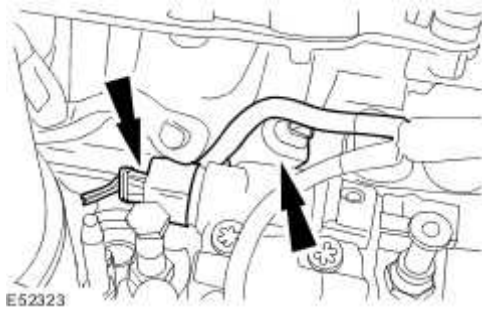
Install a new O-ring seal.

Install the oil filter housing.

▶ Tighten to 25 Nm.

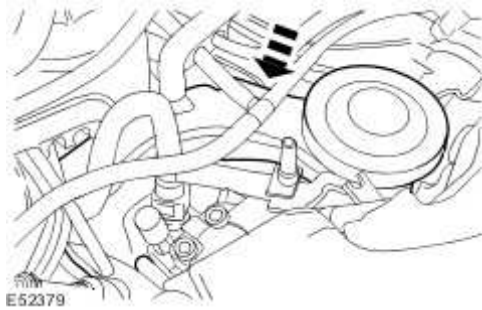


7 . Connect the fuel pump electrical connectors.

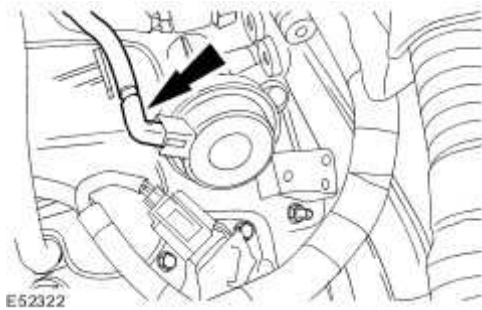


8 . Install the oil separator housing.

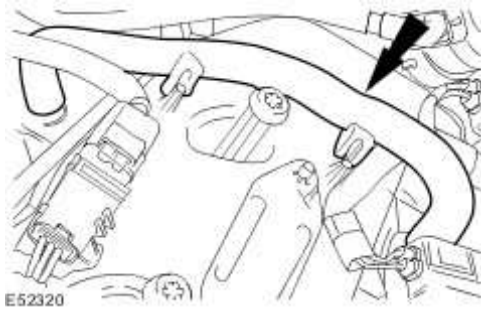
▶ Install new crankcase vent oil separator and engine block seals.



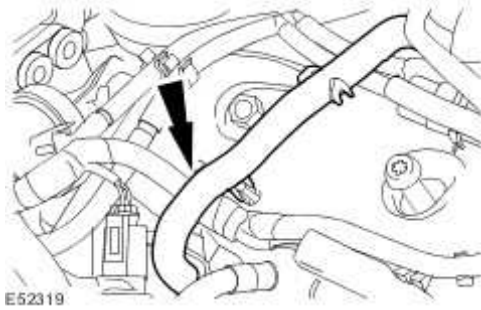
9 . Connect the left-hand inlet port deactivation vacuum hose.



10 . Connect the left-hand camshaft cover breather hose.

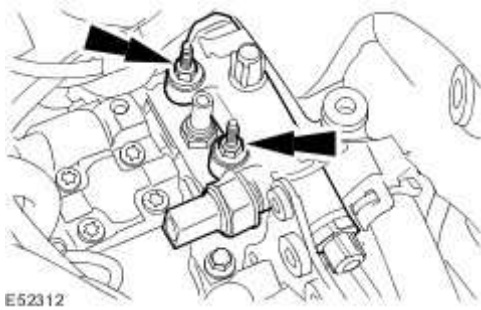


11 . Connect the right-hand camshaft cover breather hose.



12 Install the fuel injection diverter rail.

▶ Do not fully tighten the fuel injection diverter rail retaining bolts at this stage.

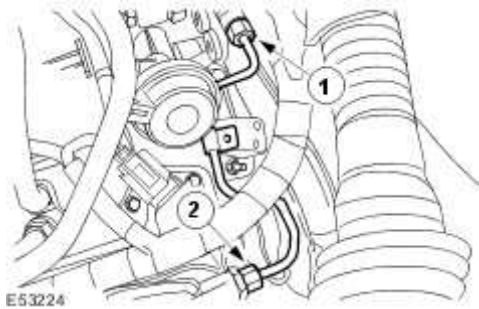


13 **NOTE:**

Left-hand shown, right-hand similar.

Install new high pressure fuel supply lines.

- ▶ Remove the blanking caps.
- ▶ Tighten the fuel injection diverter rail retaining bolts to 23 Nm.
- ▶ Tighten the high-pressure fuel supply line in the sequence shown in four stages:
 - ▶ Stage 1: Tighten the high-pressure fuel supply line union 1 to 15 Nm.
 - ▶ Stage 2: Tighten the high-pressure fuel supply line union 2 to 15 Nm.
 - ▶ Stage 3: Tighten the high-pressure fuel supply line union 1 to 30 Nm.
 - ▶ Stage 4: Tighten the high-pressure fuel supply line union 2 to 30 Nm.

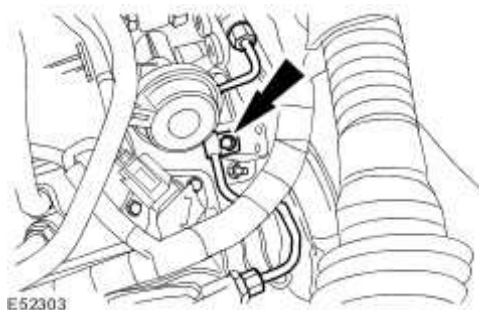


14 . **NOTE:**

Left-hand shown, right-hand similar.

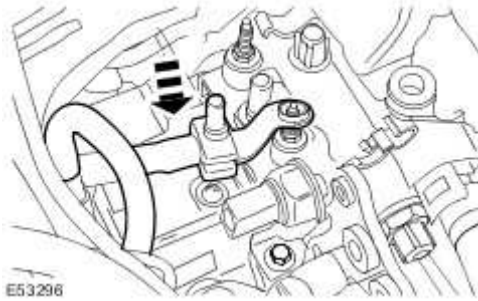
Attach the high pressure fuel supply line clamps.

- ▶ Tighten to 10 Nm.



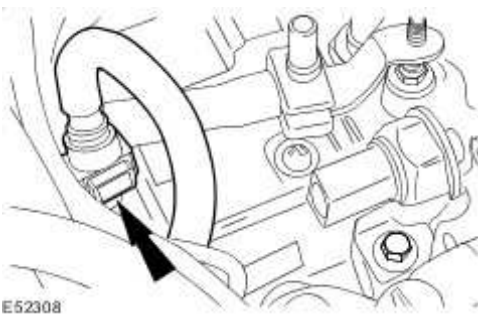
15 . Attach the fuel line.

► Remove and discard the blanking caps.

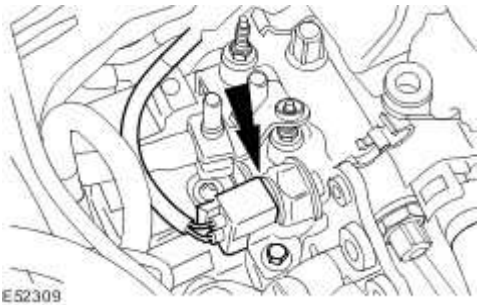


16 . Connect the fuel line.

► Remove and discard the blanking caps.

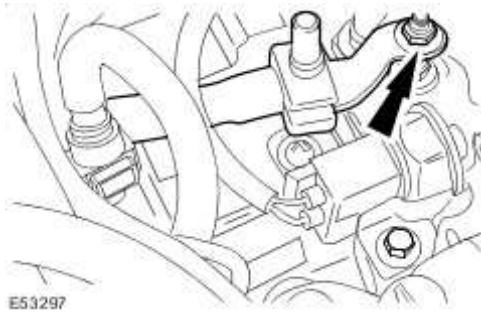


17 . Connect the FRP sensor electrical connector.



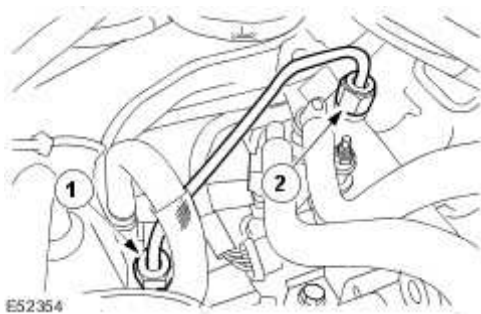
18 . Attach the fuel line retaining nut.

► Tighten to 7 Nm.



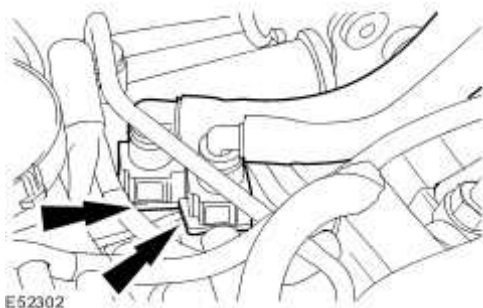
19 Install a new high pressure fuel supply line.

- ▶ Remove and discard the blanking caps.
- ▶ Install but do not tighten the high pressure fuel supply line.
- ▶ Tighten the high-pressure fuel supply line in the sequence shown in four stages:
 - ▶ Stage 1: Tighten the high-pressure fuel supply line union 1 to 15 Nm.
 - ▶ Stage 2: Tighten the high-pressure fuel supply line union 2 to 15 Nm.
 - ▶ Stage 3: Tighten the high-pressure fuel supply line union 1 to 30 Nm.
 - ▶ Stage 4: Tighten the high-pressure fuel supply line union 2 to 30 Nm.

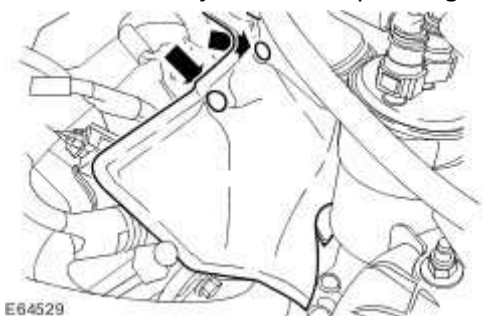


20 . Connect the low pressure fuel inlet and return lines.

- ▶ Remove and discard the blanking caps.

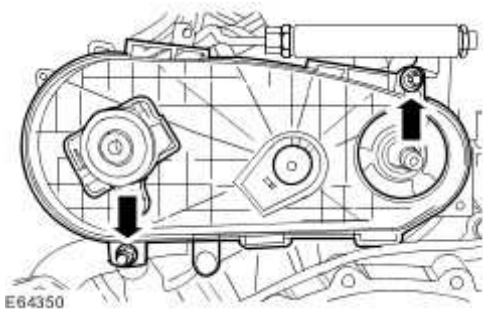


21 . Install the fuel injector sound proofing.



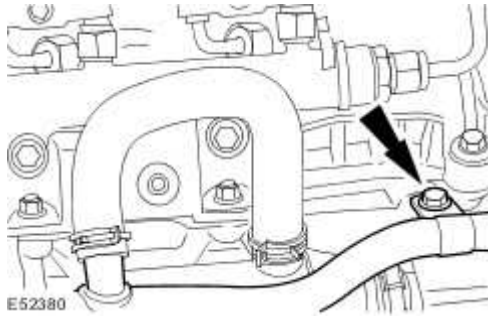
22 . Install the fuel injection pump belt rear cover.

► Tighten to 7 Nm.

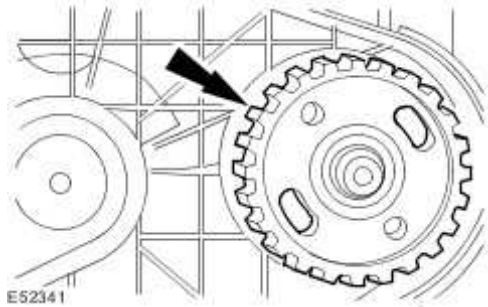


23 . Attach the EGR coolant outlet tube.

► Tighten to 10 Nm.



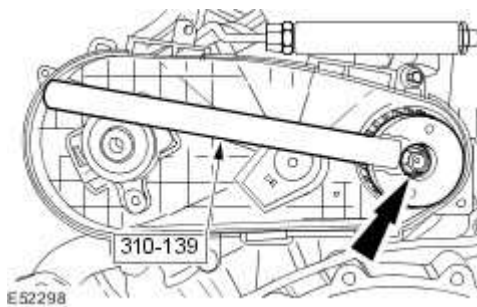
24 . Install the fuel injection pump pulley.



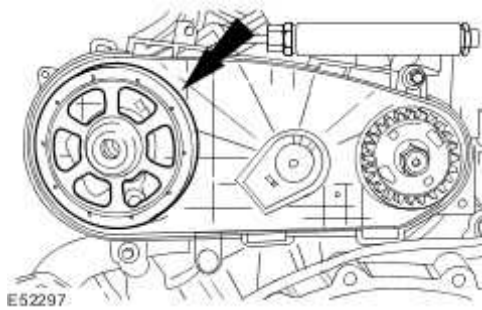
25 . Install the retaining nut.

► Using the special tool, retain the fuel injection pump pulley.

► Tighten to 50 Nm.

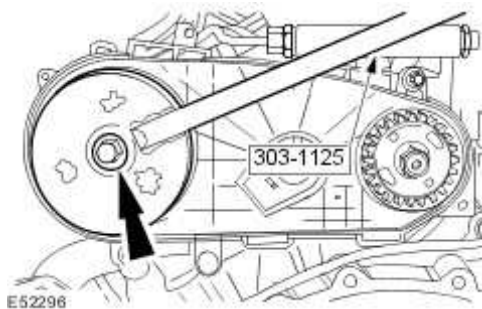


26 . Install the camshaft rear pulley.



27 . Install the new camshaft rear pulley retaining bolt.

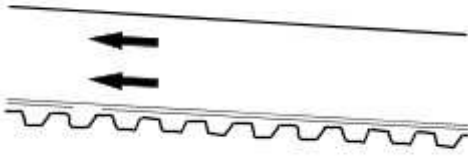
- ▶ Using the special tool, retain the camshaft rear pulley.
- ▶ Tighten the camshaft rear pulley retaining bolt in two stages:
- ▶ Tighten to 80 Nm.
- ▶ Tighten a further 90°.



28 **NOTE:**

The fuel injection pump rotates in an anti-clockwise direction when view from the rear of the engine.

Note the direction of rotation of the fuel injection pump belt.



E52241

29

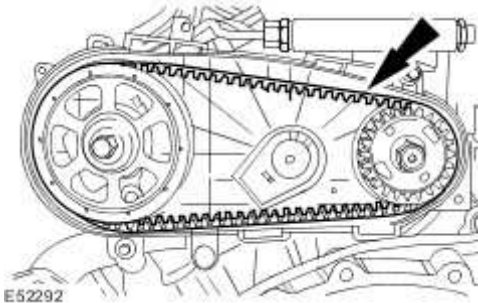


CAUTION: Do not install the new fuel injection pump belt to the pulleys with the fuel injection pump belt tensioner installed. Failure to follow this instruction may result in damage to the fuel injection pump drive belt.

NOTE:

Make sure the new fuel injection pump belt is correctly seated on to the fuel injection pump drive pulleys.

Install a new fuel injection pump belt.



E52292

30

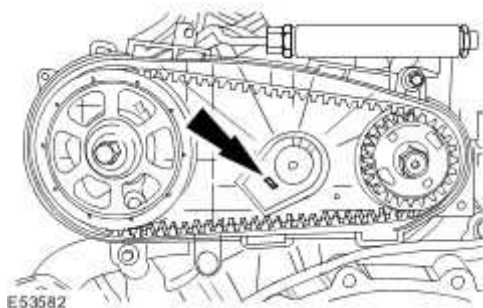


CAUTION: Make sure the fuel injection pump belt tensioner tang is correctly located to the fuel injection pump cover backplate. Failure to follow this instruction may result in damage to the components.

Install the new fuel injection pump belt tensioner.




Locate the tang on the new fuel injection pump belt tensioner into the fuel injection pump cover backplate.

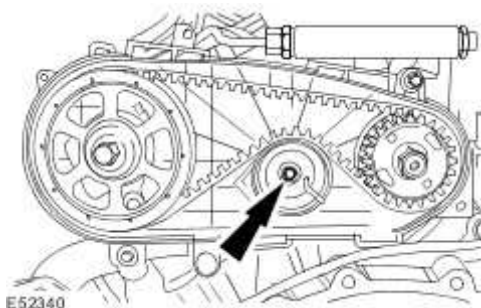


31 NOTE:

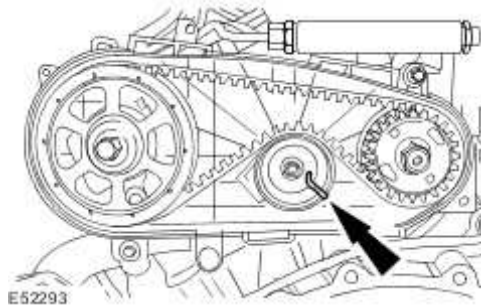
Do not remove the fuel injection pump belt tensioner locking pin before installing the new tensioner.

Install the new fuel injection pump belt tensioner retaining bolt.

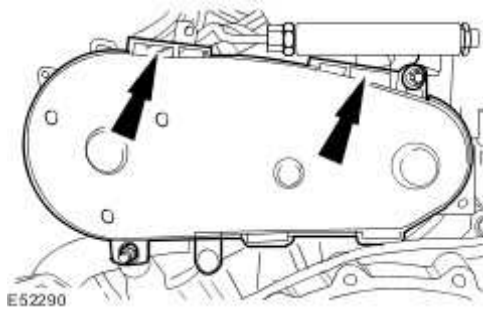
 Tighten to 25 Nm.



32 . Remove and discard the fuel injection pump belt tensioner locking pin.



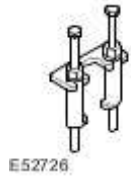
33 . Install the fuel injection pump belt cover.



- 34 . Install the secondary bulkhead center panel.
For additional information, refer to Secondary Bulkhead Center Panel
- 35 . Connect the battery.
For additional information, refer to Battery Connect (86.15.15)
- 36 . Bleed the high-pressure fuel system.
For additional information, refer to

Fuel Injector (18.10.01)

Special Service Tools



Fuel Injector Remover
303-1127

Removal



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high-pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry out any repairs to the fuel system with the engine running. The fuel pressure within the high-pressure fuel system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.



CAUTION: Do not disconnect the fuel injector electrical connectors with the engine running. Failure to follow this instruction may result in serious damage to the vehicle.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

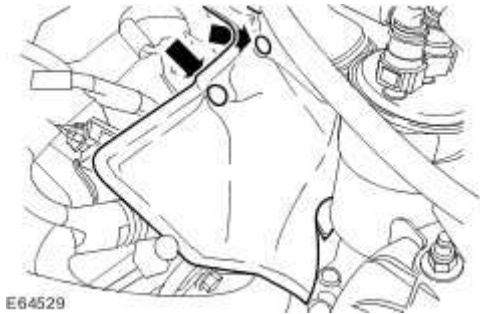


CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any exposed ports.

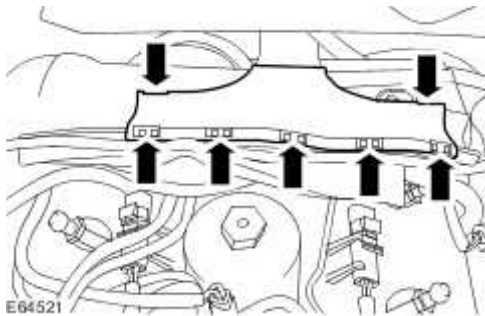


CAUTION: Do not disassemble the fuel injectors or clean the nozzles, even with an ultrasonic cleaner. Always install new fuel injectors when required.

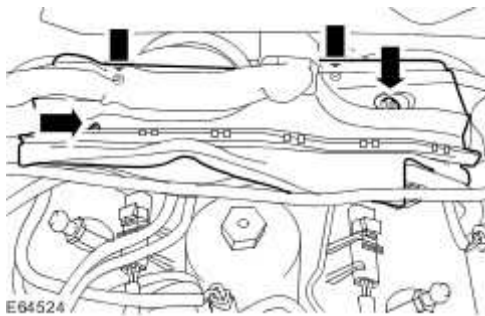
- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Remove the cowl vent screen.
For additional information, refer to Cowl Vent Screen (76.10.01)
- 3 Remove the exhaust gas recirculation (EGR) valve outlet tube.
For additional information, refer to Exhaust Gas Recirculation (EGR) Valve Outlet Tube (17.45.11)
- 4 . Remove the injector sound proofing.



5 . Remove the engine harness cover.



6 . Remove the engine harness casing.



7



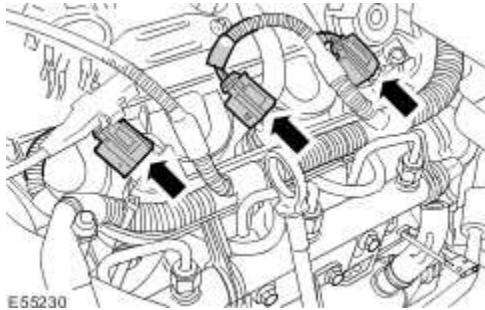
- CAUTION: Protect the fuel injector electrical connectors with lint-free material to prevent contamination from the cleaning fluid. Failure to follow this instruction may result in serious damage to the vehicle.

Clean the fuel injector, high-pressure fuel supply line and surrounding areas.
For additional information, refer to Fuel Injection Component Cleaning

8 . **NOTE:**

Left-hand shown, right-hand similar.

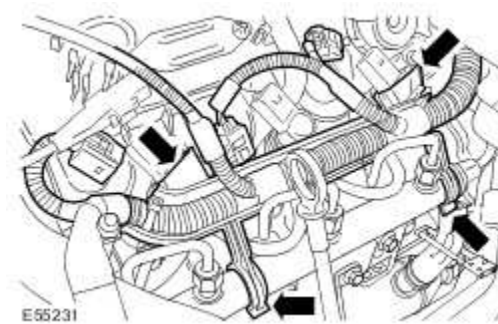
Disconnect the fuel injector electrical connectors.



9 . **NOTE:**

Left-hand shown, right-hand similar.

Detach the fuel injection wiring harness.



10 . Clean around the fuel injector, high-pressure fuel supply line and surrounding areas.

For additional information, refer to Fuel Injection Component Cleaning

11



CAUTION: Make sure that the high-pressure fuel supply line remains in contact with both the fuel injector and the fuel injection supply manifold until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

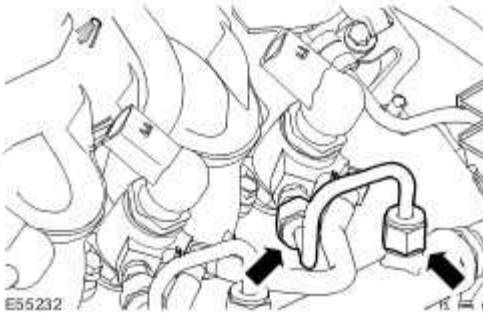


CAUTION: Make sure that the fuel injector adaptor union does not move when loosening the high-pressure fuel supply lines. Failure to follow this instruction may result in serious damage to the vehicle.

NOTE:

Left-hand shown, right-hand similar.

Loosen the high-pressure fuel supply line from the fuel injector and fuel rail.



12



CAUTION: Make sure that the high-pressure fuel supply line remains in contact with both the fuel injector and the fuel injection supply manifold until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

Using the pneumatic vacuum gun, vacuum foreign material from the high-pressure fuel supply line, the fuel injector and the fuel rail.

For additional information, refer to Fuel Injection Component Cleaning

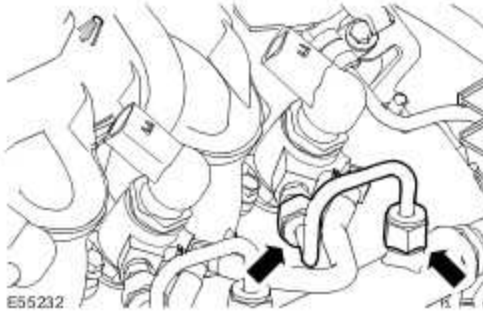
13 **NOTE:**

Left-hand shown, right-hand similar.

Remove and discard the high-pressure fuel supply line.



Install suitable blanking caps to the open threaded ports on the fuel injector and the fuel rail.



- 14 Using the pneumatic vacuum gun, vacuum foreign material from the fuel injector and the fuel rail.

For additional information, refer to Fuel Injection Component Cleaning

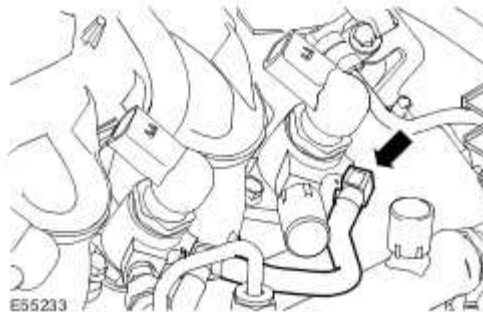
15 **NOTE:**

Left-hand shown, right-hand similar.

Disconnect the fuel return line from the fuel injector.

➤ Remove and discard the fuel return line retaining clip from the fuel injector.

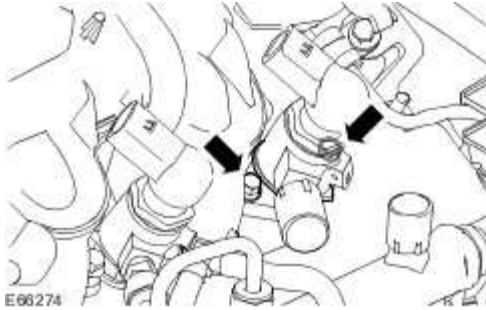
➤ Disconnect the fuel return line from the fuel injector.



16 **NOTE:**

Left-hand shown, right-hand similar.

Remove the fuel injector retaining bolts.



17 . **NOTE:**

Left-hand shown, right-hand similar.

Install the special tool studs.



18

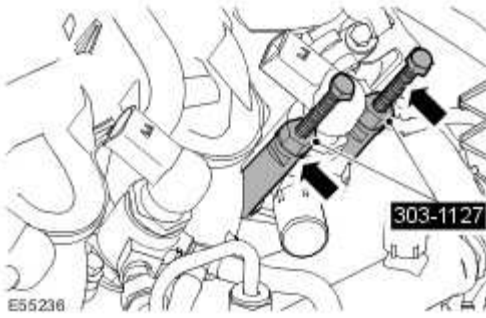


CAUTION: Make sure the fuel injector remover legs are correctly engaged to the fuel injector. Failure to follow this instruction may result in damage to the component.

NOTE:

Left-hand shown, right-hand similar.

Install the special tool puller legs to the studs.



19



CAUTION: Make sure the special tool puller bolts are rotated evenly. Failure to follow this instruction may result in damage to the special tool or fuel injector.

NOTE:

Left-hand shown, right-hand similar.

Using the special tool, remove the fuel injector.

- ▶ Install the special tool locking plate to the puller legs.
- ▶ Rotate the bolts evenly, in a clockwise direction.
- ▶ Remove the fuel injector.
- ▶ Remove the special tool.
- ▶ Remove and discard the fuel injector retaining clamp.
- ▶ Remove and discard the fuel injector sealing washer.



Installation



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high-pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry out any repairs to the fuel system with the engine running. The fuel pressure within the high-pressure fuel system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.



CAUTION: Do not disconnect the fuel injector electrical connectors with the engine running. Failure to follow this instruction may result in serious damage to the vehicle.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel

injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any exposed ports.



CAUTION: Do not disassemble the fuel injectors or clean the nozzles, even with an ultrasonic cleaner. Always install new fuel injectors when required.

1



CAUTION: Do not use tools to install the new fuel return line retaining clip. Failure to follow this instruction may result in damage to the retaining clip.

NOTE:

Install a new fuel return line retaining clip.

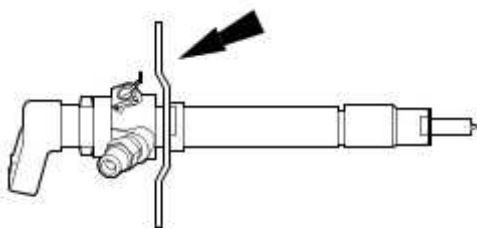
NOTE:

Install a new fuel injector sealing washer.

NOTE:

Install a new fuel injector retaining clamp.

Install a new fuel injector retaining clamp.

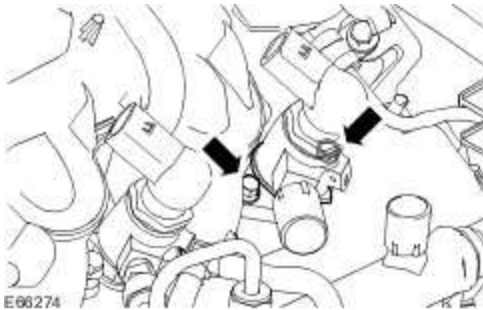


2 . **NOTE:**

Left-hand shown, right-hand similar.

Install the fuel injector.

▶ Tighten to 10 Nm.



3



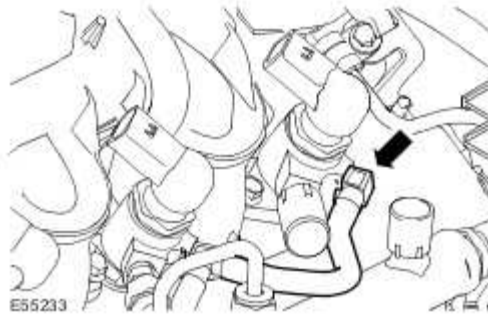
CAUTION: Make sure the fuel return line retaining clip is correctly installed to the fuel injector before installing the fuel return line.


NOTE:

Left-hand shown, right-hand similar.


Connect the fuel return line to the fuel injector.

- ▶ Visually inspect the fuel return line O-ring for damage.
- ▶ Apply a light coating of petroleum jelly to the fuel line return line O-ring.
- ▶ Connect the fuel return line to the fuel injector.



- 4
-  **CAUTION:** Do not allow the unions to hit the olive ends of the high-pressure fuel supply line as this may damage the ends of the line and allow foreign matter enter the fuel injection system.

Position the high-pressure fuel supply line as near to the final installation position as possible and then remove and discard the blanking plugs from the high-pressure fuel supply line.

- 5
-  **CAUTION:** Maintain pressure on the high-pressure fuel supply line to keep the olives in contact with the fuel injectors and the fuel injection supply manifold cones while installing the unions.

NOTE:

Install the high-pressure fuel supply lines to the fuel rail end first followed by the fuel injector end.

NOTE:

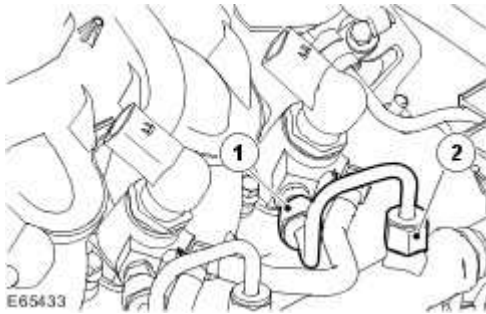
Left-hand shown, right-hand similar.

Install the new high-pressure fuel supply line.

- ▶ Tighten the high-pressure fuel supply line in the sequence shown:
- ▶ Tighten the high-pressure fuel supply line union 1 to fuel injector to 15 Nm.
- ▶ Tighten the high-pressure fuel supply line union 2 to fuel rail to 15 Nm.

► Tighten the high-pressure fuel supply line union 1 to fuel injector to 30 Nm.

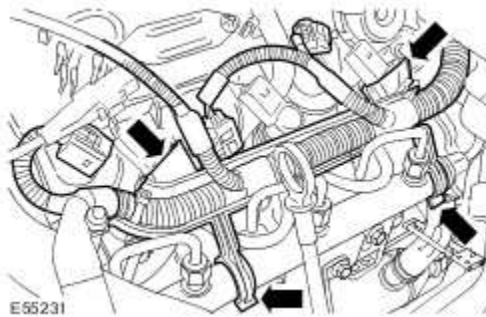
► Tighten the high-pressure fuel supply line union 2 to fuel rail to 30 Nm.



6 . NOTE:

Left-hand shown, right-hand similar.

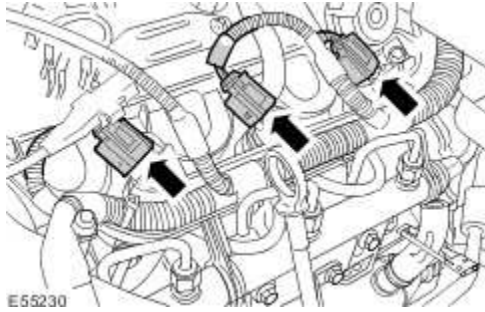
Attach the fuel injection wiring harness.



7 . NOTE:

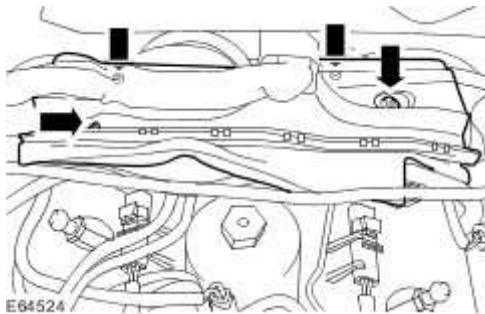
Left-hand shown, right-hand similar.

Connect the fuel injector electrical connectors.

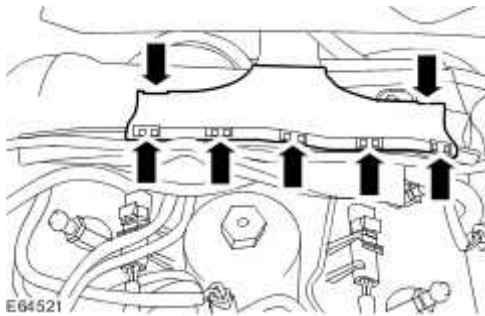


8 . Install the engine harness casing.

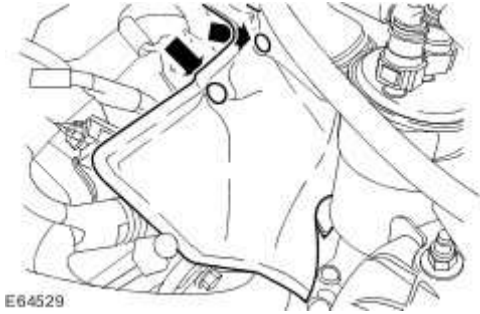
▶ Tighten to 4 Nm.



9 . Install the engine harness cover.




10 . Install the injector sound proofing.



- 11 Install the EGR valve outlet tube.
 - For additional information, refer to Exhaust Gas Recirculation (EGR) Valve Outlet Tube (17.45.11)

- 12 . Install the cowl vent screen.
 - For additional information, refer to Cowl Vent Screen (76.10.01)

- 13 . Connect the battery ground cable.
 - For additional information, refer to Battery Connect (86.15.15)

- 14  **WARNING:** Do not carry out any repairs to the fuel system with the engine running. The fuel pressure within the high-pressure system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.

NOTE:

The fuel return line must be renewed if any leaks are found from the fuel return line O-rings.

Start the engine and check visually for fuel leaks.

Fuel Rail

Removal

1



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry out any repairs to the fuel system with the engine running. The fuel pressure within the high-pressure system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking caps to any open orifices or lines.

Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

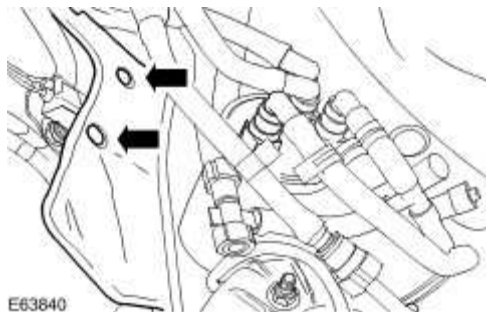
- 2 . Remove the secondary bulkhead center panel.

For additional information, refer to Secondary Bulkhead Center Panel

- 3 . **NOTE:**

Left-hand shown, right-hand similar.

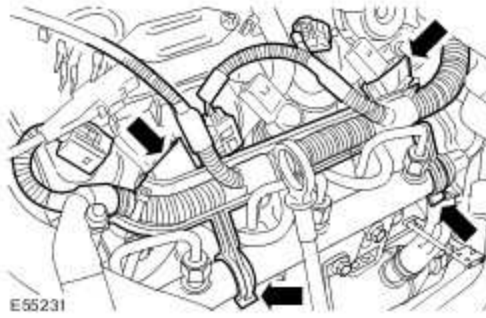
Remove the injector sound proofing.



- 4 . **NOTE:**

Left-hand shown, right-hand similar.

Detach the injector harness from the fuel rail.

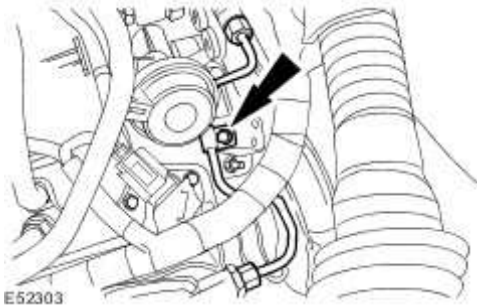


- 5 . Clean around the high-pressure fuel supply line and surrounding areas.
For additional information, refer to Fuel Injection Component Cleaning

6 . **NOTE:**

Left-hand shown, right-hand similar.

Remove the high pressure fuel supply line clamp retaining bolt.



7



CAUTION: Make sure that the high-pressure fuel supply line remains in contact with the fuel rail and fuel injection diverter rail until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

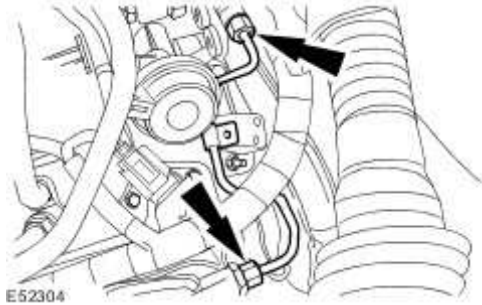


CAUTION: Make sure the tool used to loosen the high-pressure fuel supply line unions is used at the top of the unions as this is where there is most material. Failure to follow this instruction may result in damage to the unions.

NOTE:

Left-hand shown, right-hand similar.

Loosen the high pressure fuel supply line.



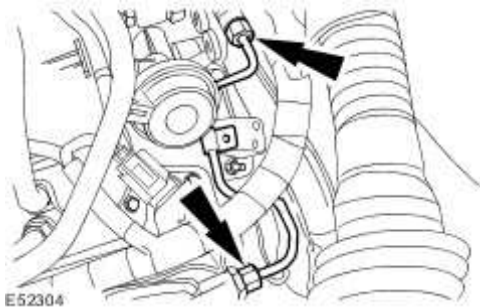
- 8 Using the pneumatic vacuum gun, vacuum foreign material from the high-pressure fuel supply line, the fuel injection diverter rail and the fuel rail.
For additional information, refer to Fuel Injection Component Cleaning

9 **NOTE:**

Left-hand shown, right-hand similar.

Remove and discard the high pressure fuel supply line.

- ▶ Install suitable blanking caps to the open threaded ports on the fuel injection diverter rail and fuel rail.



10



CAUTION: Make sure that the high-pressure fuel supply lines remain in contact

with both the fuel injectors and the fuel rail until all unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Do not use any aggressive cleaning fluid or a wire brush to clean the fluid injector nozzle.

Using the pneumatic vacuum gun, vacuum foreign material from the high-pressure fuel supply lines, the fuel injectors and the fuel injection supply manifold.

For additional information, refer to Fuel Injection Component Cleaning

11



CAUTION: Make sure that the high-pressure fuel supply lines remain in contact with both the fuel injectors and the fuel rail until all unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Make sure that the fuel injector adaptor unions do not move when loosening the high-pressure fuel supply lines. Failure to follow this instruction may result in damage to the fuel injectors or the fuel injector adaptor unions.

NOTE:

Left-hand shown, Right hand similar.

Loosen the high-pressure fuel supply lines from the fuel injectors and fuel rail.

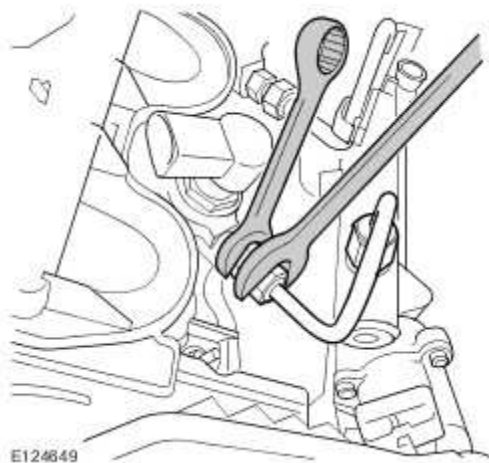


12 **NOTE:**

Left-hand shown, Right hand similar.

Remove and discard the high-pressure fuel supply lines.

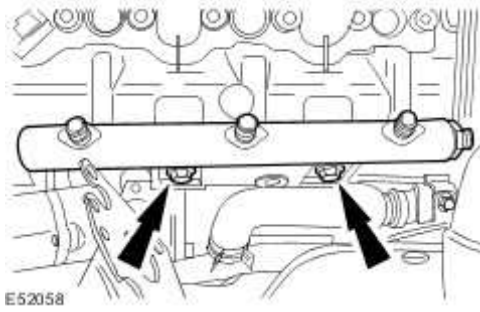
- ▶ Install suitable blanking caps to the open threaded ports on the fuel injectors and the fuel rail.



13 . **NOTE:**

Left-hand shown, right-hand similar.

Remove the fuel rail.



Installation

1



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry out any repairs to the fuel system with the engine running. The fuel pressure within the high-pressure system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in

foreign matter ingress to the fuel injection system.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking caps to any open orifices or lines.

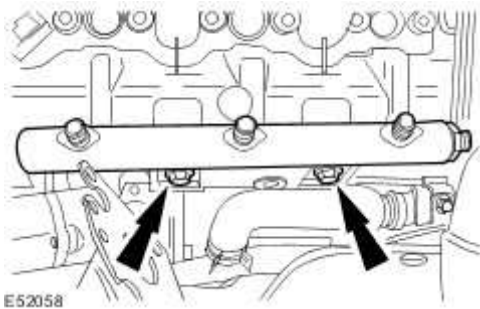
NOTE:

Left-hand shown, right-hand similar.

Install the fuel rail.



Tighten to 24 Nm.



2



CAUTION: Do not allow the unions to hit the olive ends of the high-pressure fuel supply line as this may damage the ends of the line and allow foreign matter enter the fuel injection system.

Position the high-pressure fuel supply lines as near to the final installation position as possible and then remove and discard the blanking plugs from the high-pressure fuel supply lines and fuel rail.

3



CAUTION: Do not allow the unions to hit the olive end of the high-pressure fuel

supply line and allow foreign matter to enter the fuel injection system.



CAUTION: Maintain pressure on the high pressure fuel supply line to keep the olives in contact with the fuel injectors and the fuel rail cones while installing unions.

NOTE:

Remove and discard the blanking caps.

Install the new high-pressure fuel supply lines.

- 1) Install the new high-pressure fuel supply line, tighten the fuel supply line unions finger tight.

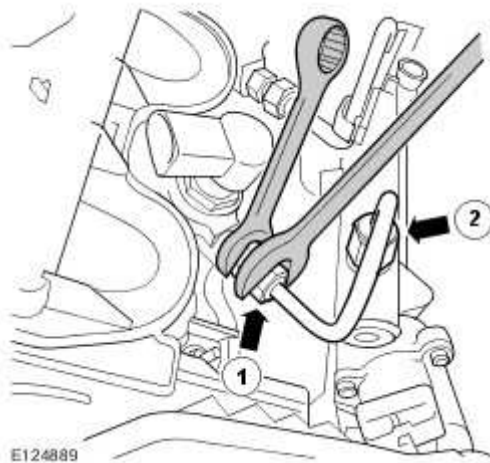
▶ Tighten the high-pressure fuel supply lines in the sequence shown in four stages:

▶ Stage 1: Tighten the high-pressure fuel supply line union 1 to 15 Nm.

▶ Stage 2: Tighten the high-pressure fuel supply line union 2 to 15 Nm.

▶ Stage 3: Tighten the high-pressure fuel supply line union 1 to 30 Nm.

▶ Stage 4: Tighten the high-pressure fuel supply line union 2 to 30 Nm.



4



CAUTION: Do not allow the unions to hit the olive ends of the high-pressure fuel supply line as this may damage the ends of the line and allow foreign matter enter the fuel injection system.

NOTE:

Left-hand shown, right-hand similar.

Install new high-pressure fuel supply line.

- 1) Install the new high-pressure fuel supply line, tighten the fuel supply line unions finger tight.

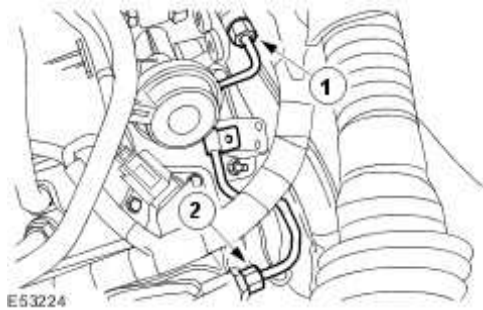
▶ Tighten the high-pressure fuel supply line in the sequence shown in four stages:

▶ Stage 1: Tighten the high-pressure fuel supply line union 1 to 15 Nm.

▶ Stage 2: Tighten the high-pressure fuel supply line union 2 to 15 Nm.

▶ Stage 3: Tighten the high-pressure fuel supply line union 1 to 30 Nm.

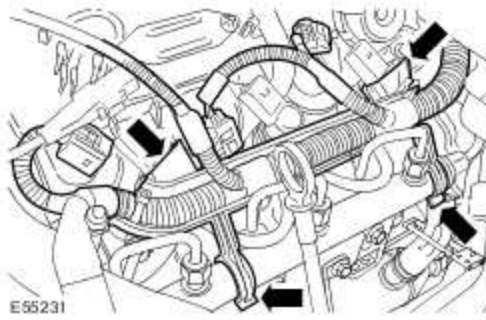
▶ Stage 4: Tighten the high-pressure fuel supply line union 2 to 30 Nm.



5 . **NOTE:**

Left-hand shown, right-hand similar.

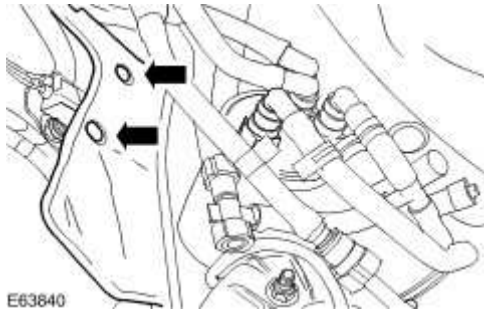
Attach the injector harness to the fuel rail.



6 . **NOTE:**

Left-hand shown, right-hand similar.

Install the injector sound proofing.



7 . Install the secondary bulkhead center panel.

For additional information, refer to Secondary Bulkhead Center Panel

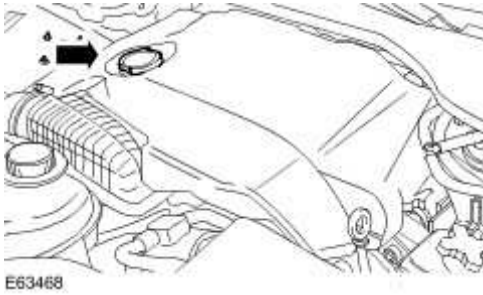
8 . Connect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)

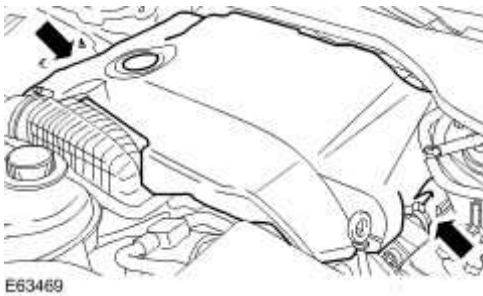
Intake Air Shutoff Throttle

Removal

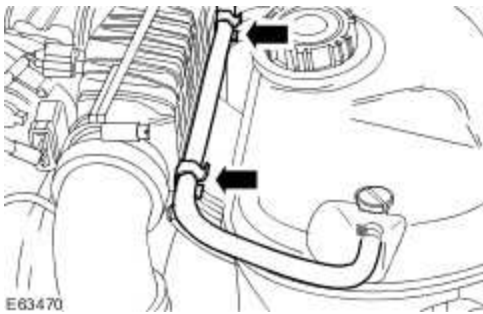
- 1 . Remove the oil filler cap.



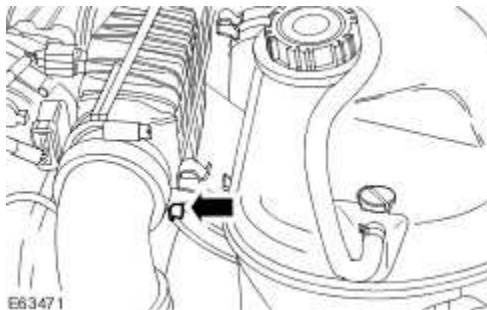
- 2 . Remove the engine cover.



- 3 . Detach the coolant hose.



- 4 . Remove the retaining bolt.

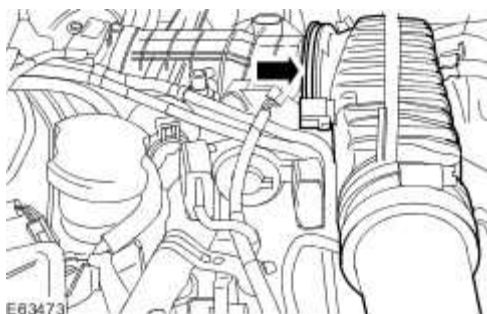


5 . Disconnect the electrical connectors.

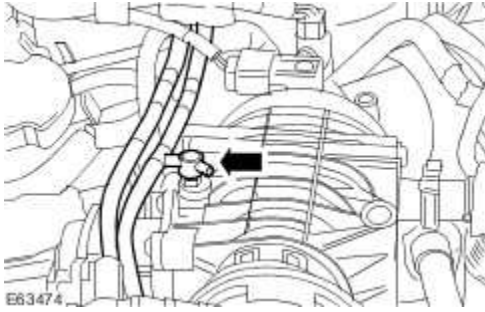


6 . Detach the intake air shutoff throttle elbow.

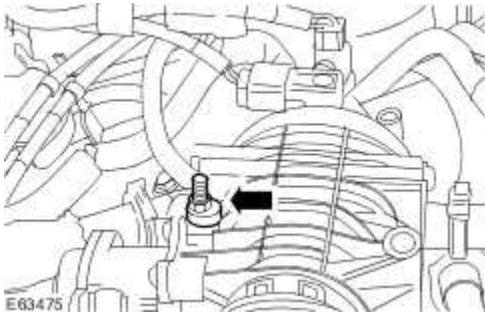
► Release the retaining clip.



7 . Detach the vacuum hoses.

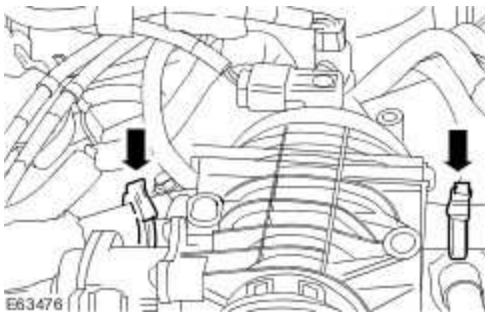


8 . Remove the retaining bolt.

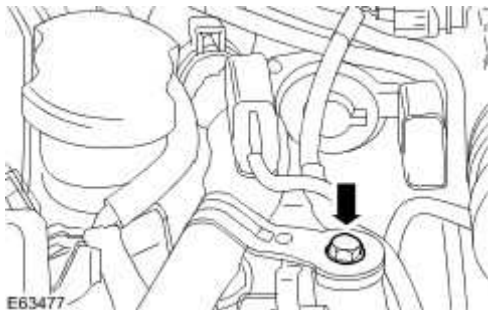


9 . Detach the exhaust gas recirculation (EGR) valve outlet tube retaining clips.

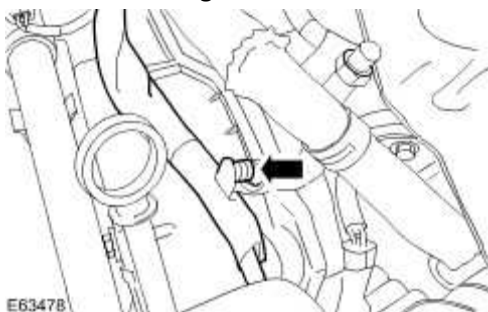
► Discard the retaining clips.



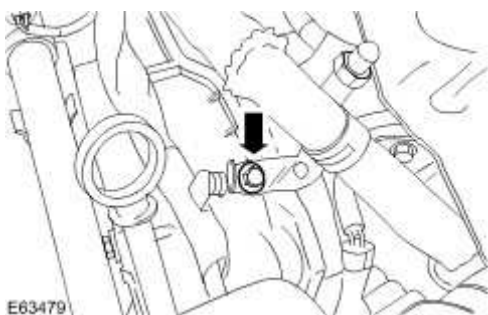
10 . Remove the right-hand EGR valve outlet tube retaining bolt.



- 11 . Detach the wiring harness from the left-hand EGR valve outlet tube retaining bracket.



- 12 . Remove the left-hand EGR valve outlet tube retaining bolt.



- 13 . **NOTE:**

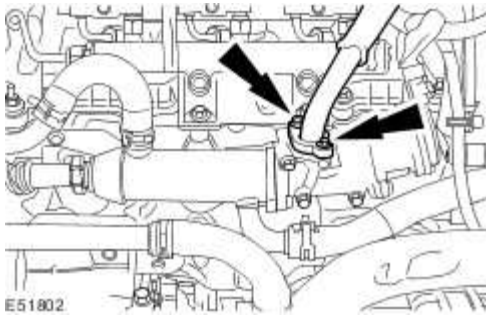
Engine shown removed for clarity.

NOTE:

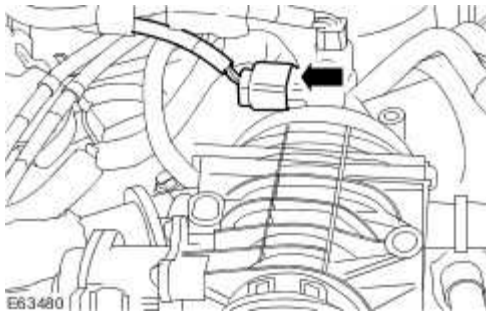
Right-hand shown, left-hand similar.

Remove the right-hand and left-hand EGR valve outlet tubes.

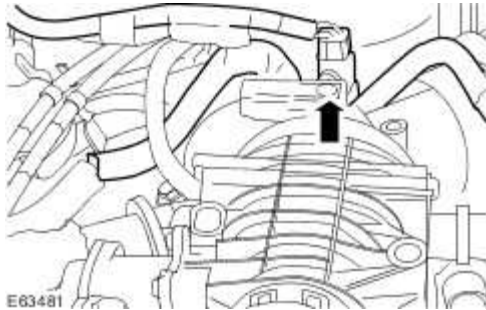
► Discard the gaskets.



14 . Disconnect the electrical connector.



15 . Detach the fuel return line valve from the intake air shutoff throttle.

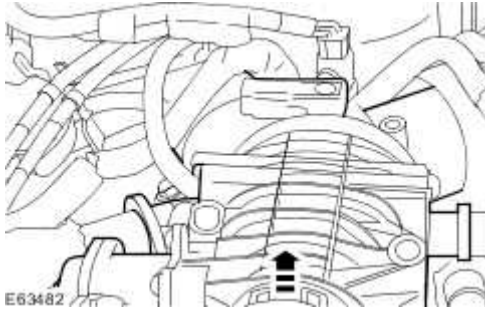



16



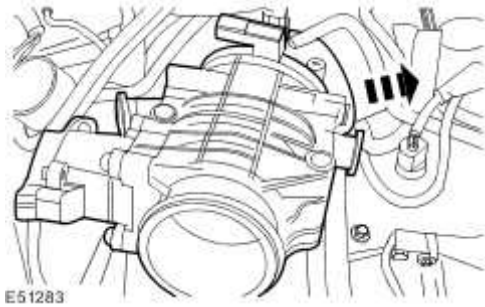
CAUTION: Make sure the fuel return line valve retaining clip is not damaged.
Failure to follow this instruction may result in damage to the vehicle.


Reposition the intake air shutoff throttle.



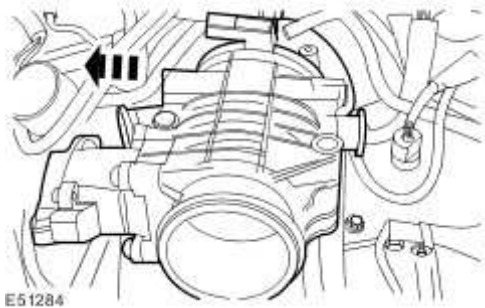
- 17  **CAUTION:** Make sure the fuel return line valve retaining clip is not damaged.
Failure to follow this instruction may result in damage to the vehicle.

Reposition the intake air shutoff throttle.

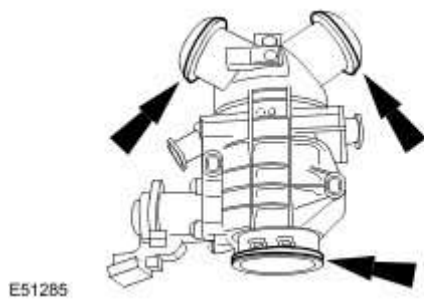


- 18  **CAUTION:** Make sure the fuel return line valve retaining clip is not damaged.
Failure to follow this instruction may result in damage to the vehicle.

Remove the intake air shutoff throttle.



- 19 . Remove and discard the intake air shutoff throttle seals.



Installation

1 . NOTE:

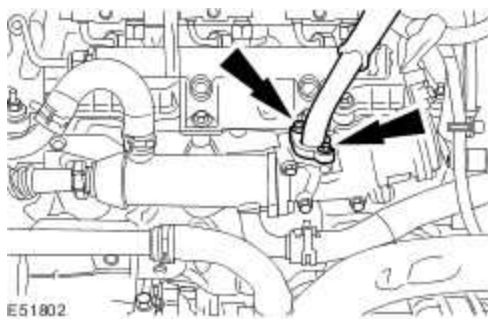
Engine removed for clarity.

NOTE:

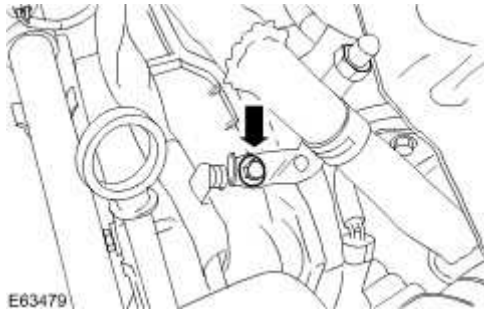
Right-hand shown, left-hand similar

To install, reverse the removal procedure.

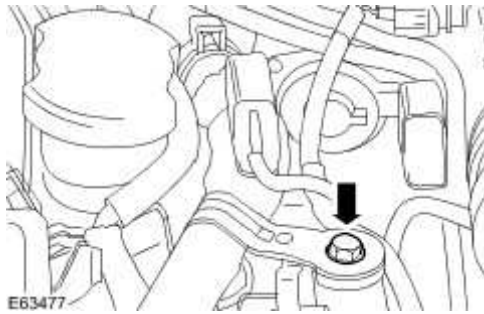
1) Tighten to 10 Nm.



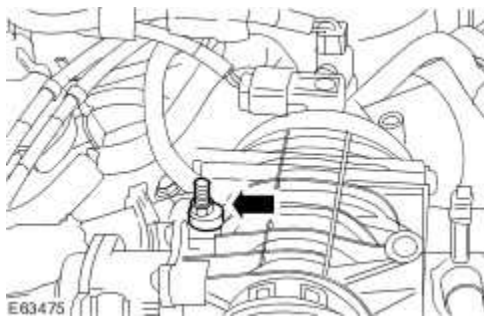
2 . Tighten to 5 Nm.



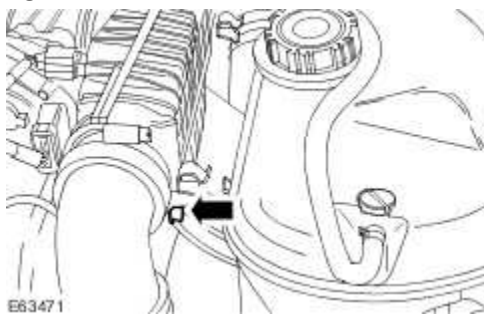
3 . Tighten to 5 Nm.



4 . Tighten to 10 Nm.



5 . Tighten to 10 Nm.



Swirl Plate Actuator Diaphragm

Removal

NOTE:

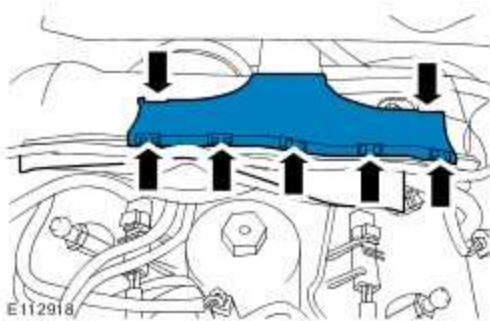
Removal steps in this procedure may contain installation details.

- 1 . Remove the cowl vent screen.

For additional information, refer to Cowl Vent Screen (76.10.01)

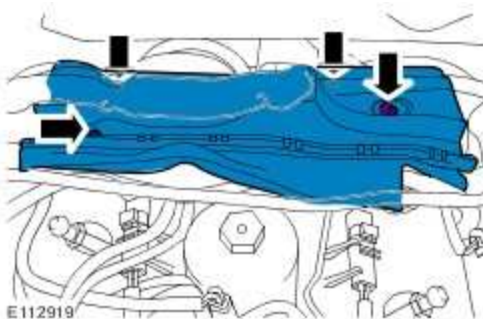
- 2 . Remove the wiring harness cover.

▶ Release the 7 clips.



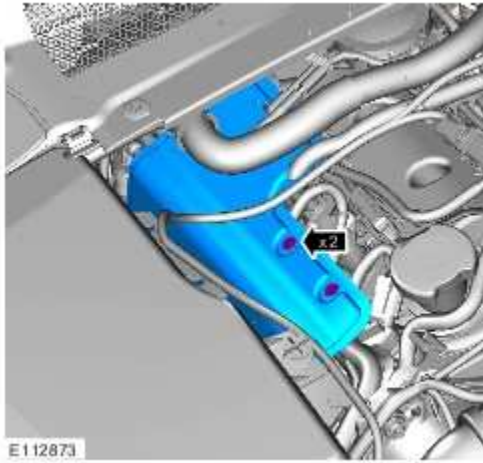
- 3 . Remove the wiring harness carrier.

▶ Remove the 4 bolts.



4 . Remove the RH injector sound proofing.

▶ Release the 2 clips.



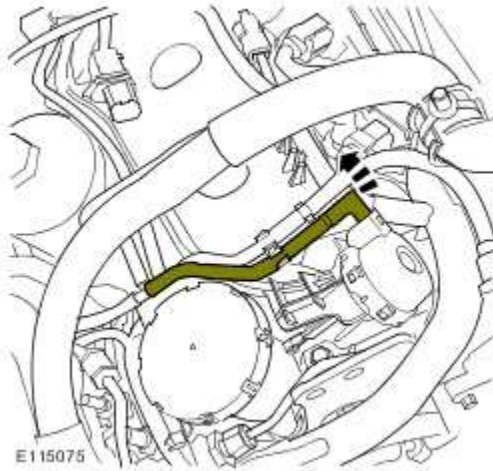
5 Check the port deactivation hoses are a secure fit onto the stub pipe and for signs of being
· trapped or chaffing.

▶ If the valve does not hold vacuum continue with the replacement of the diaphragm.

▶ If the valve holds vacuum check the valve on the other side of the engine.

▶ If one side is found not to hold vacuum then both diaphragms are to be changed.

6 . Disconnect the port deactivation valve vacuum hoses.



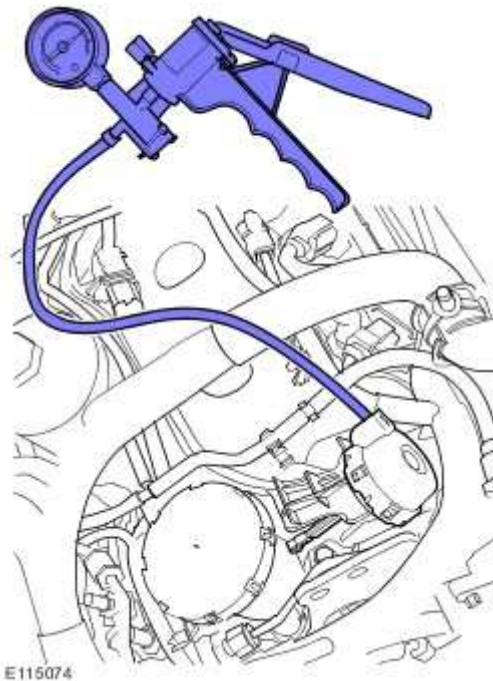
7 NOTE:

Check the vacuum gauge and any hoses to be used for leaks prior to using on the vehicle.

NOTE:

Make sure the vacuum gauge hose is a secure fit to the port deactivation diaphragm caps.

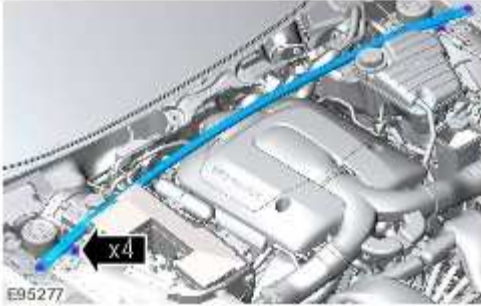
Using a vacuum gauge, check the port deactivation valve diaphragms.



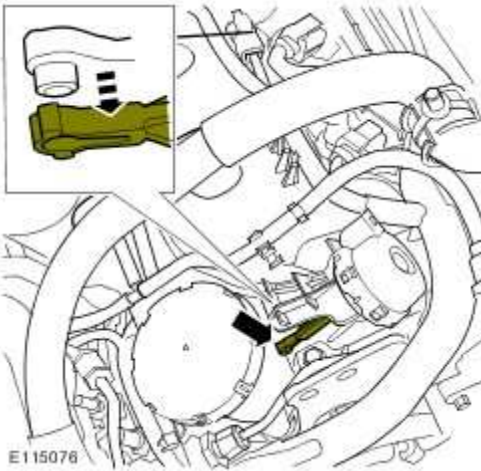
8 NOTE:

Some variation in the illustrations may occur, but the essential information is always correct.

Remove the engine bay brace.



9 . Release the port deactivation valve connecting rod.



10 NOTE:

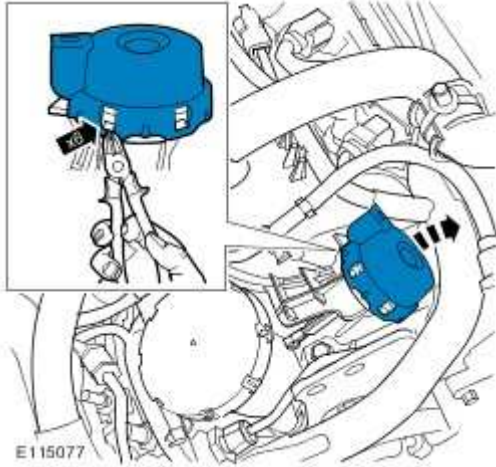
Cut the retaining clips off the old port deactivation diaphragm caps to aid removal.

NOTE:

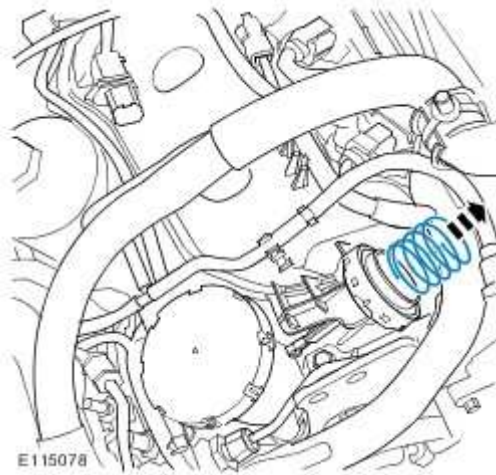
Make sure the valve cover is not damaged during removal of the port deactivation diaphragm cap.

Remove the port deactivation valve cap.

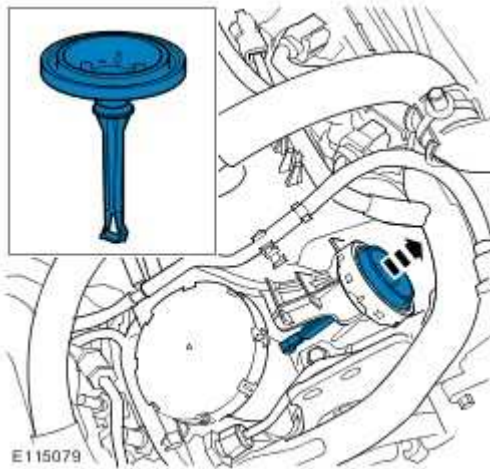
- ▶ Release the 6 clips.
- ▶ Check the diaphragm for splits or damage.



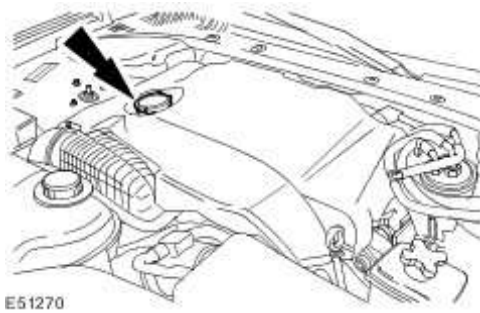
11 . Remove the port deactivation valve spring.



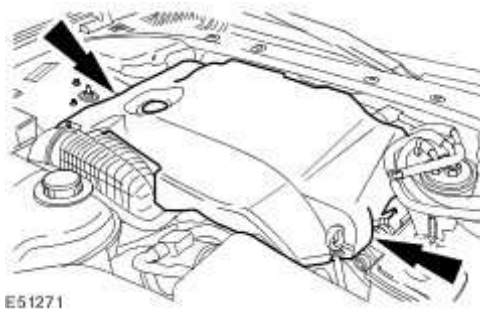
12 . Remove the port deactivation valve connecting rod and diaphragm.



13 . Remove the oil filler cap.



14 . Remove the engine cover.



Installation

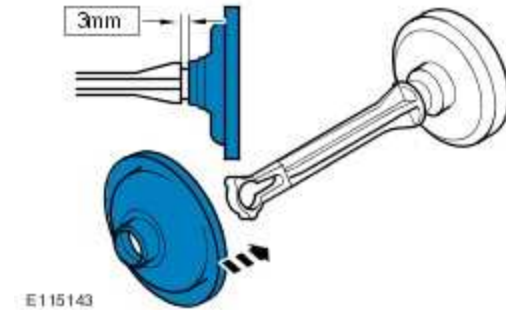
1 . **NOTE:**

Apply a small amount water to the diaphragm to aid installation.

NOTE:

Make sure the diaphragm is fully seated on the connecting rod.

Install the new port deactivation diaphragm to the new connecting rod.



2



CAUTION: Make sure that the mating faces are clean and free of foreign material.

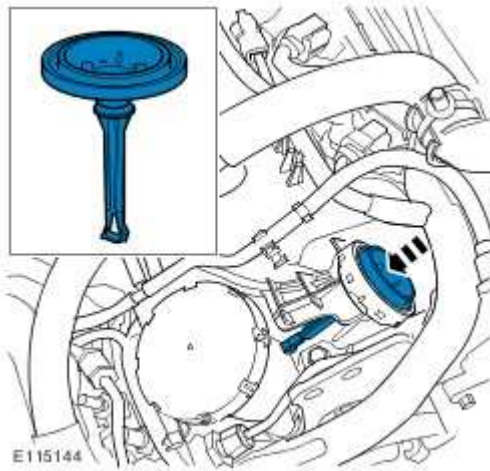


CAUTION: Make sure the port deactivation rod is correctly aligned to the port deactivation valve arm.

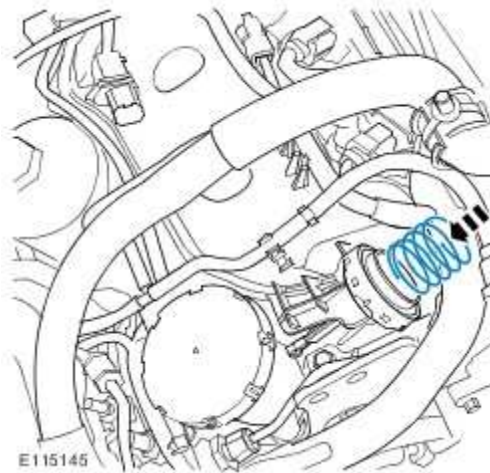
NOTE:

Make sure the new port deactivation diaphragm and rod are installed in the correct orientation to the port deactivation linkage.


Install the port deactivation valve connecting rod and diaphragm.



3 . Install the port deactivation valve spring.



4  **CAUTION:** Using a mirror check all clips are fully latched.

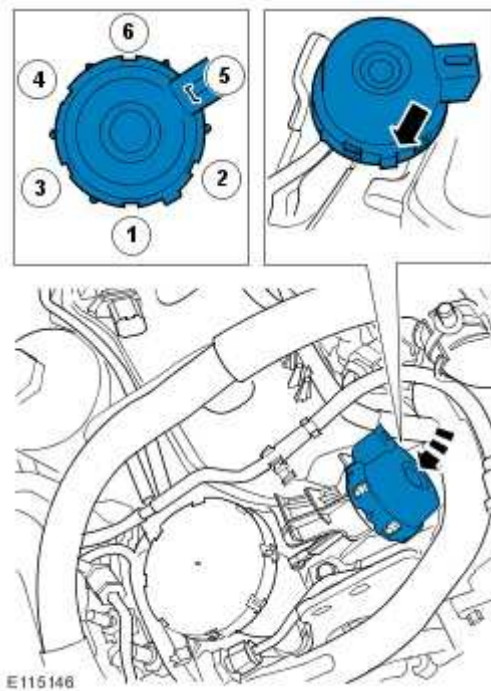
 **CAUTION:** Make sure the port deactivation rod is not rotated once the cap has been installed, if rotation occurs the diaphragm will be damaged.

NOTE:

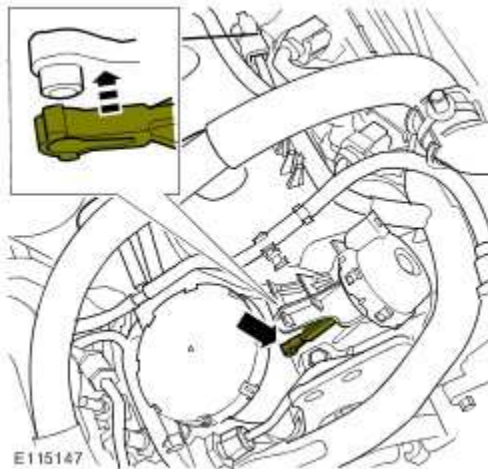
An audible click is heard when the clips are fully latched.

Install the port deactivation valve cap.

- ▶ Make sure the cap is correctly aligned within the timing marks.
- ▶ Secure the clips in the sequence shown.



5 . Attach the port deactivation valve connecting rod.

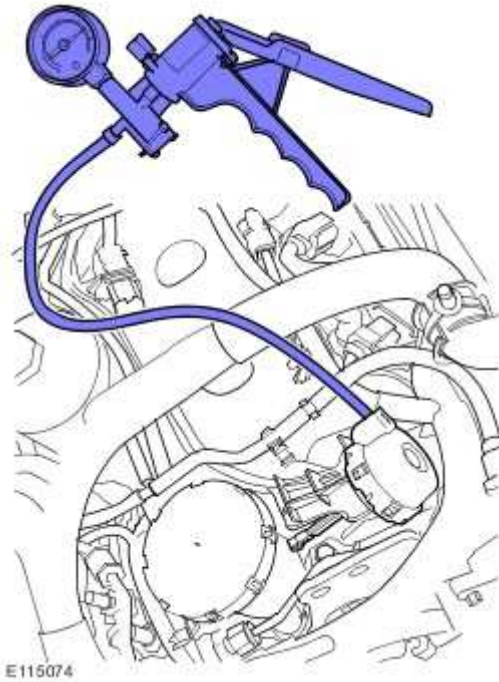


6 . Repeat the above procedure on the opposite side.

7 NOTE:

Check the vacuum gauge and any hoses to be used for leaks prior to using on the vehicle.

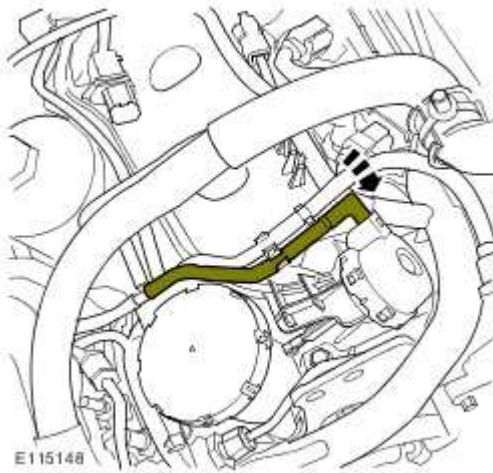
Check the port deactivation valve diaphragms using a vacuum gauge.



8 NOTE:

When the LH hose is re-connected to the valve the right angle bend must be turned downwards, make sure the hose lies correctly in the gap between the engine cover support and the valve cover.

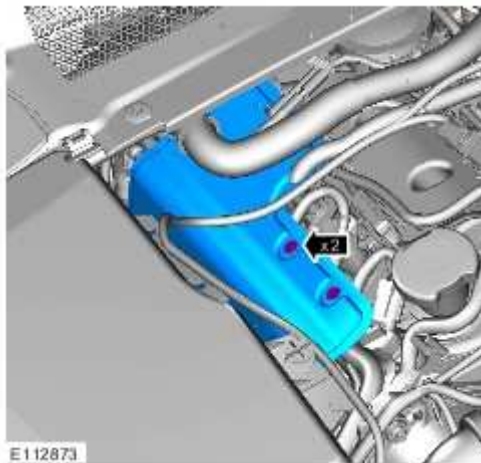
Connect the port deactivation valve vacuum hoses.



9 . Position the port deactivation hose as shown in illustration.

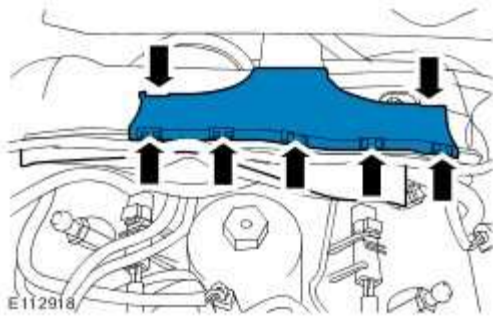
10 . Install the RH injector sound proofing.

► Secure with the clips.



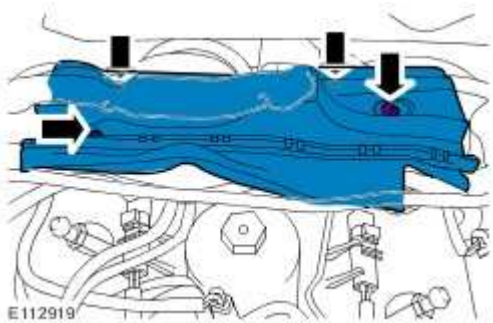
11 . Install the wiring harness cover.

► Secure in the clips.



12 . Install the wiring harness carrier.

▶ Install the bolts. TORQUE: 10 Nm



13 . Install the cowl vent screen.

For additional information, refer to Cowl Vent Screen (76.10.01)

14



CAUTION: Correct installation of the oil filler cap can be obtained by tightening the cap until an audible click is heard.

Install the engine cover.

303-04D : Fuel Charging and Controls – Turbocharger – 2.7L Diesel

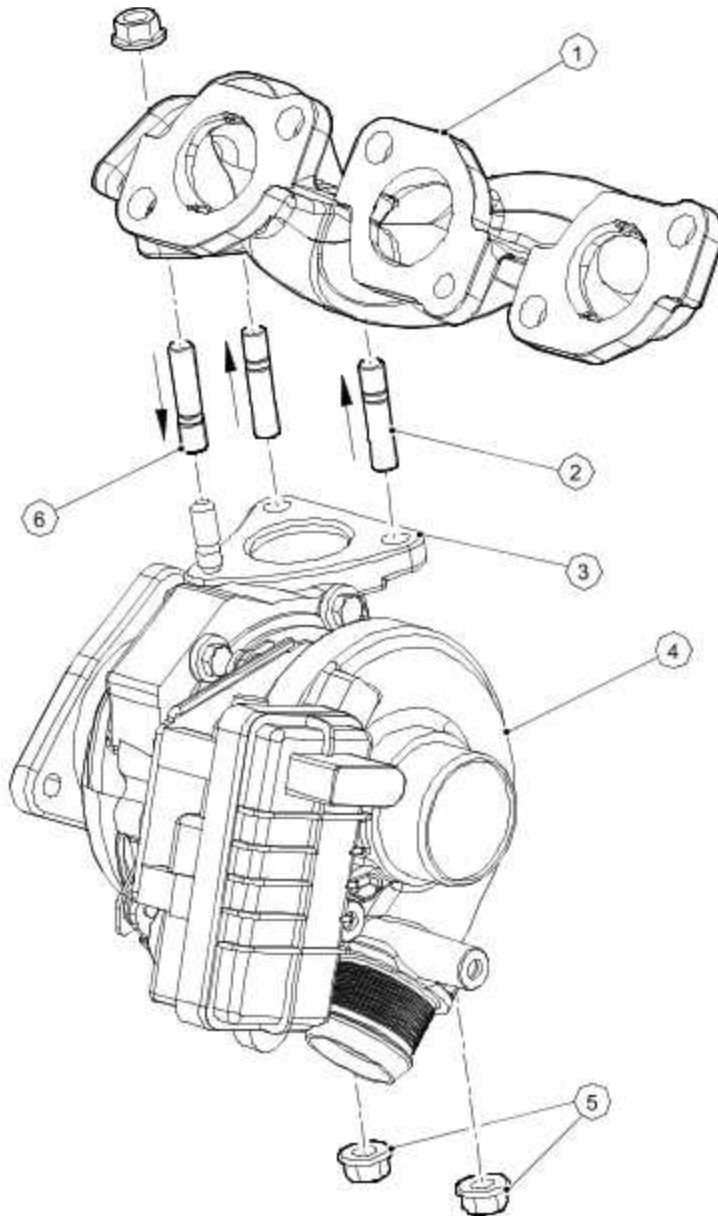
Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Oil supply tube union to turbocharger retaining bolt	30	22	–
Oil supply tube to cylinder block retaining bolt	10	–	89
Oil return tube to turbocharger retaining bolts	10	–	89
Oil return tube to cylinder block retaining bolt	10	–	89
Turbocharger to exhaust manifold retaining nuts	23	17	–
Turbocharger support bracket retaining bolts	23	17	–
Turbocharger heatshield retaining bolts	10	–	89

Turbocharger



E52144

Item	Part Number	Description
1	—	Exhaust manifold
2	—	Exhaust manifold studs
3	—	Turbocharger mounting flange

4	—	Turbocharger
5		Turbocharger retaining nuts
6		Exhaust manifold stud (note orientation of stud)

Variable Vane Turbocharger

The engine is fitted with twin variable vane Turbochargers, electronically controlled, one to each bank. The turbochargers are fixed to the exhaust manifold by a three hole flange. The turbocharger consists of two elements, a turbine and a compressor both installed on a single shaft.

The turbocharger bearings are supplied with oil from the engine.

The turbine uses the flow of the exhaust gas to drive the compressor. The compressor draws air through the air cleaner and forces it into the intake manifold.

Principles of Operation - Variable vane turbocharger

The turbocharger is designed to improve engine induction and engine performance. The list below details the concerns relating to turbocharger performance.

High engine speed produces excessive turbine speed and therefore creates excessive turbocharger boost pressure.

Low engine speed does not produce sufficient turbine speed and therefore not enough turbocharger boost pressure is achieved.

The turbocharger does not have a wastegate control valve. Instead, it has variable turbocharger vanes which are located in the turbocharger turbine housing and these direct the air flow into the turbocharger turbine. The turbocharger vanes act as the control for the turbocharger boost pressure.

The turbocharger produces its full turbocharger boost pressure over the entire engine speed range, not just at high engine speed. This is achieved through the adjustment of the vanes and the resulting change in the flow of the exhaust gas.

The speed of the exhaust gas flow within the turbocharger is increased independent of engine speed by varying the intake cross section in front of the turbocharger turbine. This is achieved by adjusting the angle of the vanes controlling the air flow into the turbocharger turbine and this then drives the turbocharger turbine faster. The higher turbocharger speed produces a high turbocharger boost pressure at all engine speeds.

The engine control module (ECM) controls the turbocharger vanes by means of an electronic vane adjustment solenoid attached to the turbocharger.

Regulation at Low Engine Speed

At low engine speeds the ECM operates the vane adjustment solenoid. The vane adjustment solenoid moves the adjusting ring so that the vanes are set at a shallow angle. The shallow intake cross section this creates for the stream of exhaust gas allows the turbocharger boost pressure to build up rapidly and easily at low engine speeds.

Regulation at Moderate Engine Speed

As the engine speed increases and the quantity of exhaust gas increases, the vane adjustment solenoid moves the adjusting ring so that the vanes are set at a steeper angle. The steeper angle opens the intake cross section effectively reducing the gas flow, and turbine speed, while maintaining constant turbocharger boost pressure.

Regulation at Maximum Engine Speed

As the engine speed increases the intake cross section in front of the turbocharger turbine is continuously enlarged. The turbine speed and hence the quantity of the air supplied to the engine, is adjusted to suit the engine speed. This means that the turbocharger boost pressure remains optimized over all engine speeds.

The maximum position of the turbocharger vanes (maximum opening cross section) is also an emergency position, in the event of an electrical concern. This lowers the chance of engine damage due to excessive boost in the event of a turbocharger control concern.

Turbocharger

Principle of operation

The turbochargers used on the 2.7L diesel engine are **variable geometry** units, which means that the amount of boost generated can be varied according to the engine load, not just the engine speed.

The vane angles are varied by solenoids mounted on the turbochargers.

The solenoid operation is governed by the engine control module in response to engine load and conditions, ensuring the correct boost pressure for the prevailing conditions.

For information on the operation of the system,
Turbocharger

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

Inspection and Verification



WARNING: The following tests may involve working in close proximity to hot components. Make sure adequate protection is used. Failure to follow this instruction may result in personal injury.



WARNING: The turbochargers can continue to rotate after the engine has stopped. Do not attempt to check the turbochargers until one minute has elapsed since the engine was switched off. Failure to follow this instruction may result in personal injury.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

NOTE:

If diagnostic trouble codes (DTCs) are recorded and the symptom is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

NOTE:

This section contains references to Parameter Identifiers (PIDs). Where the Jaguar approved diagnostic system is not available, a scantool may be used to access these PIDs, all of which give information, and some of which can be used to both read information and to activate components. The format of the information may vary, depending on the tool used.

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Intake air system	Circuit(s)
Hose(s)/hose connections	Turbocharger actuator(s)
Turbocharger(s)	Engine control module (ECM)
General engine condition.	Electrical connections and harnesses to the turbocharger(s)

- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC index, or the symptom chart if no DTCs are set.

Symptom chart

Symptom	Possible source	Action
Poor performance	Low/Contaminated fuel Restricted air intake system General engine condition ECM failure	Check the fuel level and condition, Fuel Charging and Controls Check the air intake for restriction, Intake Air Distribution and Filtering Check the engine condition, compressions, etc, Engine - 2.7L Diesel Check for DTCs. Refer to the warranty policy and procedures manual if an ECM is suspect.

No boost	<p>Electrical connections and harnesses to the turbocharger(s)</p> <p>Restricted air intake system</p> <p>Charge air cooler restricted/leaking</p> <p>Turbocharger actuator failure(s)</p> <p>Turbocharger failure(s)</p> <p>ECM failure</p>	<p>Check the electrical connections and harnesses to the turbocharger(s). Check the air intake for restriction/leakage (see visual inspection). For air intake checks, Intake Air Distribution and Filtering For turbocharger actuator tests, GO to Pinpoint Test G552276p2. and GO to Pinpoint Test G552276p3. For turbocharger mechanical checks, GO to Pinpoint Test G552276p1. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
No boost/excessive noise	Turbocharger failure	For turbocharger mechanical checks, GO to Pinpoint Test G552276p1.

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of powertrain DTCs,
Electronic Engine Controls

DTC	Condition	Possible source	Action
P004500	Variable geometry turbocharger (VGT) actuator open circuit (right hand bank)	<p>VGT actuator circuit: high resistance</p> <p>VGT actuator circuit: short circuit to ground</p> <p>VGT actuator failure</p> <p>ECM failure</p>	<p>For right hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p2. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

P004700	Variable geometry turbocharger (VGT) actuator circuit low (right hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to ground VGT actuator failure ECM failure	For right hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p2. Refer to the warranty policy and procedures manual if an ECM is suspect.
P004800	Variable geometry turbocharger (VGT) actuator circuit high (right hand bank)	VGT actuator circuit: short circuit to power VGT actuator failure ECM failure	For right hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p2. Refer to the warranty policy and procedures manual if an ECM is suspect.
P004A00	Variable geometry turbocharger (VGT) actuator open circuit (left hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to ground VGT actuator failure ECM failure	For left hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P004C00	Variable geometry turbocharger (VGT) actuator circuit low (left hand bank)	VGT actuator circuit: short circuit to power VGT actuator failure ECM failure	For left hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P004D00	Variable geometry turbocharger (VGT) actuator circuit high (left hand bank)	VGT actuator circuit: short circuit to power VGT actuator failure ECM failure	For left hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P132A00	Variable geometry turbocharger (VGT) actuator H bridge fault (right hand bank)	VGT actuator circuit(s): high resistance, short circuit to ground, short circuit to power	For right hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p2. Refer to the warranty policy and procedure manual if an

		<p>Turbocharger vanes stuck/sticking</p> <p>VGT actuator failure</p> <p>ECM failure</p>	ECM is suspect.
P132B00	Variable geometry turbocharger (VGT) actuator performance (right hand bank)	<p>VGT actuator circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>Turbocharger vanes stuck/sticking</p> <p>VGT actuator failure</p> <p>ECM failure</p>	<p>For right hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p2.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P132D00	Variable geometry turbocharger (VGT) actuator H bridge fault (left hand bank)	<p>VGT actuator circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>Turbocharger vanes stuck/sticking</p> <p>VGT actuator failure</p> <p>ECM failure</p>	<p>For left hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p3.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P132E00	Variable geometry turbocharger (VGT) actuator performance (left hand bank)	<p>VGT actuator circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>Turbocharger vanes stuck/sticking</p> <p>VGT actuator failure</p> <p>ECM failure</p>	<p>For left hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p3.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P132F00	Variable geometry turbocharger (VGT) actuator voltage plausibility (left hand bank)	<p>VGT actuator circuit(s): high resistance, short circuit to ground, short circuit to power</p>	<p>For left hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p3.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>

		VGT actuator failure ECM failure	
P138E00	Variable geometry turbocharger (VGT) actuator adaption (right hand bank)	VGT actuator circuit(s): high resistance, short circuit to ground, short circuit to power VGT actuator failure	For right hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p2.
P023400	Turbocharger overboost condition, manifold absolute pressure (MAP) sensor control deviation	Air leakage MAP sensor circuit: high resistance MAP sensor circuit: short circuit to ground MAP sensor circuit: short circuit to power MAP sensor failure Exhaust gas recirculation (EGR) fault Turbocharger fault ECM failure	Check for air leakage. Intake Air Distribution and Filtering For MAP sensor tests. Electronic Engine Controls For EGR tests. Engine Emission Control Check for DTCs indicating a turbocharger fault. Refer to the warranty policy and procedures manual if an ECM is suspect.
P023600	Variable geometry turbocharger (VGT) actuator circuit range/performance (right hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to ground VGT actuator circuit: short circuit to power VGT actuator failure ECM failure	For right hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p2. Refer to the warranty policy and procedures manual if an ECM is suspect.
P023700	Variable geometry turbocharger (VGT) actuator	VGT actuator circuit: high resistance	For right hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p2.

	circuit low (right hand bank)	VGT actuator circuit: short circuit to ground VGT actuator failure ECM failure	Refer to the warranty policy and procedures manual if an ECM is suspect.
P023800	Variable geometry turbocharger (VGT) actuator circuit high (right hand bank)	VGT actuator circuit: short circuit to power VGT actuator failure ECM failure	For right hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p2. Refer to the warranty policy and procedures manual if an ECM is suspect.
P024000	Variable geometry turbocharger (VGT) actuator circuit range/performance (left hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to ground VGT actuator circuit: short circuit to power VGT actuator failure ECM failure	For left hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P024100	Variable geometry turbocharger (VGT) actuator circuit low (left hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to ground VGT actuator failure ECM failure	For left hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P024200	Variable geometry turbocharger (VGT) actuator circuit high (left hand bank)	VGT actuator circuit: short circuit to power VGT actuator failure ECM failure	For left hand bank VGT actuator circuit tests, GO to Pinpoint Test G552276p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P226300	Turbocharger boost system performance, manifold	IAT sensor circuit(s): high resistance, short circuit to	For IAT, MAP and MAF sensor tests.

	absolute pressure (MAP) sensor control deviation	<p>ground, short circuit to power</p> <p>MAP sensor circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>MAF sensor circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>EGR circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>VGT actuator failure</p> <p>Turbocharger vanes stuck/sticking</p> <p>ECM failure</p>	<p>Electronic Engine Controls For EGR tests.</p> <p>Engine Emission Control For VGT actuator tests. GO to Pinpoint Test G552276p2. and GO to Pinpoint Test G552276p3.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P029900	Turbocharger underboost condition, manifold absolute pressure (MAP) sensor control deviation	<p>MAP sensor circuit: high resistance</p> <p>MAP sensor circuit: short circuit to ground</p> <p>MAP sensor circuit: short circuit to power</p> <p>MAP sensor failure</p> <p>Exhaust gas recirculation (EGR) fault</p> <p>Turbocharger fault</p> <p>ECM failure</p>	<p>For MAP sensor tests.</p> <p>Electronic Engine Controls For EGR tests.</p> <p>Engine Emission Control Check for DTCs indicating a turbocharger fault. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

Pinpoint Tests



CAUTION: Do not insert any tools into the turbocharger body. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

A small amount of oil inside the turbocharger body, visible when the hoses are disconnected, is normal.

NOTE:

A small amount of play in the turbine shaft is normal. If in any doubt, compare with a known good unit.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

NOTE:

If DTCs are recorded and a fault is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

PINPOINT TEST G552276p1 : CHECK THE TURBOCHARGER MECHANICAL CONDITION

G552276t1 : CHECK FOR EXCESSIVE PLAY IN THE TURBOCHARGER SHAFT

1. Disconnect the intake and outlet hoses from the turbocharger. 2. Check that the turbocharger rotates freely, and without noise. 3. Grip the ends of the turbine shaft at either side of the turbocharger and assess the play.

Is the play in the shaft excessive? (Compare the play to a known good unit in the event of uncertainty).

-> Yes

INSTALL a new turbocharger.

Turbocharger LH

Turbocharger RH CLEAR any DTCs, test the vehicle for normal operation.

-> No

CHECK for other sources of noise. Refer to the symptom chart for diagnosing the turbocharger system for the cause of the lack of boost.

PINPOINT TEST G552276p2 : CHECK THE ROTARY ELECTRONIC ACTUATOR CIRCUIT A

G552276t2 : CHECK THE ROTARY ELECTRONIC ACTUATOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Rotary Electronic Actuator connector, C40,

Circuit	Pin
(+) pwm motor	C40 - 01
(-) pwm motor	C40 - 02
Ground	C40 - 03
ECM feedback	C40 - 04
5volt supply	C40 - 05

2. Powertrain Control Module (PCM) connector, C99,

Circuit	Pin
(+) pwm motor	C99 - J2
(-) pwm motor	C99 - K2
Ground	C99 - G3
PCM feedback	C99 - C4
5volt supply	C99 - D1

3. 4. Disconnect the connector, C40. 5. Key on, engine off. 6. Measure the resistance between:

C40, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 0.5 ohms?

-> Yes

GO to Pinpoint Test G552276t3.

-> No

Repair the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t3 : CHECK THE POWER SUPPLY TO THE ROTARY ELECTRONIC ACTUATOR

1. Measure the voltage between:

C40, harness side	Battery
Pin 05	Negative terminal

Is the voltage between 4.5 volts and 5 volts?

-> **Yes**

GO to Pinpoint Test G552276t4.

-> **No**

Repair the power circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t4 : CHECK THE ROTARY ELECTRONIC ACTUATOR FEEDBACK CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. 2. Measure the resistance between:

C40, harness side	Battery
Pin 04	Negative terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> **Yes**

GO to Pinpoint Test G552276t5.

-> **No**

GO to Pinpoint Test G552276t7.

G552276t5 : CHECK THE ROTARY ELECTRONIC ACTUATOR FEEDBACK CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C40, harness side	Battery
Pin 04	Positive terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> **Yes**

GO to Pinpoint Test G552276t6.

-> **No**

GO to Pinpoint Test G552276t8.

G552276t6 : CHECK THE ROTARY ELECTRONIC ACTUATOR FEEDBACK CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM connector, C99. 2. Measure the resistance between:

C40, harness side	C99, harness side
Pin 04	Pin C4

Is the resistance less than 0.5 ohms?

-> Yes

GO to Pinpoint Test G552276t16.

-> No

Repair the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t7 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. 2. Disconnect the ECM connector, C99. 3. Key on, Engine off. 4. Measure the resistance between:

C40, harness side	Battery
Pin 04	Negative terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

Repair the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t8 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Key on, Engine off. 4. Measure the resistance between:

C40, harness side	Battery
Pin 04	Positive terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

Repair the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t16 : CHECK THE ROTARY ELECTRONIC ACTUATOR PWM+ CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C40, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

GO to Pinpoint Test G552276t17.

-> No

GO to Pinpoint Test G552276t19.

G552276t17 : CHECK THE ROTARY ELECTRONIC ACTUATOR PWM+ CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C40, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

GO to Pinpoint Test G552276t18.

-> No

GO to Pinpoint Test G552276t20.

G552276t18 : CHECK THE ROTARY ELECTRONIC ACTUATOR PWM+ CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Measure the resistance between:

C40, harness side	C99, harness side
Pin 01	Pin J2

Is the resistance less than 0.5 ohms?

-> Yes

GO to Pinpoint Test G552276t21.

-> No

Repair the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t19 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Key on, engine off. 4. Measure the resistance between:

C40, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

Repair the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t20 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Key on, engine off. 4. Measure the resistance between:

C40, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

Repair the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t21 : CHECK THE ROTARY ELECTRONIC ACTUATOR PWM- CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C40, harness side	C40, harness side
Pin 02	Pin 03

Is the resistance greater than 10 Kohms (+/-10%) ?

-> **Yes**

GO to Pinpoint Test G552276t22.

-> **No**

GO to Pinpoint Test G552276t24.

G552276t22 : CHECK THE TURBOCHARGER PWM- CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C40, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> **Yes**

GO to Pinpoint Test G552276t23.

-> **No**

GO to Pinpoint Test G552276t25.

G552276t23 : CHECK THE ROTARY ELECTRONIC ACTUATOR PWM- CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Measure the resistance between:

C40, harness side	C99, harness side
Pin 02	Pin K2

Is the resistance less than 0.5 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Connector C40 - ECM connector - Turbocharger 1 (right-hand bank) - ECM

-> **No**

Repair the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t24 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Key on, engine off. 4. Measure the resistance between:

C40, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

Repair the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t25 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Key on, engine off. 4. Measure the resistance between:

C40, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

Repair the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552276p3 : CHECK THE ROTARY ELECTRONIC ACTUATOR CIRCUIT B

G552276t9 : CHECK THE ROTARY ELECTRONIC ACTUATOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Rotary Electronic Actuator connector, C41

Circuit	Pin
(+) pwm motor	C41 - 01
(-) pwm motor	C41 - 02
Ground	C41 - 03
PCM feedback	C41 - 04
5volt supply	C41 - 05

2. Powertrain Control Module (PCM) connector, C99,

Circuit	Pin
(+) pwm motor	C99 - J3
(-) pwm motor	C99 - K3
Ground	C99 - D2
PCM feedback	C99 - B4
5volt supply	C99 - D1

3. 4. Disconnect the connector, C41. 5. Key on, Engine off. 6. Measure the resistance between:

C41, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 0.5 ohms?

-> Yes

GO to Pinpoint Test G552276t10.

-> No

Repair the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t10 : CHECK THE POWER SUPPLY TO THE ROTARY ELECTRONIC ACTUATOR

1. Measure the voltage between:

C41, harness side	Battery
Pin 05	Negative terminal

Is the voltage 4.5 volts and 5 volts?

-> Yes

GO to Pinpoint Test G552276t11.

-> No

Repair the power circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t11 : CHECK THE ROTARY ELECTRONIC ACTUATOR FEEDBACK CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. 2. Measure the resistance between:

C41, harness side	Battery
Pin 04	Negative terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

GO to Pinpoint Test G552276t12.

-> **No**

GO to Pinpoint Test G552276t14.

G552276t12 : CHECK THE ROTARY ELECTRONIC ACTUATOR FEEDBACK CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C41, harness side	Battery
Pin 04	Positive terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> **Yes**

GO to Pinpoint Test G552276t13.

-> **No**

GO to Pinpoint Test G552276t15.

G552276t13 : CHECK THE ROTARY ELECTRONIC ACTUATOR FEEDBACK CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM connector, C99. 2. Measure the resistance between:

C41, harness side	C99, harness side
Pin 04	Pin B4

Is the resistance less than 0.5 ohms?

-> **Yes**

GO to Pinpoint Test G552276t26.

-> **No**

Repair the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t14 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. 2. Disconnect the ECM connector, C99. 3. Key on, engine off. 4. Measure the resistance between:

C41, harness side	Battery
Pin 04	Negative terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

Repair the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t15 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Key on, engine off. 4. Measure the resistance between:

C41, harness side	Battery
Pin 04	Positive terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

Repair the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t26 : CHECK THE ROTARY ELECTRONIC ACTUATOR PWM+ CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C41, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

GO to Pinpoint Test G552276t27.

-> No

GO to Pinpoint Test G552276t29.

G552276t27 : CHECK THE ROTARY ELECTRONIC ACTUATOR PWM+ CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C41, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

GO to Pinpoint Test G552276t28.

-> No

GO to Pinpoint Test G552276t30.

G552276t28 : CHECK THE ROTARY ELECTRONIC ACTUATOR PWM+ CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Measure the resistance between:

C41, harness side	C99, harness side
Pin 01	Pin J3

Is the resistance less than 0.5 ohms?

-> Yes

GO to Pinpoint Test G552276t31.

-> No

Repair the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t29 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Key on, engine off. 4. Measure the resistance between:

C41, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

Repair the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t30 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Key on, engine off. 4. Measure the resistance between:

C41, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> **No**

Repair the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t31 : CHECK THE ROTARY ELECTRONIC ACTUATOR PWM- CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C41, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> **Yes**

GO to Pinpoint Test G552276t32.

-> **No**

GO to Pinpoint Test G552276t34.

G552276t32 : CHECK THE ROTARY ELECTRONIC ACTUATOR PWM- CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C41, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> **Yes**

GO to Pinpoint Test G552276t33.

-> **No**

GO to Pinpoint Test G552276t35.

G552276t33 : CHECK THE ROTARY ELECTRONIC ACTUATOR PWM- CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Measure the resistance between:

C41, harness side	C99, harness side
Pin 02	Pin K3

Is the resistance less than 0.5 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Connector C41 - ECM connector - Turbocharger 2 (left-hand bank) - ECM

-> No

Repair the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t34 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Key on, engine off. 4. Measure the resistance between:

C41, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

Repair the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552276t35 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C99. 3. Key on, engine off. 4. Measure the resistance between:

C41, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 10 Kohms (+/-10%) ?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

Repair the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

Turbocharger LH

Removal

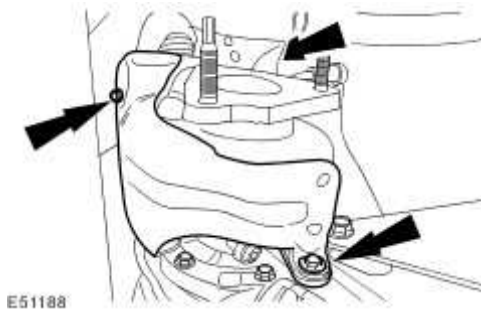
- 1 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

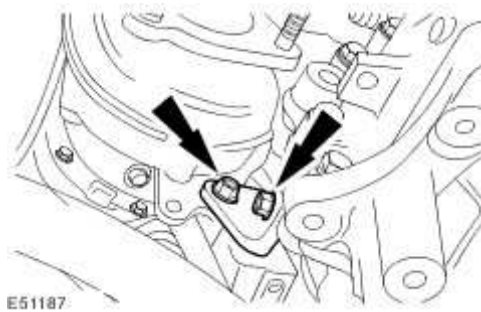
- 2 . Remove the left-hand catalytic converter.

For additional information, refer to Catalytic Converter - 2.7L Diesel (17.50.05)

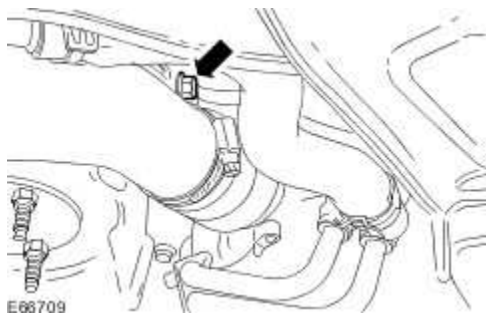
- 3 . Remove the turbocharger heatshield.



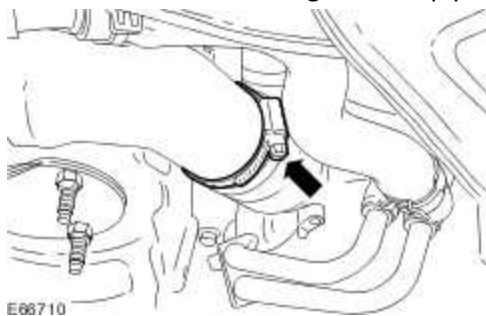
- 4 . Remove the turbocharger support bracket.



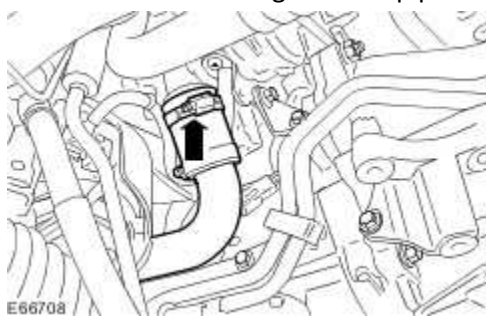
- 5 . Remove the turbocharger outlet pipe retaining bolt.



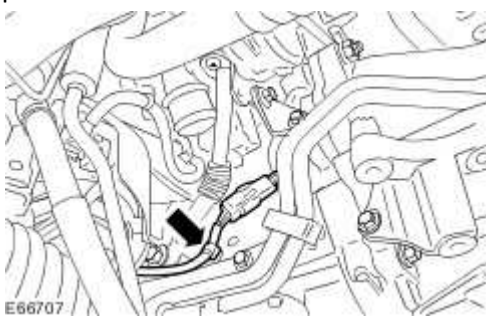
6 . Disconnect the turbocharger outlet pipe.



7 . Remove the turbocharger outlet pipe from the turbocharger.

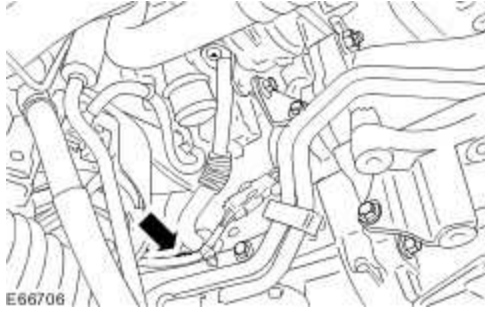


8 Detach the crankshaft position (CKP) sensor wiring harness from the oil return tube retaining plate.



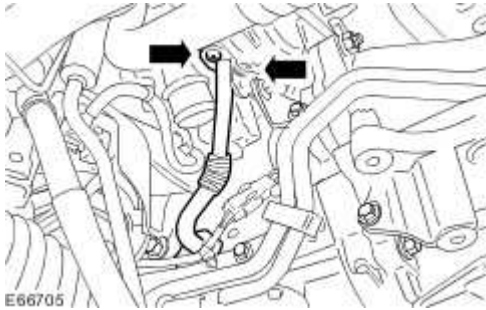
9 . Detach the turbocharger oil return tube.

- ▶ Remove and discard the O-ring seal.
- ▶ Install blanking caps to the exposed ports.

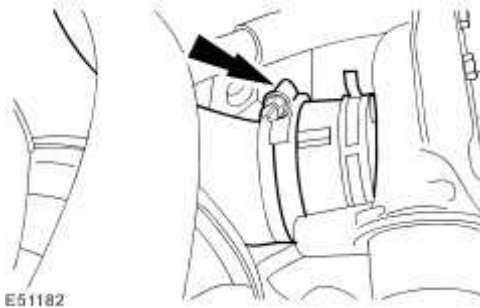


10 . Remove the turbocharger oil return tube from the turbocharger.

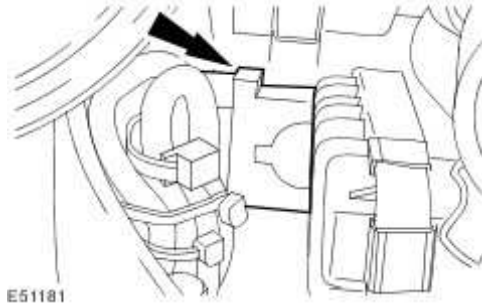
- ▶ Remove and discard the gasket.
- ▶ Install blanking caps to the exposed ports.



11 . Detach the turbocharger intake tube.



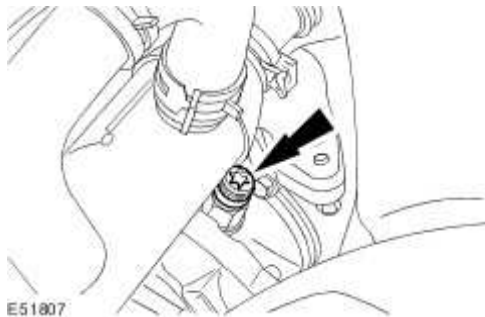
12 . Disconnect the turbocharger solenoid electrical connector.



13 . Lower the vehicle.

14 . Disconnect the turbocharger oil supply tube.

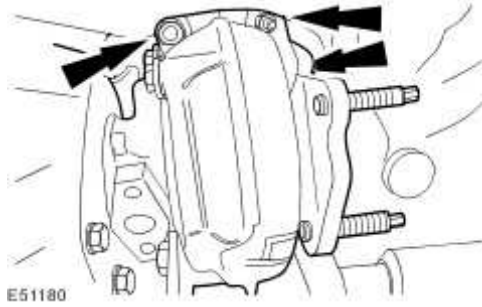
- ▶ Remove and discard the sealing washer.
- ▶ Install blanking caps to the exposed ports.



15 . Raise the vehicle.

16 Remove the turbocharger.

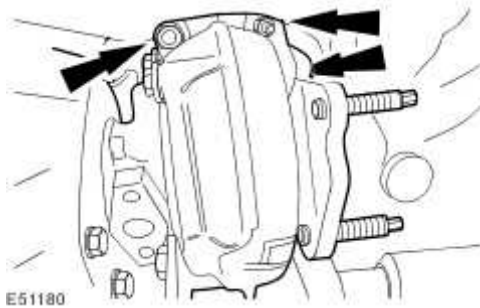
- ▶ Remove and discard the turbocharger retaining nuts.
- ▶ Remove and discard the turbocharger to exhaust manifold retaining studs.
- ▶ Install blanking caps to the exposed ports.



Installation

1 . Install the turbocharger.

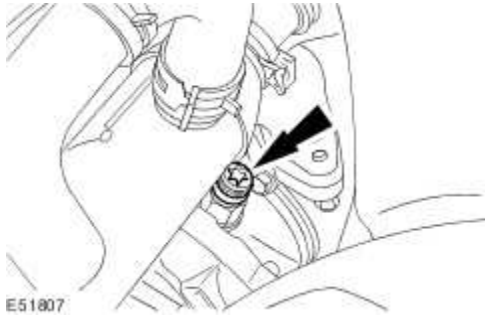
- ▶ Remove the blanking caps.
- ▶ Install new turbocharger to exhaust manifold retaining studs.
- ▶ Install new turbocharger retaining nuts.
- ▶ Tighten to 23 Nm.



2 . Lower the vehicle.

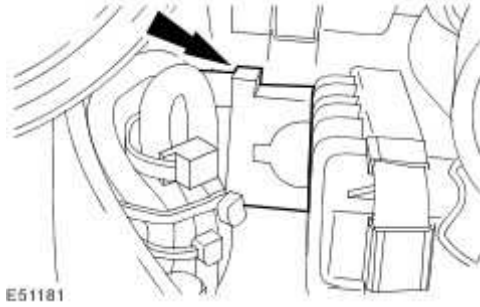
3 . Connect the turbocharger oil supply tube.

- ▶ Remove the blanking caps.
- ▶ Install a new sealing washer.
- ▶ Tighten to 30 Nm.



4 . Raise the vehicle.

5 . Connect the turbocharger solenoid electrical connector.



6 . Attach the air cleaner lower outlet tube.

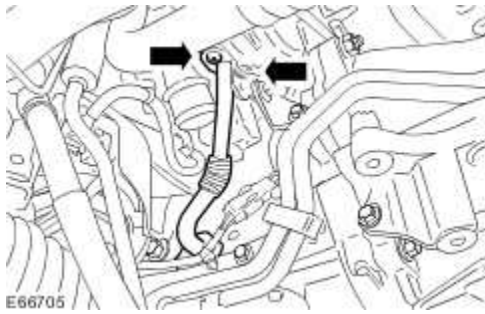


7 . Install the turbocharger oil return tube to the turbocharger.

▶ Remove the blanking caps.

▶ Install a new gasket.

▶ Tighten to 10 Nm.

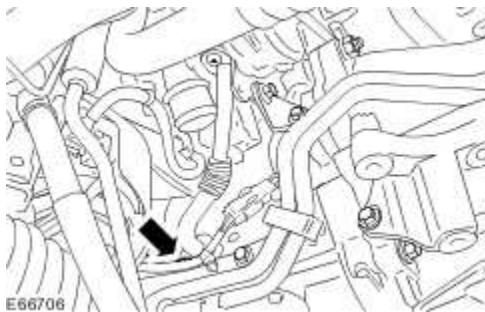


8 . Attach the turbocharger oil return tube.

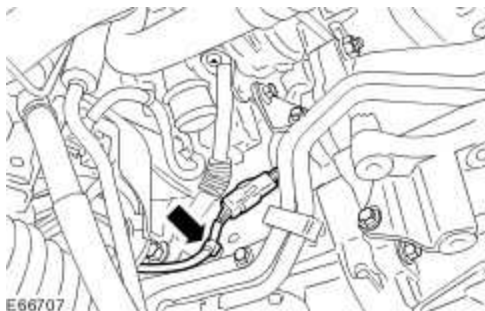
▶ Remove the blanking caps.

▶ Install a new O-ring seal.

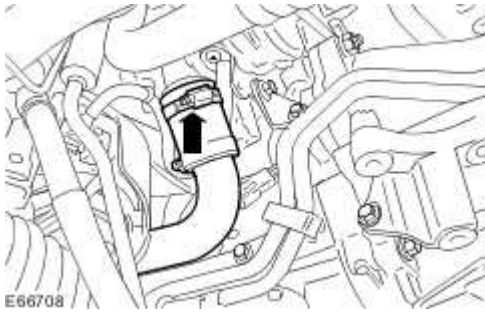
▶ Tighten to 10 Nm.



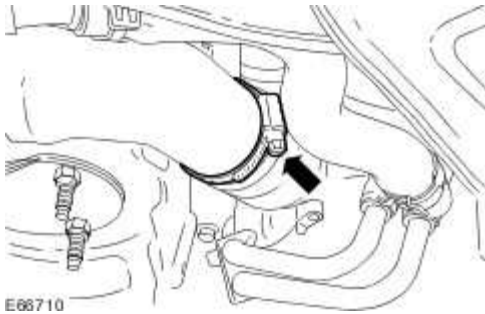
9 . Attach the CKP sensor wiring harness to the oil return tube retaining plate.



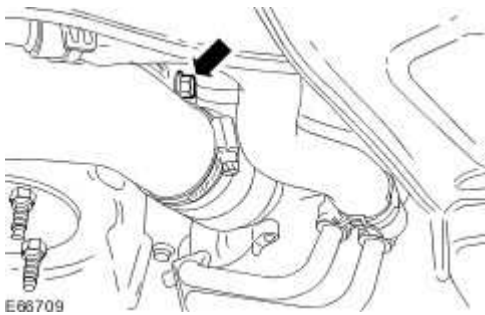
10 . Install the turbocharger outlet hose to the turbocharger.



11 . Connect the turbocharger outlet pipe.

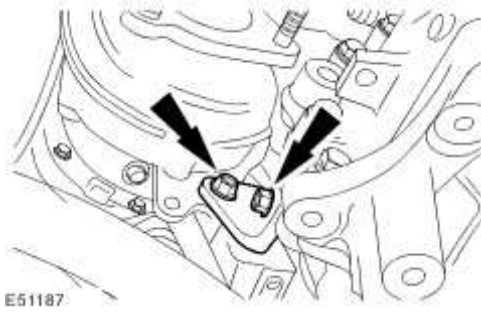


12 . Install the turbocharger outlet pipe retaining bolt.



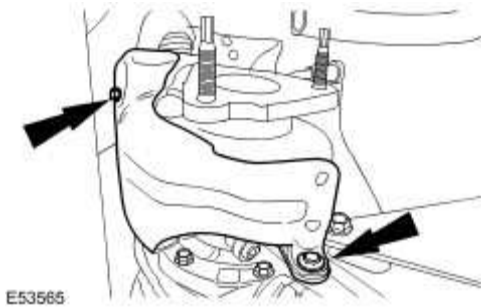
13 . Install the turbocharger support bracket.

► Tighten to 23 Nm.



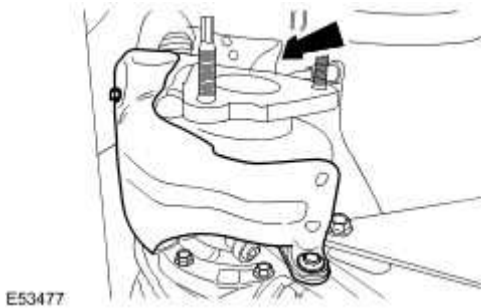
14 . Install the turbocharger heatshield.

► Tighten to 6 Nm.



15 . Install the turbocharger heatshield retaining nut.

► Tighten to 10 Nm.



16 . Install the left-hand catalytic converter.

For additional information, refer to Catalytic Converter - 2.7L Diesel (17.50.05)

17 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

Turbocharger LH

Removal

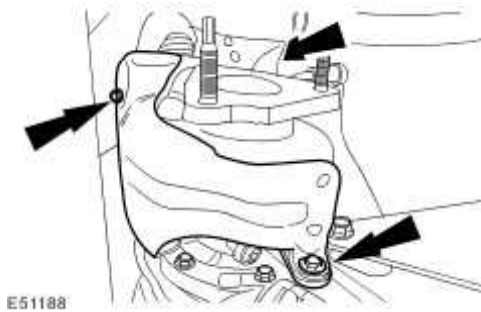
- 1 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

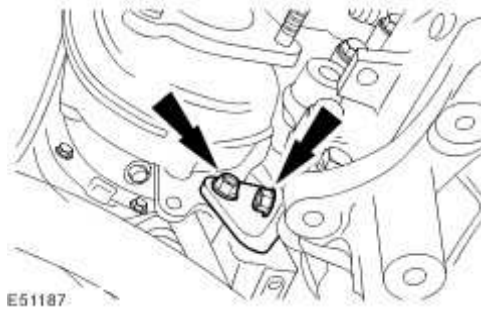
- 2 . Remove the left-hand catalytic converter.

For additional information, refer to Catalytic Converter - 2.7L Diesel (17.50.05)

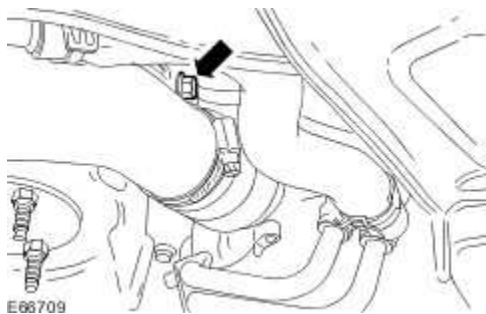
- 3 . Remove the turbocharger heatshield.



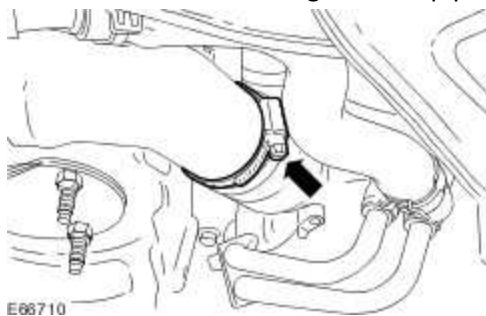
- 4 . Remove the turbocharger support bracket.



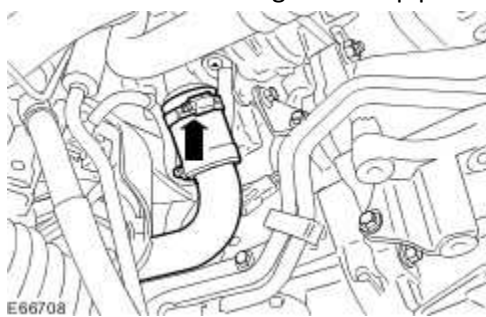
- 5 . Remove the turbocharger outlet pipe retaining bolt.



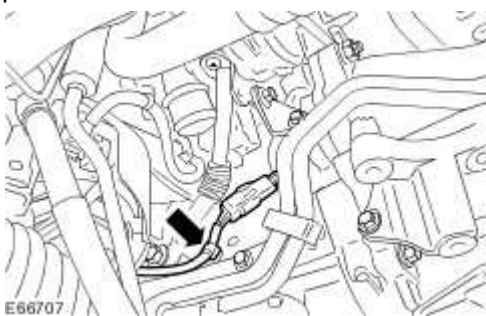
6 . Disconnect the turbocharger outlet pipe.



7 . Remove the turbocharger outlet pipe from the turbocharger.

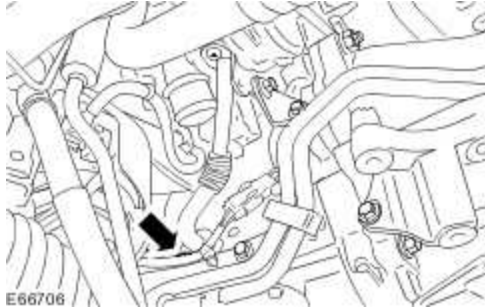


8 Detach the crankshaft position (CKP) sensor wiring harness from the oil return tube retaining plate.



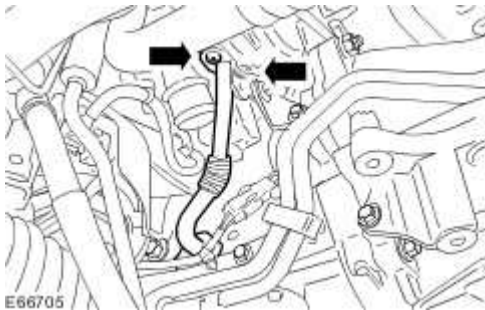
9 . Detach the turbocharger oil return tube.

- ▶ Remove and discard the O-ring seal.
- ▶ Install blanking caps to the exposed ports.

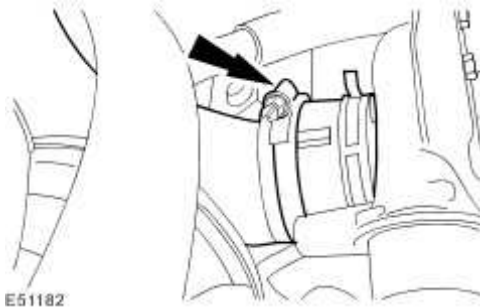


10 . Remove the turbocharger oil return tube from the turbocharger.

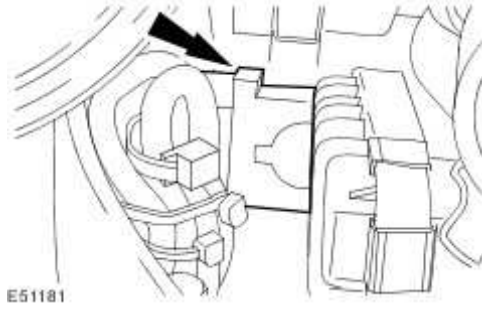
- ▶ Remove and discard the gasket.
- ▶ Install blanking caps to the exposed ports.



11 . Detach the turbocharger intake tube.



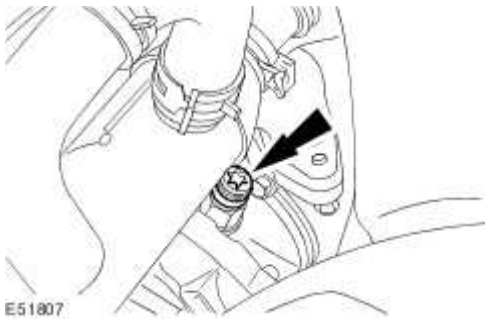
12 . Disconnect the turbocharger solenoid electrical connector.



13 . Lower the vehicle.

14 . Disconnect the turbocharger oil supply tube.

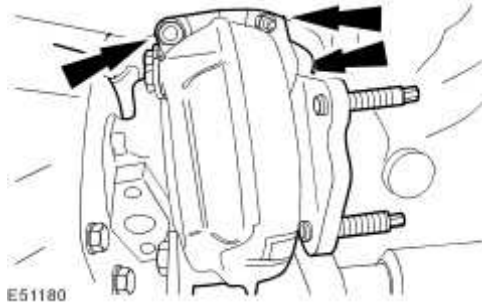
- ▶ Remove and discard the sealing washer.
- ▶ Install blanking caps to the exposed ports.



15 . Raise the vehicle.

16 Remove the turbocharger.

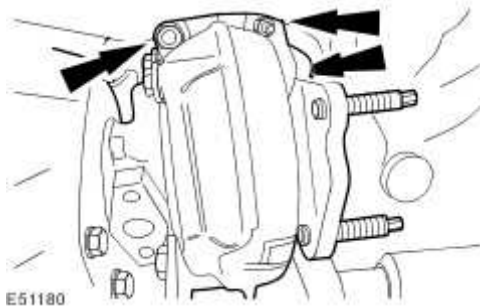
- ▶ Remove and discard the turbocharger retaining nuts.
- ▶ Remove and discard the turbocharger to exhaust manifold retaining studs.
- ▶ Install blanking caps to the exposed ports.



Installation

1 . Install the turbocharger.

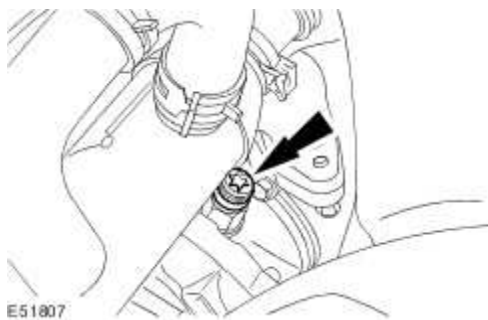
- ▶ Remove the blanking caps.
- ▶ Install new turbocharger to exhaust manifold retaining studs.
- ▶ Install new turbocharger retaining nuts.
- ▶ Tighten to 23 Nm.



2 . Lower the vehicle.

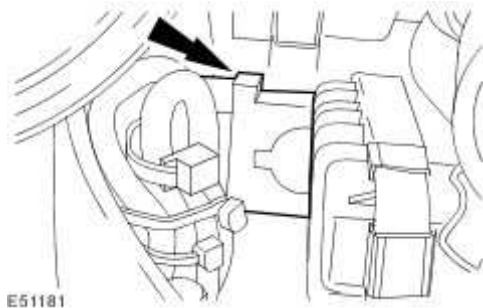
3 . Connect the turbocharger oil supply tube.

- ▶ Remove the blanking caps.
- ▶ Install a new sealing washer.
- ▶ Tighten to 30 Nm.



4 . Raise the vehicle.

5 . Connect the turbocharger solenoid electrical connector.



6 . Attach the air cleaner lower outlet tube.

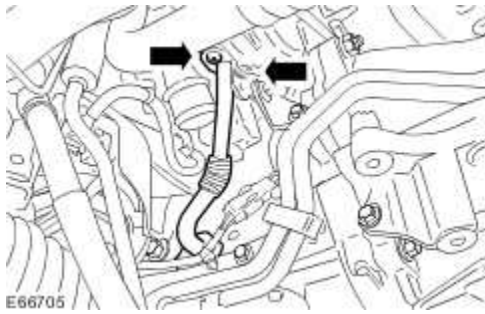


7 . Install the turbocharger oil return tube to the turbocharger.

▶ Remove the blanking caps.

▶ Install a new gasket.

▶ Tighten to 10 Nm.

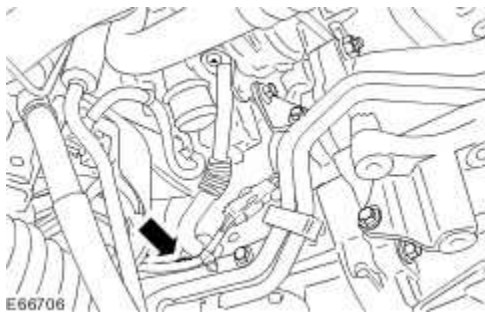


8 . Attach the turbocharger oil return tube.

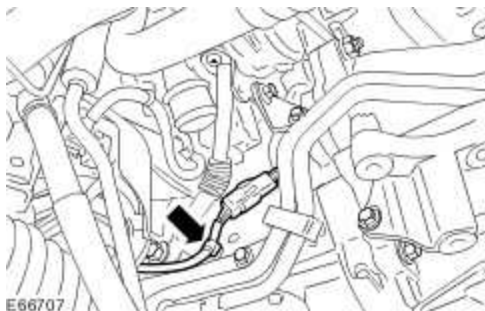
▶ Remove the blanking caps.

▶ Install a new O-ring seal.

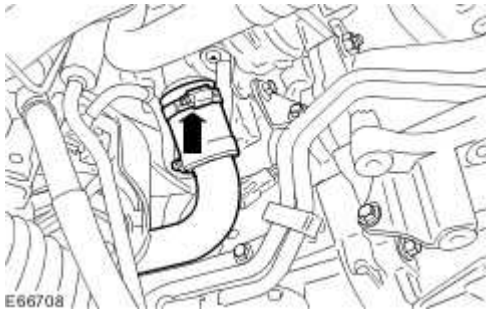
▶ Tighten to 10 Nm.



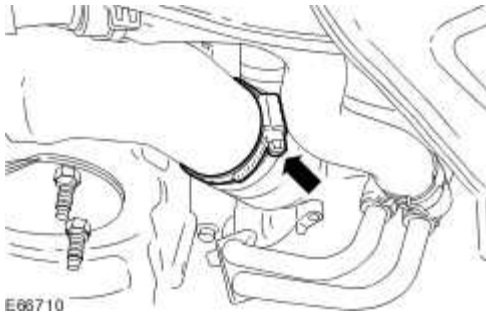
9 . Attach the CKP sensor wiring harness to the oil return tube retaining plate.



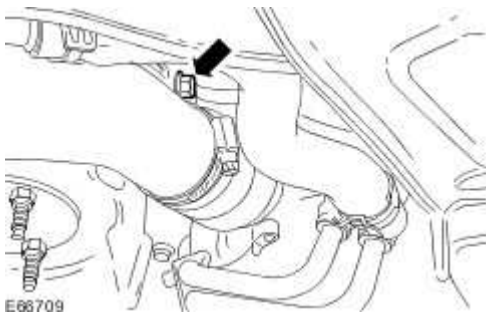
10 . Install the turbocharger outlet hose to the turbocharger.



11 . Connect the turbocharger outlet pipe.

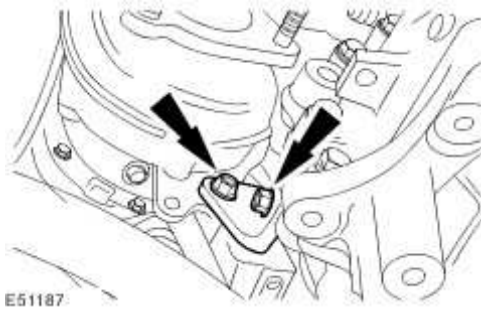


12 . Install the turbocharger outlet pipe retaining bolt.



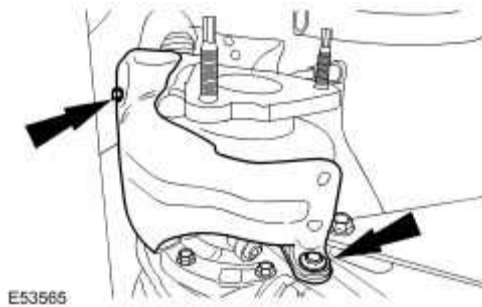
13 . Install the turbocharger support bracket.

► Tighten to 23 Nm.



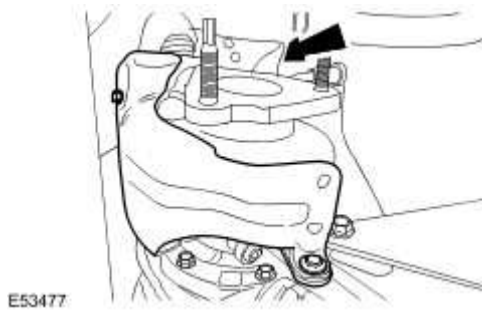
14 . Install the turbocharger heatshield.

► Tighten to 6 Nm.



15 . Install the turbocharger heatshield retaining nut.

► Tighten to 10 Nm.



16 . Install the left-hand catalytic converter.

For additional information, refer to Catalytic Converter - 2.7L Diesel (17.50.05)

17 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

303-05 : Accessory Drive

Specifications

Specifications

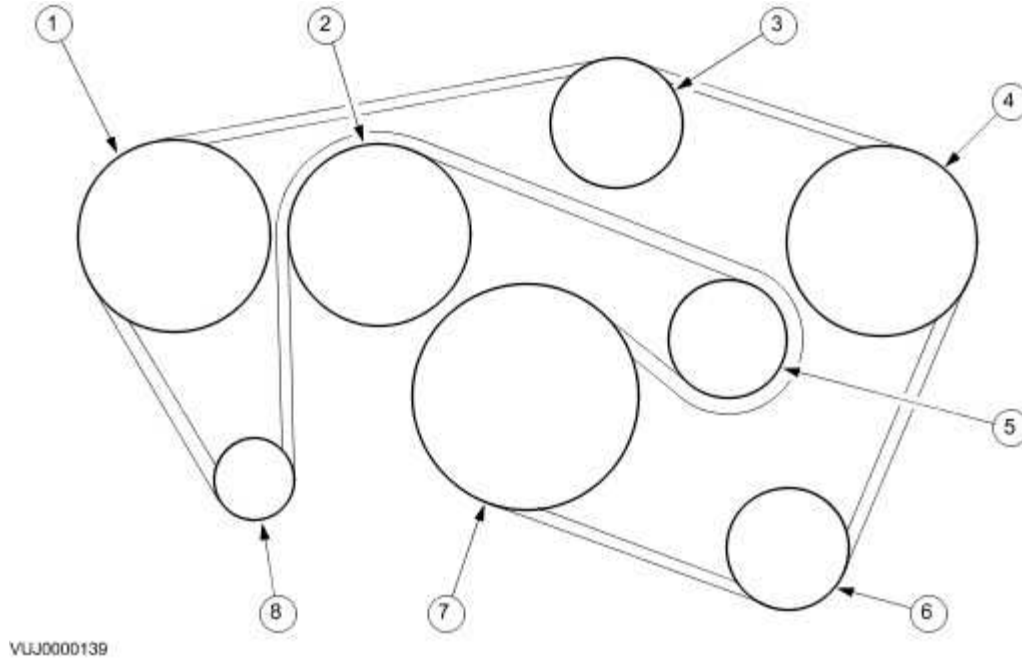
Torque Specifications

Description	Nm	lb-ft	lb-in
Accessory drive belt tensioner retaining bolt - Vehicles with 3.0L engine	45	33	-
Accessory drive belt tensioner retaining bolt - Vehicles with 2.7L diesel engine	47	35	-
Accessory drive belt tensioner retaining bolt - Vehicles with 3.5L or 4.2L engine	40	30	-
Accessory drive belt idler pulley retaining bolt - Vehicles with 3.0L, 3.5L or 4.2L engine	25	18	-
Accessory drive belt idler pulley retaining bolt - Vehicles with 2.7L diesel engine	47	35	-
Fuel injection pump belt rear cover retaining bolts - Vehicles fitted with 2.7L diesel engine	7	-	62
Camshaft rear pulley retaining bolt - Vehicles fitted with 2.7L diesel engine	A	-	-
Fuel injection pump pulley - Vehicles fitted with 2.7L diesel engine	50	37	-
Fuel injection pump belt tensioner retaining bolt - Vehicles fitted with 2.7L diesel engine	25	18	-
Supercharger belt tensioner retaining bolt	40	30	-
Supercharger belt idler pulley retaining bolt	25	18	-

A = refer to procedure for correct tightening sequence

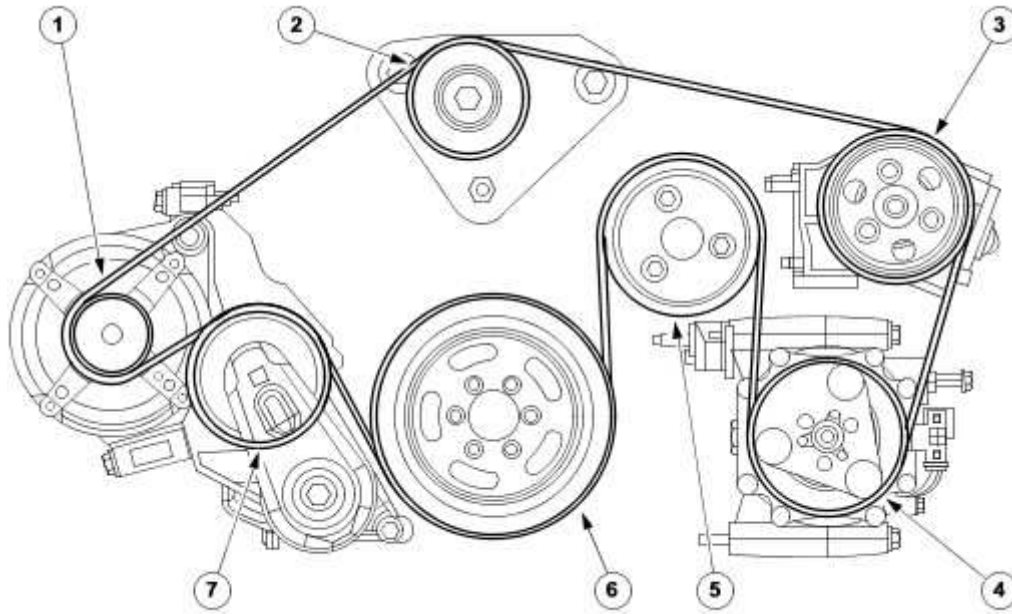
Accessory Drive

Vehicles with 3.0L engine



Item	Part Number	Description
1	—	Accessory drive belt idler pulley
2	—	Water pump pulley
3	—	Accessory drive belt idler pulley
4	—	Power steering pump pulley
5	—	Accessory drive belt tensioner
6	—	Air conditioning (A/C) compressor pulley
7	—	Crankshaft pulley
8	—	Generator pulley

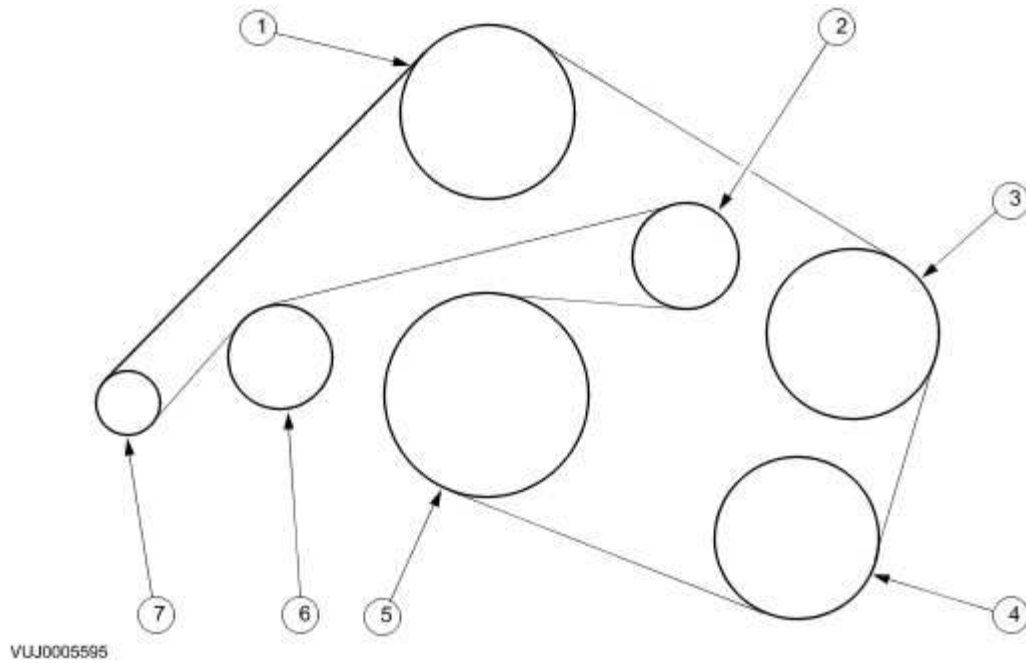
Vehicles with 2.7L diesel engine



E50935

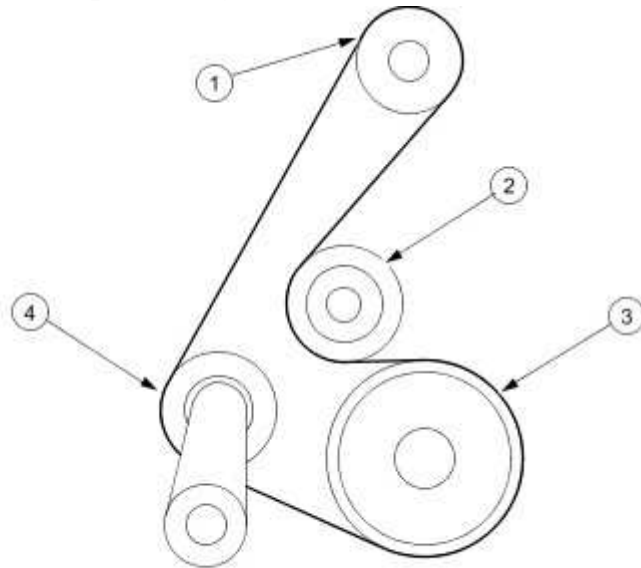
Item	Part Number	Description
1		Generator pulley
2		Accessory drive belt idler pulley
3		Power steering pump pulley
4		Air conditioning (A/C) compressor pulley
5		Water pump pulley
6		Crankshaft pulley
7		Accessory drive belt tensioner

Vehicles with 3.5L or 4.2L engine



Item	Part Number	Description
1	—	Water pump pulley
2	—	Accessory drive belt tensioner
3	—	Power steering pump pulley
4	—	Air conditioning (A/C) compressor pulley
5	—	Crankshaft pulley
6	—	Accessory drive belt idler pulley
7	—	Generator pulley

Vehicles with supercharger



E30190

Item	Part Number	Description
1	—	Supercharger pulley
2	—	Supercharger belt idler pulley
3	—	Crankshaft pulley
4	—	Supercharger belt tensioner

Crankshaft Pulley

The combined crankshaft pulley and torsional vibration damper drives a single, six ribbed vee belt. The belt drives all of the engine-mounted accessories such as the generator, the power assisted steering pump, the air-conditioning compressor and the coolant water pump.

Air Conditioning Compressor Pulley

This is positioned at the lowest point of the front-end accessory drive on the left-hand side accessory mounting.

Power Assisted Steering Pump Pulley

The power assisted steering pump pulley is located on the left-hand side, above the air conditioning compressor.

Generator Pulley

The generator is fitted on the right-hand accessory mounting.

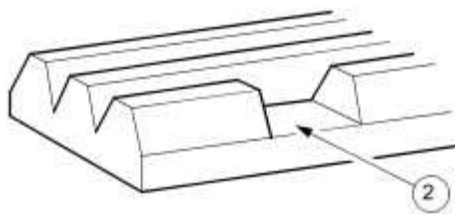
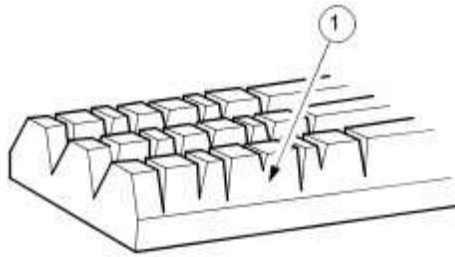
Supercharger Pulley

The supercharger is located between the left-hand and right-hand cylinders and retained at three mounting points.

Accessory drive belt tensioner and supercharger belt tensioner

The accessory drive belt tensioner and supercharger belt tensioner is calibrated to provide the correct amount of tension to the belt for a given drive system. Unless a spring within the tensioner assembly breaks, or some other mechanical part of the tensioner fails, there is no need to check the tensioner for correct tension.

Accessory drive belt and supercharger belt



VUJ0000908

Item	Description
1	Acceptable drive belt cracking
2	Unacceptable drive belt damage

The accessory drive belt and the supercharger belt should be inspected at every routine service for excessive wear and damage. A drive belt which displays symptoms of cracking may be perfectly fit for further service.

Should cracking be detected, serviceability may be assessed using the following guidelines:

Fifteen cracks per rib over a 100 mm length of drive belt is acceptable.

Section(s) of belt missing from any rib is not acceptable and the drive belt must be renewed.

Accessory drive belt tensioner



E30135

The accessory drive belt tensioner consists of an idler pulley which is free to rotate on a bearing, located at the end of a spring-loaded pivot arm.

The pivot arm can be turned counter-clockwise (viewed from the front of the engine) for accessory drive belt removal and installation.

The accessory drive belt wear indicators are incorporated on the bottom of the accessory drive belt tensioner. When the indicators are aligned the accessory drive belt requires replacing.

Accessory Drive - 2.7L Diesel

Principles of Operation

The 2.7L diesel engine uses two accessory drive systems, the front end accessory drive (FEAD), and the fuel injection pump drive.

FEAD

The FEAD drives: the coolant pump, the generator, the power assisted steering pump, and the air conditioning compressor, driven from the crankshaft pulley via a single six-ribbed belt.

Fuel injection pump drive

The fuel injection pump is driven from the exhaust camshaft of the left-hand cylinder bank, by a single, toothed belt.

The fuel injection pump is **NOT** timed to the engine.

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious mechanical faults.

FEAD	Fuel injection pump belt
Belt condition (cracking/damage/contamination)	Security/correct fitment of cover
Belt tension	Check for debris inside the cover
Function of driven components (siezed, etc)	Belt condition (cracking/damage/contamination)
Pulley alignment	Belt tension

- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

Noise definitions

Description of noise	Definition/Possible cause
Squeal	Continuous shriek, most noticeable when the engine is accelerated (usually associated with lack of belt tension, contamination or wet slip)

Chirp	Twittering noise that usually stops at engine speeds above idle. Usually associated with misaligned pulleys
Whine	Continuous noise, changing frequency with engine speed, generally associated with rotating components (generator, idler, etc)
Rattle	Metallic knocking, often a loose component or tensioner fault
Rumble	Bearing noise

Symptoms (FEAD)

Symptom	Possible cause	Action
Noise (see definitions above)	Belt condition Belt tension Pulleys misaligned Driven components	Check the belt condition (see visual inspection). Check the tensioner function. GO to Pinpoint Test G552803p1. Check the pulley alignment. Check the driven components for excessive resistance to rotation. Rectify as necessary.
Drive belt does not hold tension	Belt condition Tensioner fault	Check the belt condition (see visual inspection). Check the tensioner function. Rectify as necessary.

Symptoms (Fuel injection pump belt)

Symptom	Possible cause	Action
Noise (see definitions above)	Belt condition Belt fouling cover Tensioner bearing failure Fuel injection pump failure	Check the belt condition (see visual inspection). Check the belt cover for indications of fouling (this may indicate a pump misalignment), Fuel Injection Pump The belt tensioner must be renewed if the belt is removed, making a check of the bearing impractical. Remove the belt, check the fuel injection pump pulley for security. Check the fuel injection pump for excessive resistance to rotation (excessive resistance in the pump will cause the pulley securing nut to loosen as a design feature). Check for diagnostic trouble codes (DTCs) indicating a pump malfunction, Fuel Charging and Controls

Loss of drive (with no drive to the fuel injection pump, the engine will not run)	Belt broken/stripped teeth Drive pulleys loose	Investigate the cause of the belt breakage/damage (a belt broken at a 45 degree angle normally indicates a shear, a break straight across the belt normally indicates that the belt has been crimped). Check the fuel injection pump for excessive resistance to rotation (excessive resistance in the pump will cause the pulley securing nut to loosen as a design feature). Check for DTCs indicating a pump malfunction, Fuel Charging and Controls
---	---	---

Pinpoint tests

PINPOINT TEST G552803p1 : ELIMINATE THE FEAD AS THE SOURCE OF NOISE

G552803t1 : CHECK FOR THE PRESENCE OF NOISE WITH THE FEAD BELT DISCONNECTED

1. Remove the ignition key. 2. Disconnect the FEAD belt, Accessory Drive Belt - 2.7L Diesel (12.10.40) 3. Start the engine and allow to idle. 4. Check for the presence of the noise.

Is the noise still apparent?

-> Yes

The FEAD is not the cause of the noise. Confirm the symptoms, check for alternative causes.

-> No

Inspect the FEAD belt and driven components. Check the driven components for excessive resistance to rotation.

Accessory Drive Belt - 3.0L, VIN Range: G00442->G45703 (12.10.40)


Removal

1 . Disconnect the battery ground cable. <<414-01>>

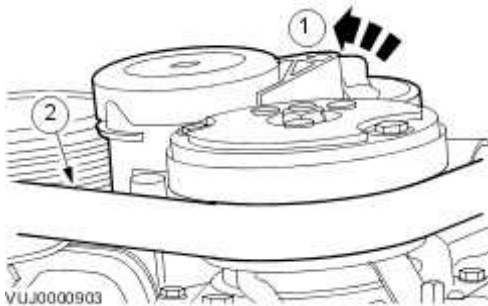
2 . Remove the air deflector. <<501-02>>

3 Remove the accessory drive belt.

1) Rotate the accessory drive belt tensioner counter-clockwise.

 Use a 3/8 inch square drive bar to rotate the accessory drive belt tensioner.

2) Remove the accessory drive belt.



Installation

1 . To install, reverse the removal procedure.

Accessory Drive Belt - 3.0L, VIN Range: G45704->G99999 (12.10.40)

Removal

- 1 . Disconnect the battery ground cable.


For additional information, refer to Battery Disconnect and Connect

- 2 . Remove the air cleaner outlet pipe.

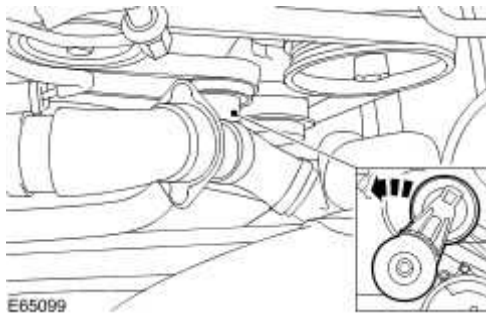
For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

- 3 Detach the accessory drive belt.

- 1) Rotate the accessory drive belt tensioner counter-clockwise.

 Use a 3/8 inch square drive bar or a 1 inch open ended wrench to rotate the accessory drive belt tensioner.

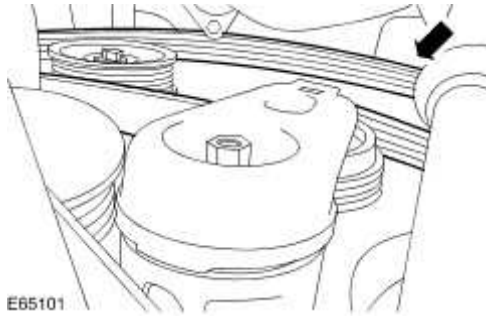
- 2) Detach the accessory drive belt.



- 4 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

- 5 . Remove the accessory drive belt.



Installation

- 1 . To install, reverse the removal procedure.

Accessory Drive Belt - 3.5L/4.2L (12.10.40)

Removal

All vehicles

1. Disconnect the battery ground cable.

For additional information, refer to

2. Remove the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

Vehicles with supercharger


3. Remove the supercharger belt.

For additional information, refer to Supercharger Belt - VIN Range: G00442->G45703 (18.50.08)

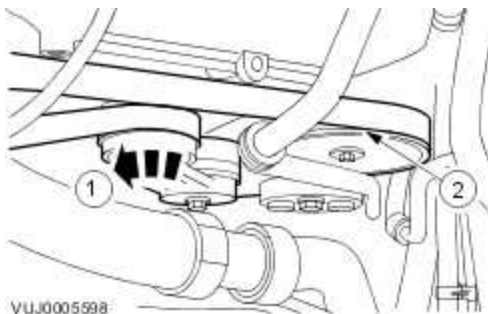
All vehicles

4. Detach the accessory drive belt.

- 1) Rotate the accessory drive belt tensioner counter-clockwise.

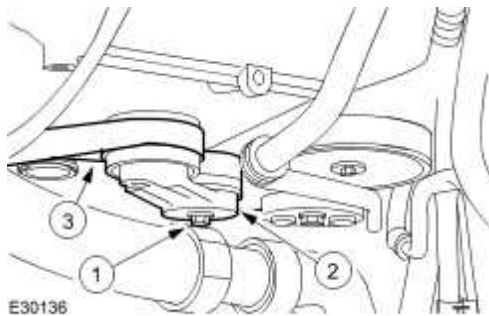
 Use a 3/8 inch square drive bar to rotate the accessory drive belt tensioner.

- 2) Detach the accessory drive belt.



5. Remove the accessory drive belt.

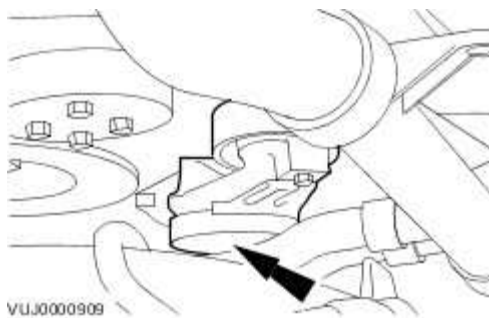
- 1) Remove the accessory drive belt tensioner retaining bolt.
- 2) Remove the accessory drive belt tensioner.
- 3) Remove the accessory drive belt.



Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 40 Nm.



Accessory Drive Belt - 2.7L Diesel (12.10.40)

Special Service Tools

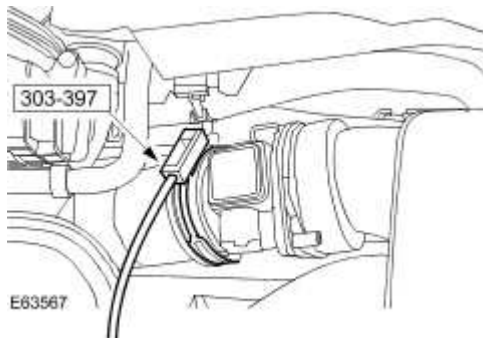


Accessory belt detensioner
303-703


Removal

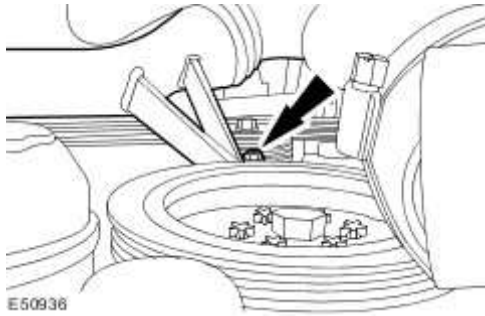
- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect

- 2 . Disconnect the top intake tube off the air filter housing.



- 3 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)
- 4 . Reposition the air intake to right-hand turbo charger tube.

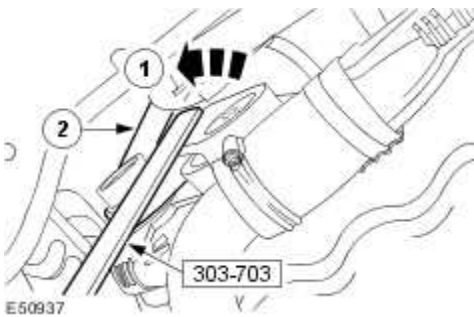
 Remove the retaining nut.



5 Remove the accessory drive belt.

1) Using the special tool, rotate the accessory drive belt tensioner counter clockwise.

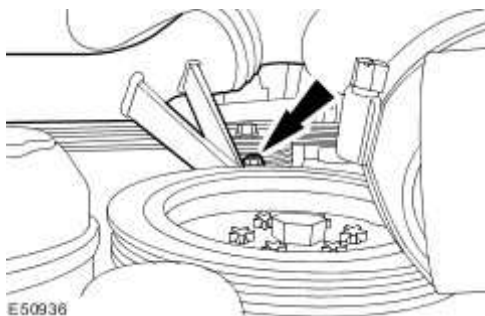
2) Remove the accessory drive belt.



Installation

1 . To install, reverse the removal procedure.

► Tighten to 8 Nm.



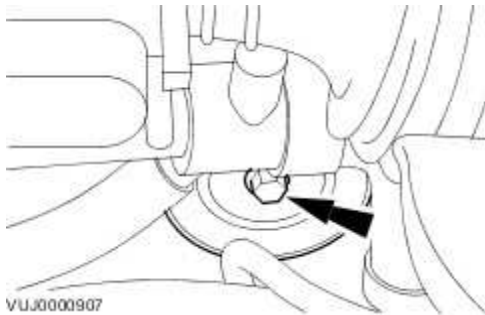
Accessory Drive Belt Idler Pulley - 3.0L, VIN Range: G00442->G45703 (12.10.43)

Removal

- 1 Remove the accessory drive belt.
 - . For additional information, refer to Accessory Drive Belt - 3.0L, VIN Range: G00442->G45703 (12.10.40)


- 2 . Lower the vehicle.

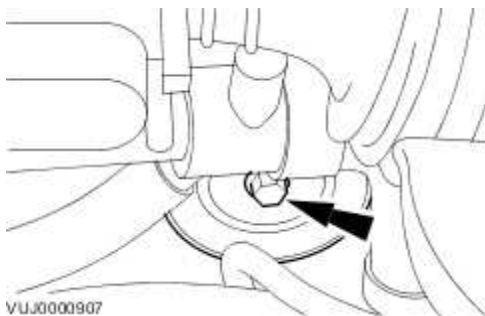
- 3 . Remove the accessory drive belt idler pulley.



Installation

- 1 . To install, reverse the removal procedure.

 Tighten to 25 Nm.



Accessory Drive Belt Idler Pulley - 3.0L, VIN Range: G45704->G99999 (12.10.43)

Removal

- 1 . Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

- 2 . Remove the air cleaner outlet pipe.

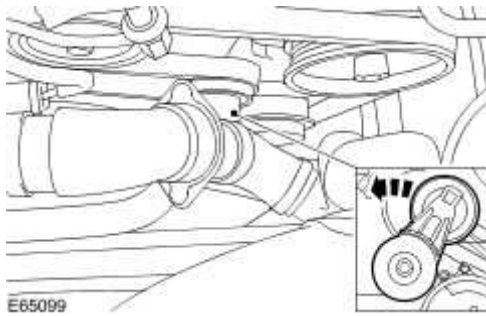
For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

- 3 Detach the accessory drive belt.

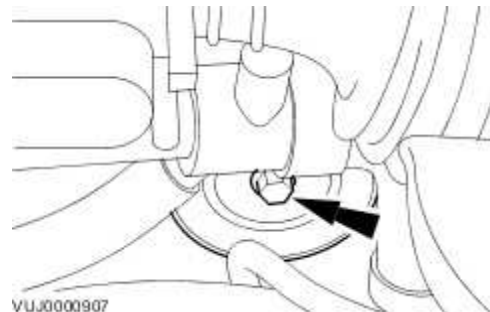
- 1) Rotate the accessory drive belt tensioner counter-clockwise.

▶ Use a 3/8 inch square drive bar or a 1 inch open ended wrench to rotate the accessory drive belt tensioner.

- 2) Detach the accessory drive belt.



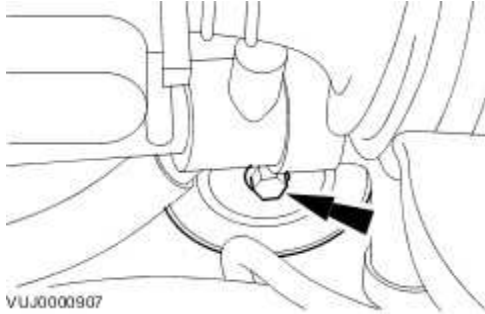
- 4 . Remove the accessory drive belt idler pulley.



Installation

1 . To install, reverse the removal procedure.

▶ Tighten to 25 Nm.



Accessory Drive Belt Idler Pulley - 3.5L/4.2L, VIN Range: G00442->G45703 (12.10.43)

Removal

All vehicles

- 1 . Disconnect the battery ground cable.

For additional information, refer to

- 2 . Remove the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

Vehicles with supercharger

- 3 Remove the supercharger belt.

. For additional information, refer to Supercharger Belt - VIN Range: G00442->G45703 (18.50.08)

All vehicles

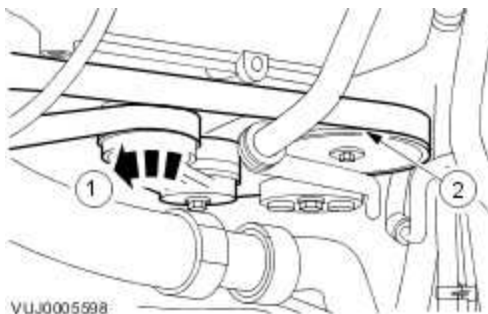
- 4 Detach the accessory drive belt.

.

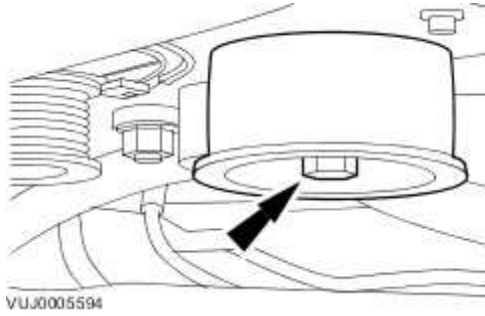
- 1) Rotate the accessory drive belt tensioner counter-clockwise.

➤ Use a 3/8 inch square drive bar to rotate the accessory drive belt tensioner.

- 2) Detach the accessory drive belt.



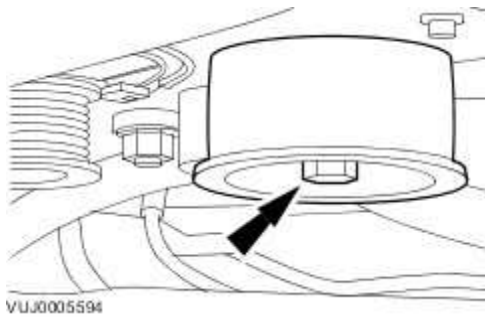
- 5 . Remove the accessory drive belt idler pulley.



Installation

- 1 . To install, reverse the removal procedure.

▶ Tighten to 25 Nm.



Accessory Drive Belt Idler Pulley - 3.5L/4.2L, VIN Range: G45704->G99999 (12.10.43)

Removal

All vehicles

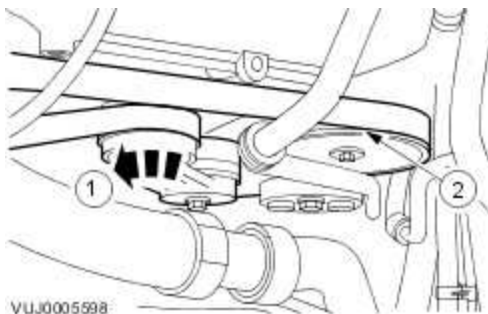
- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Remove the air cleaner outlet pipe.
For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

Vehicles with supercharger

- 3 Remove the supercharger belt.
For additional information, refer to Supercharger Belt - VIN Range: G45704->G99999 (18.50.08)

All vehicles

- 4 Detach the accessory drive belt.
 - ▶ Using a 3/8 inch square drive bar, rotate the accessory drive belt tensioner counter-clockwise.
 - ▶ Detach the accessory drive belt.



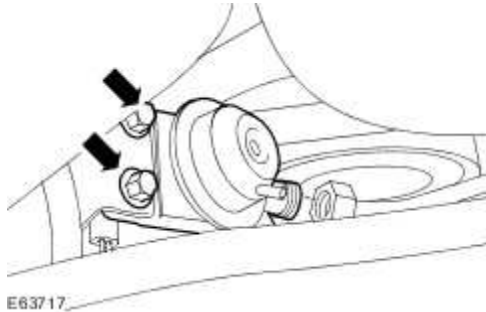
Vehicles without supercharger

5 . NOTE:

Vehicles with supercharger shown, vehicles without supercharger similar.

Release the secondary air injection (AIR) control valve.

▶ Remove the 2 bolts.



6 . Remove the air deflector.

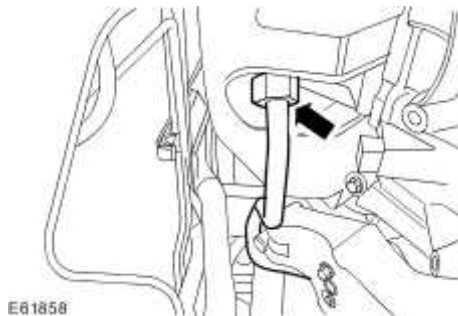
For additional information, refer to Air Deflector (76.11.41)

7



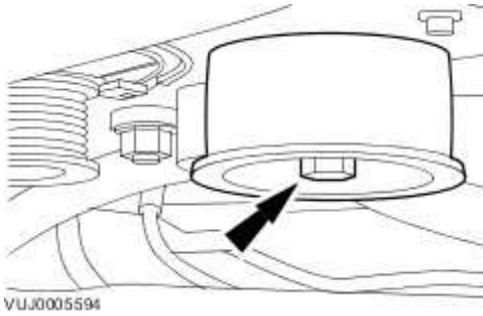
CAUTION: Care must be taken when disconnecting the AIR control valve to exhaust manifold tube. Failure to follow these instructions may result in damage to the A/C pipes.

Disconnect the AIR control valve to exhaust manifold tube from the LH exhaust manifold.



All vehicles

8 . Remove the accessory drive belt idler pulley.

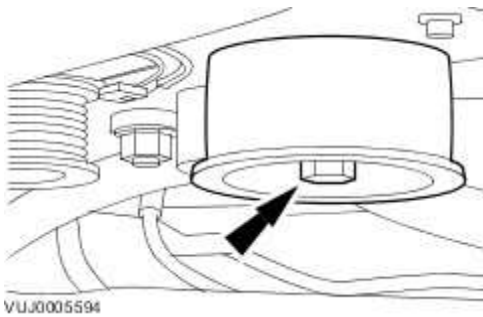


Installation

All vehicles

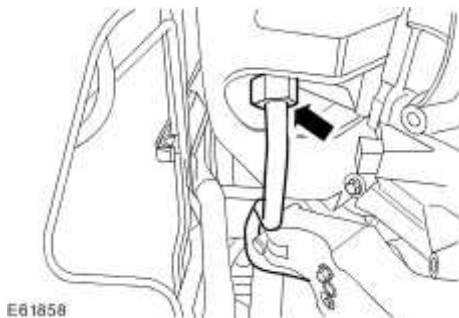
- 1 . To install, reverse the removal procedure.

▶ Tighten to 25 Nm.

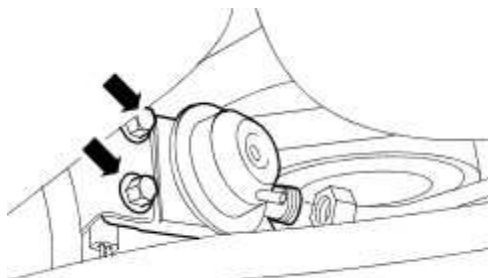


Vehicles without supercharger

- 2 . Tighten to 35 Nm.



- 3 . Tighten to 25 Nm.



E63717

Accessory Drive Belt Idler Pulley - 2.7L Diesel (12.10.43)

Special Service Tools



Accessory belt detensioner.

303-703

Removal

- 1 . Disconnect the battery.

For additional information, refer to Battery Disconnect and Connect

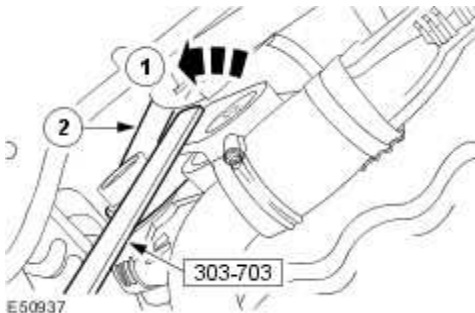
- 2 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

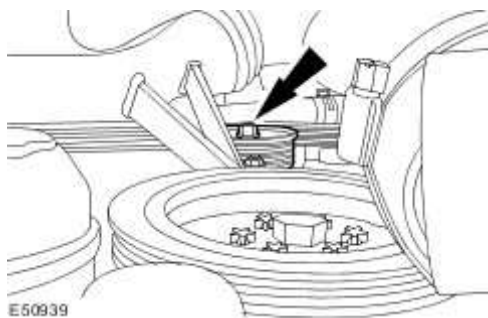
- 3 Detach the accessory drive belt.

- 1) Using the special tool, rotate the accessory drive belt tensioner counter clockwise.

- 2) Detach the accessory drive belt.



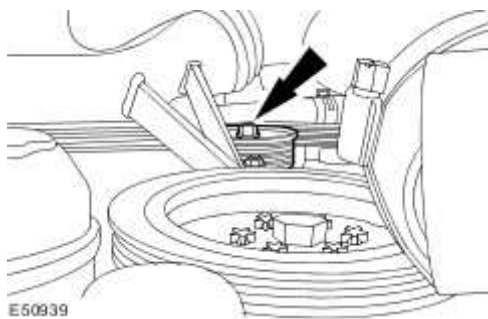
- 4 . Remove the accessory drive belt idler pulley.



Installation

- 1 . To install, reverse the removal procedure.

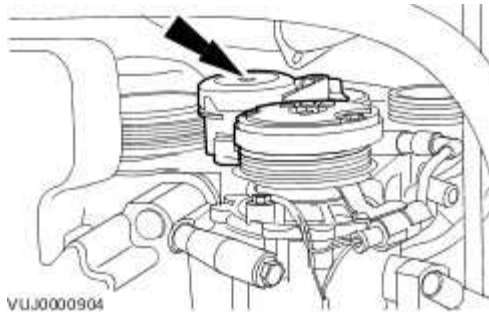
► Tighten to 47 Nm.



Accessory Drive Belt Tensioner - 3.0L, VIN Range: G00442->G45703 (12.10.41)

Removal

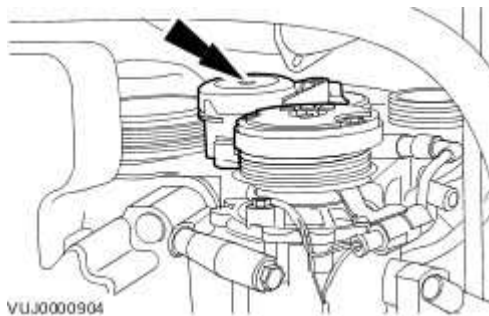
- 1 Remove the accessory drive belt.
 - . For additional information, refer to Accessory Drive Belt - 3.0L, VIN Range: G00442->G45703 (12.10.40)
- 2 . Remove the accessory drive belt tensioner.



Installation

- 1 . To install, reverse the removal procedure.

▶ Tighten to 45 Nm.



Accessory Drive Belt Tensioner - 3.0L, VIN Range: G45704->G99999 (12.10.41)

Removal

- 1 . Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

- 2 . Remove the air cleaner outlet pipe.

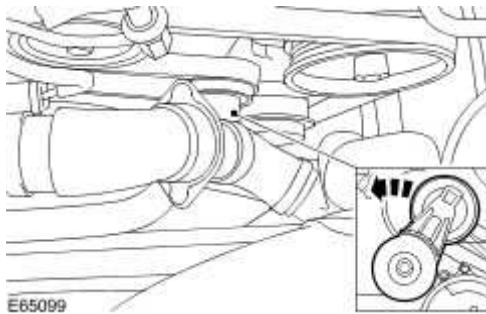
For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

- 3 Detach the accessory drive belt.

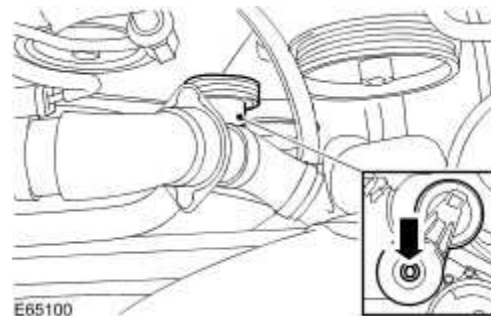
- 1) Rotate the accessory drive belt tensioner counter-clockwise.

▶ Use a 3/8 inch square drive bar or a 1 inch open ended wrench to rotate the accessory drive belt tensioner.

- 2) Detach the accessory drive belt.



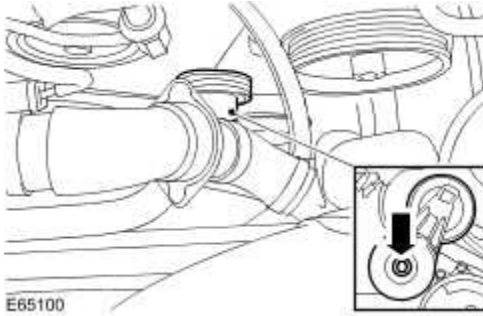
- 4 . Remove the accessory drive belt tensioner.



Installation

1 . To install, reverse the removal procedure.

▶ Tighten to 45 Nm.



Accessory Drive Belt Tensioner - 3.5L/4.2L (12.10.41)

Removal

- 1 . Disconnect the battery ground cable.

For additional information, refer to

- 2 . Remove the air cleaner outlet pipe.

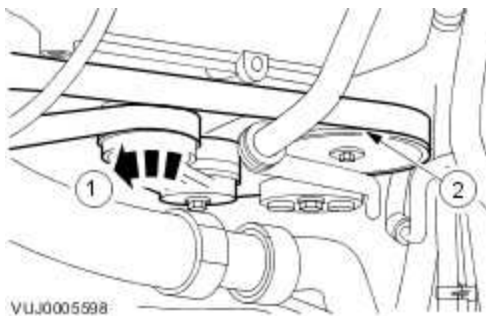
For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

- 3 Detach the accessory drive belt.

- 1) Rotate the accessory drive belt tensioner counter-clockwise.

▶ Use a 3/8 inch square drive bar to rotate the accessory drive belt tensioner.

- 2) Detach the accessory drive belt.



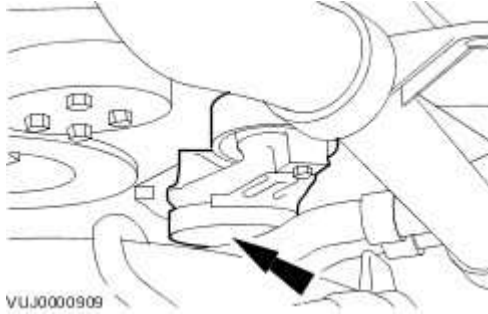
- 4 . Remove the accessory drive belt tensioner.



Installation

1 . To install, reverse the removal procedure.

▶ Tighten to 40 Nm.



Accessory Drive Belt Tensioner - 2.7L Diesel (12.10.41)

Special Service Tools



Accessory belt detensioner.

303-703

Removal

- 1 . Disconnect the battery.

For additional information, refer to Battery Disconnect and Connect

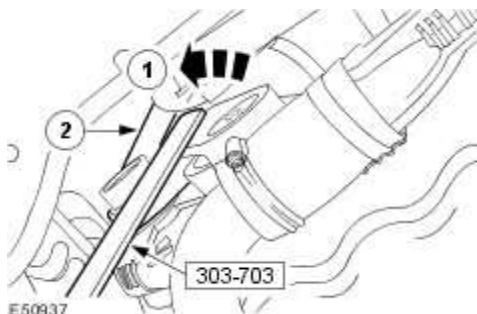
- 2 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

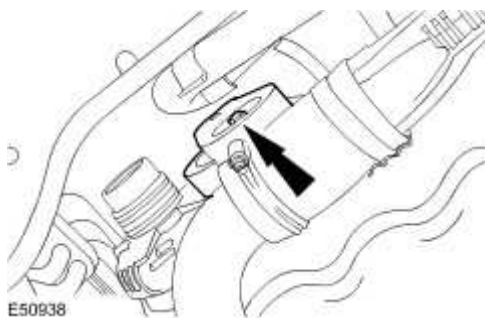
- 3 Detach the accessory drive belt.

- 1) Using the special tool, rotate the accessory drive belt tensioner counter clockwise.

- 2) Detach the accessory drive belt.



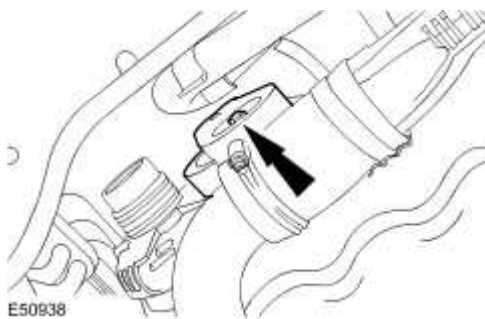
- 4 . Remove the accessory drive belt tensioner.



Installation

- 1 . To install, reverse the removal procedure.

▶ Tighten to 47 Nm.



Fuel Injection Pump Belt

Removal

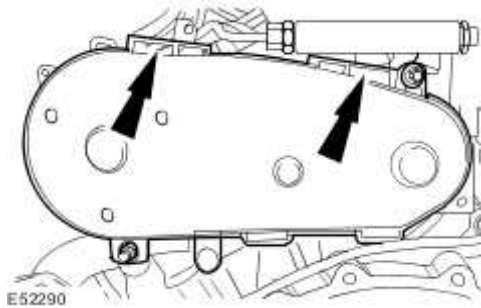
- 1 . Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

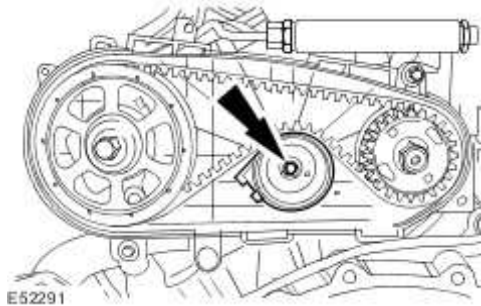
- 2 . Remove the secondary bulkhead centre panel.

For additional information, refer to Secondary Bulkhead Center Panel

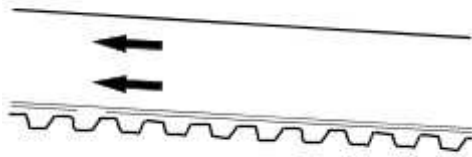
- 3 . Remove the fuel injection pump belt cover.



- 4 . Remove and discard the fuel injection pump belt tensioner.

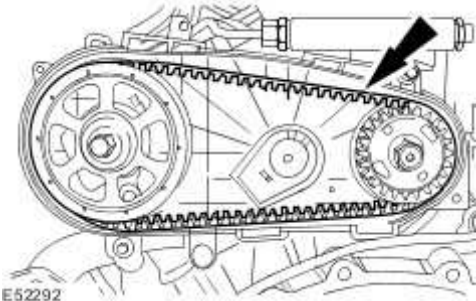


- 5 . Note the direction of rotation of the fuel injection pump belt.



E52241

6 . Remove and discard the fuel injection pump belt.



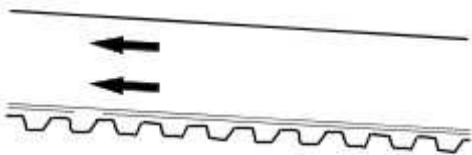
E52292

Installation

1 NOTE:

The fuel injection pump rotates in an anti-clockwise direction when viewed from the rear of the engine.

Note the direction of rotation of the new fuel injection pump belt.



E52241

2



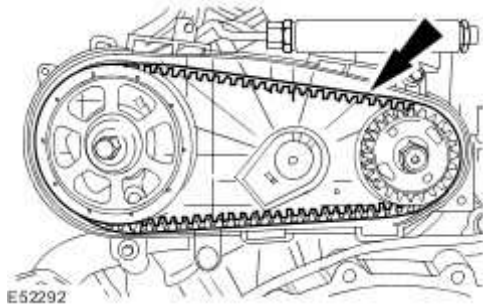
CAUTION: Do not install the fuel injection pump belt to the pulleys with the fuel injection pump belt tensioner installed. Failure to follow this instruction may result in

damage to the fuel injection pump drive belt.

NOTE:

Make sure the fuel injection pump belt is correctly seated on to the fuel injection pump drive pulleys.

Install a new fuel injection pump belt.



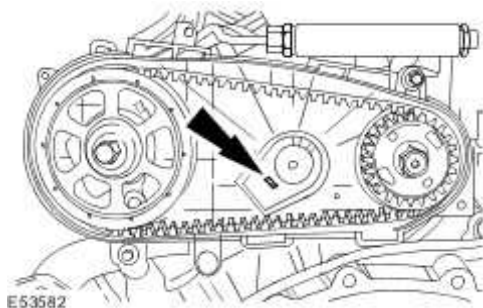
3



CAUTION: Make sure the fuel injection pump belt tensioner is correctly located in to the fuel injection pump cover backplate. Failure to follow this instruction may result in damage to the components.

Install the fuel injection pump belt tensioner.

- ▶ Locate the tang on the new fuel injection pump belt tensioner in to the fuel injection pump cover backplate.

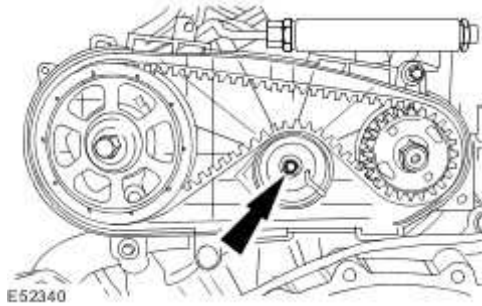


4 **NOTE:**

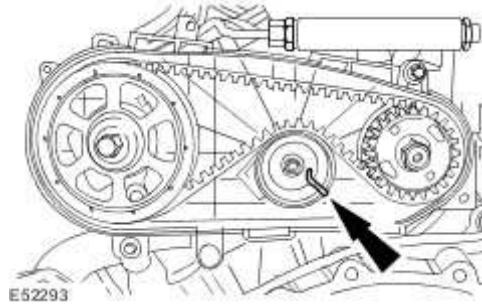
Do not remove the fuel injection pump belt tensioner locking pin before installing the tensioner.

Install the fuel injection pump belt tensioner retaining bolt.

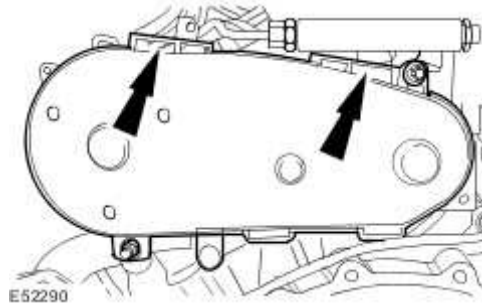
► Tighten to 25 Nm.



5 . Remove and discard the fuel injection pump belt tensioner locking pin.



6 . Install the fuel injection pump belt cover.



7 . Install the secondary bulkhead centre panel.

For additional information, refer to Secondary Bulkhead Center Panel

8 . Connect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)

Fuel Injection Pump Pulley

Special Service Tools



Reaction arm - fuel pump pulley
303-138



Holder - fuel pump pulley
303-139

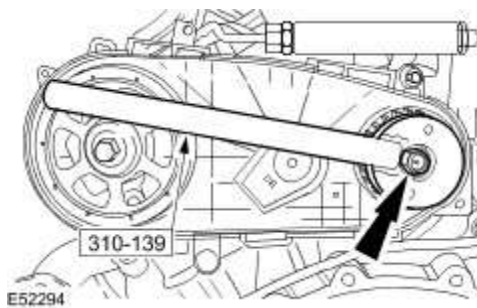
Removal

- 1 . Remove and discard the fuel injection pump belt.
For additional information, refer to Fuel Injection Pump Belt

- 2 . Remove the injection pump pulley retaining nut.

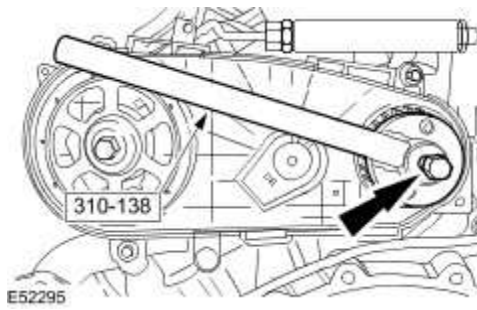
► Using the special tool, retain the fuel injection pump pulley.

► Remove the special tool.



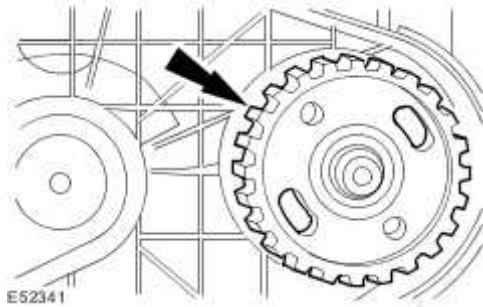
- 3 . Using the special tool, remove the fuel injection pump pulley.

- ▶ Remove the special tool.



Installation

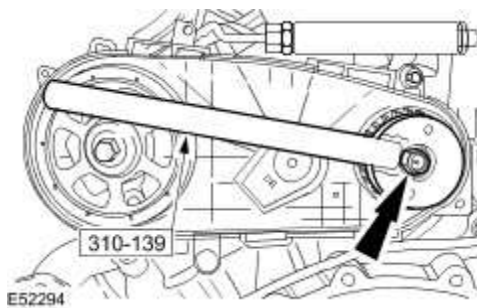
- 1 . Install the fuel injection pump pulley.



- 2 . Install the retaining nut.

- ▶ Using the special tool, retain the fuel injection pump pulley.

- ▶ Tighten to 50 Nm.



- 3 . Install a new fuel injection pump belt.

For additional information, refer to Fuel Injection Pump Belt

Supercharger Belt - VIN Range: G00442- >G45703 (18.50.08)

Removal

- 1 . Disconnect the battery ground cable.

For additional information, refer to

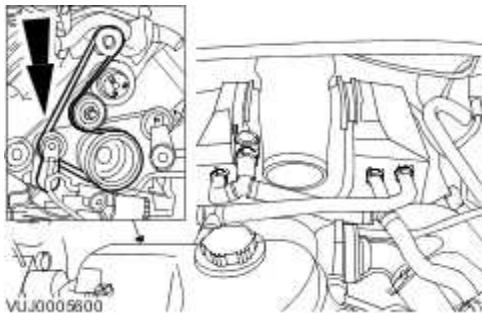
- 2 . Remove the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

- 3 . Detach the supercharger belt.

▶ Use a 1/2 inch square drive bar to rotate the supercharger belt tensioner.

- 2) Detach the supercharger belt.



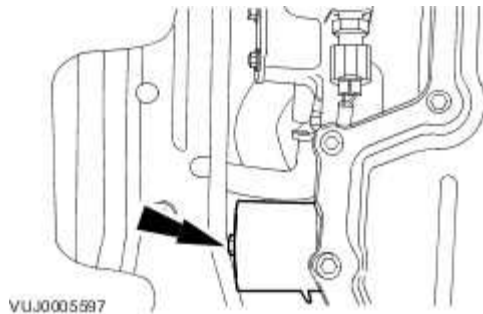
- 4 . Remove the air deflector.

For additional information, refer to

- 5 . Reposition the supercharger belt tensioner.

▶ Loosen the supercharger belt tensioner retaining bolt.

▶ Reposition the supercharger belt tensioner.



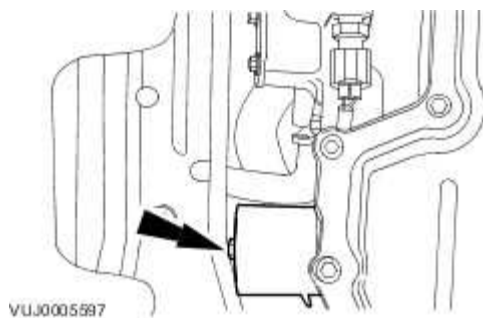
6 . Lower the vehicle.

7 . Remove the supercharger belt.

Installation

1 . To install, reverse the removal procedure.

► Tighten to 40 Nm.

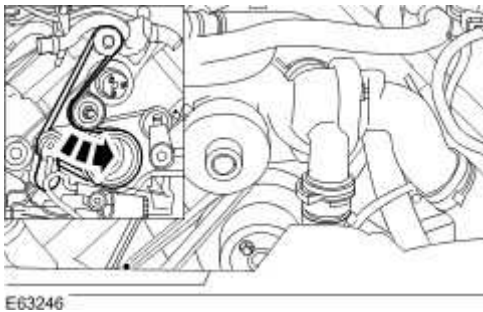


Supercharger Belt - VIN Range: G45704- >G99999 (18.50.08)

Removal

- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Remove the air cleaner outlet pipe.
For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)
- 3 . Remove the coolant expansion tank.
For additional information, refer to Coolant Expansion Tank (26.15.01)
- 4 . Remove the supercharger belt.

► Use a 1/2 inch square drive bar to rotate the supercharger belt tensioner.



Installation

- 1 . To install, reverse the removal procedure.

Supercharger Belt Idler Pulley - VIN Range: G04422->G45703 (18.50.09)

Removal

- 1 . Disconnect the battery ground cable.

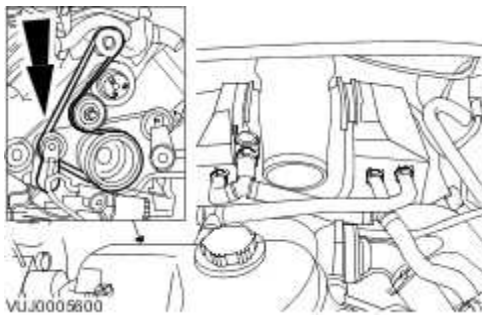
For additional information, refer to

- 2 . Remove the air cleaner outlet pipe.

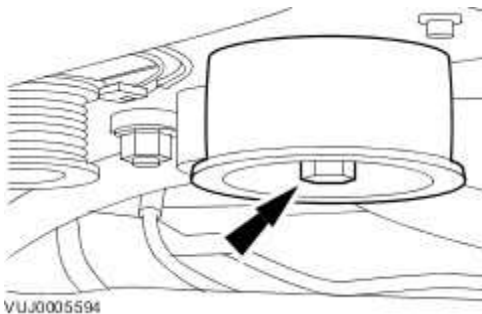
For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

- 3 . Detach the supercharger belt.

▶ Use a 1/2 inch square drive bar to rotate the supercharger belt tensioner.



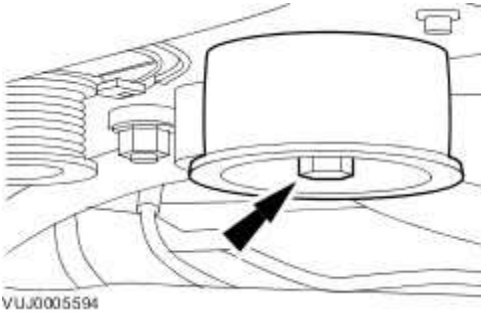
- 4 . Remove the supercharger belt idler pulley.



Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 40 Nm.



Supercharger Belt Idler Pulley - VIN Range: G45704->G99999 (18.50.09)

Removal

- 1 . Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

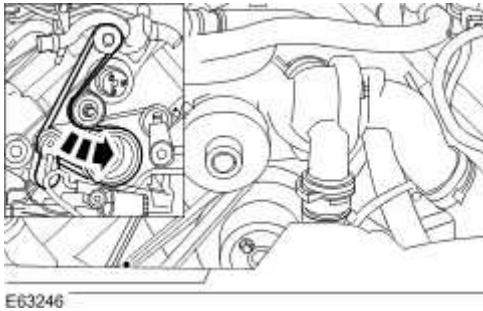
- 2 . Remove the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

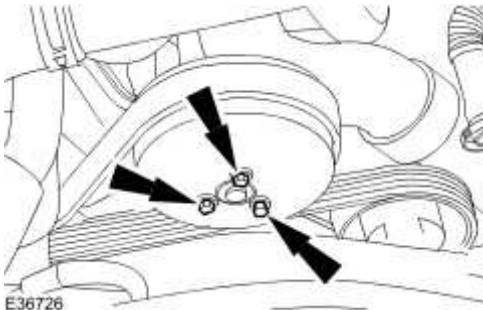
- 3 . Remove the coolant expansion tank.

For additional information, refer to Coolant Expansion Tank (26.15.01)

- 4 . Using the special tool, detach the supercharger belt.



- 5 . Loosen the water pump pulley retaining bolts.

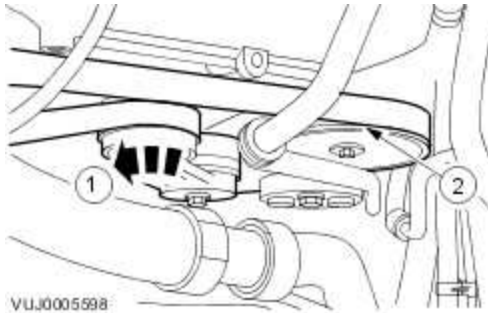


- 6 Detach the accessory drive belt.

1) Rotate the accessory drive belt tensioner counter-clockwise.

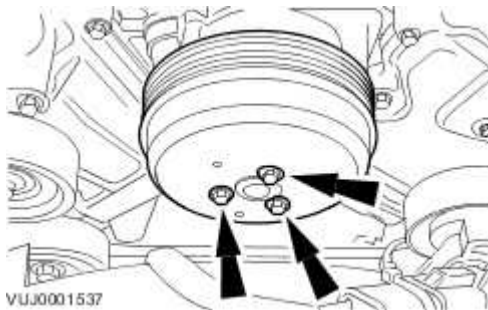
▶ Use a 3/8 inch square drive bar to rotate the accessory drive belt tensioner.

2) Detach the accessory drive belt.

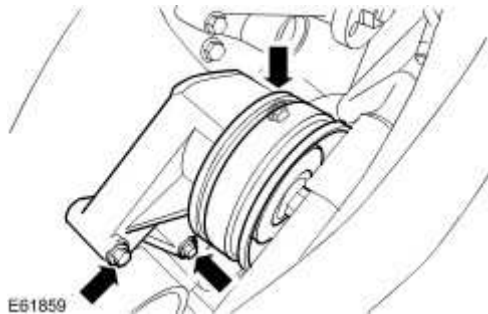


7 . Remove the water pump pulley.

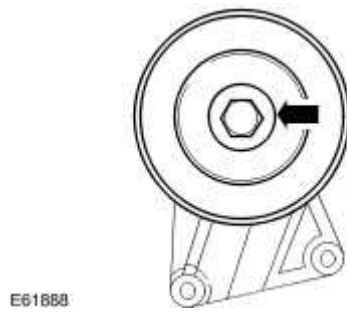
▶ Discard the water pump pulley retaining bolts.



8 . Remove the supercharger belt idler pulley and bracket assembly.



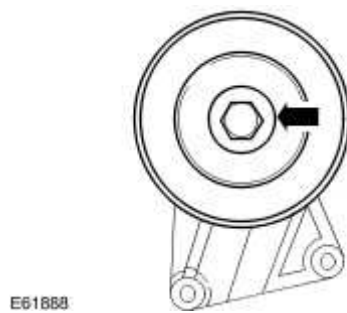
9 . Remove the supercharger belt idler pulley.



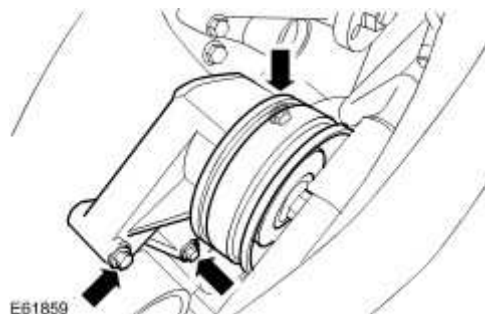
Installation

1 . To install, reverse the removal procedure.

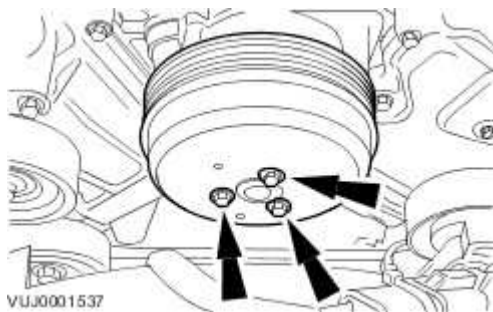
▶ Tighten to 40 Nm.



2 . Tighten to 9 Nm.



3 . Tighten to 10 Nm + 45°.



Supercharger Belt Tensioner - VIN Range: G00442->G45703 (18.50.24)

Removal

- 1 . Disconnect the battery ground cable.

For additional information, refer to

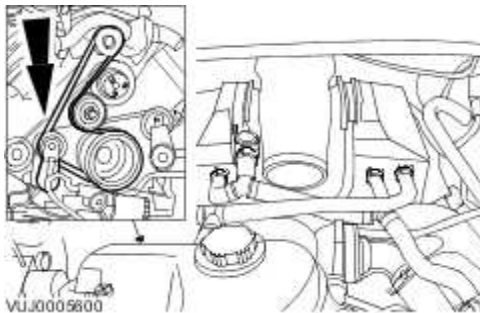
- 2 . Remove the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

- 3 . Detach the supercharger belt.

▶ Use a 1/2 inch square drive bar to rotate the supercharger belt tensioner.

▶ Detach the supercharger belt.



- 4 . Remove the air deflector.

For additional information, refer to

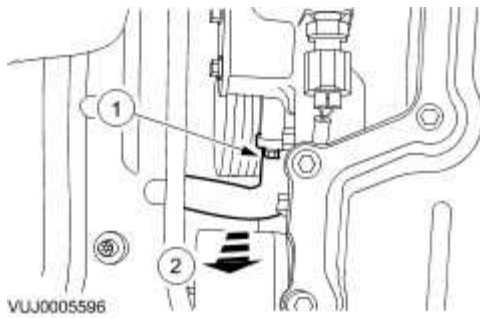
- 5 . **NOTE:**

Remove and discard the oil cooler pipe O-ring seal.

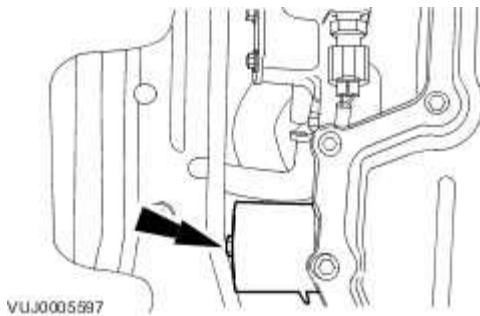
Detach the oil cooler pipe from the oil filter adaptor.

- 1) Remove the the oil cooler pipe retaining bolt.

2) Detach the oil cooler pipe from the oil filter adaptor.



6 . Remove the supercharger belt tensioner.



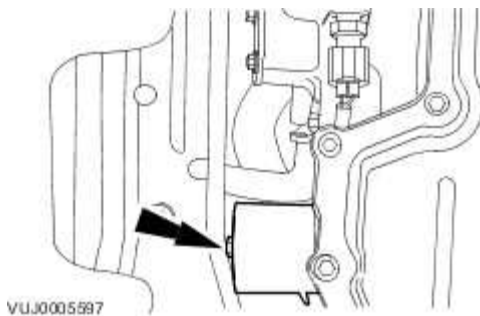
Installation

1 . **NOTE:**

Install a new O-ring seal to oil cooler pipe.

To install, reverse the removal procedure.

► Tighten to 40 Nm.



Supercharger Belt Tensioner - VIN Range: G00442->G45703 (18.50.24)

Removal

- 1 . Disconnect the battery ground cable.

For additional information, refer to

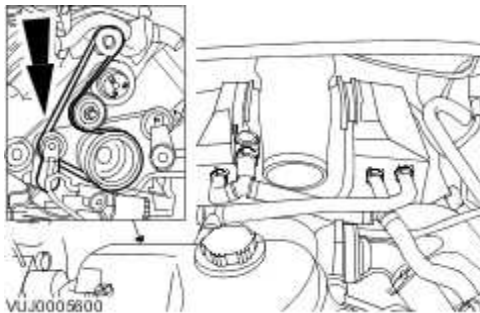
- 2 . Remove the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

- 3 . Detach the supercharger belt.

▶ Use a 1/2 inch square drive bar to rotate the supercharger belt tensioner.

▶ Detach the supercharger belt.



- 4 . Remove the air deflector.

For additional information, refer to

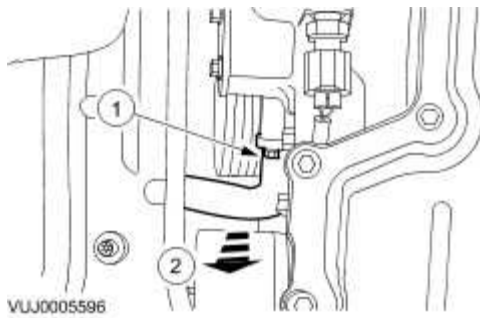
- 5 . **NOTE:**

Remove and discard the oil cooler pipe O-ring seal.

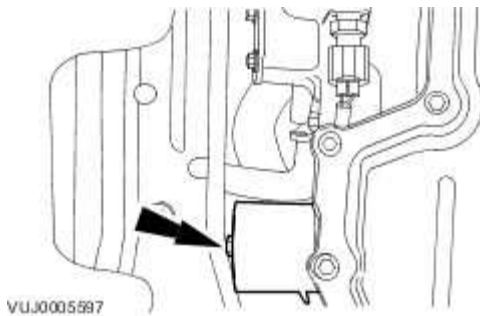
Detach the oil cooler pipe from the oil filter adaptor.

- 1) Remove the the oil cooler pipe retaining bolt.

2) Detach the oil cooler pipe from the oil filter adaptor.



6 . Remove the supercharger belt tensioner.



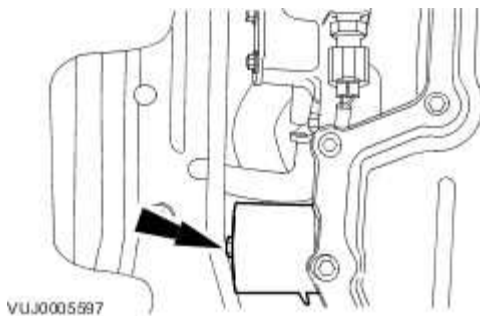
Installation

1 . **NOTE:**

Install a new O-ring seal to oil cooler pipe.

To install, reverse the removal procedure.

► Tighten to 40 Nm.



303-06 : Starting System

Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Starter motor retaining bolts - Vehicles fitted with 3.0L engines	25	18	-
Starter motor retaining bolts - Vehicles fitted with 3.5L or 4.2L engines	45	33	-
Starter motor retaining bolts - Vehicles fitted with 2.7L diesel engines	48	35	-
Battery positive terminal integral connector retaining nut - Vehicles fitted with 3.0L engines	11	9	-
Battery positive terminal integral connector retaining nut - Vehicles fitted with 3.5L or 4.2L engines	9	-	80
Battery positive terminal integral connector retaining nut - Vehicles fitted with 2.7L diesel engines	11	9	-
Solenoid terminal integral connector retaining nut	7	-	62

Starting System

The function of the starting system is to crank the engine fast enough to allow the engine to start. Heavy cables, connectors and switches are used in the system because of the large currents required.

The starting system consists of a pre-engaged type starter motor, battery, remote control switch (ignition switch) and relay. When the starter is operated from the ignition switch, the engagement lever moves the pinion into mesh with the engine ring gear teeth, the electrical contacts within the solenoid complete the high power circuit and the starter motor operates to turn the engine.

Vehicles equipped with automatic transmission have a transmission range sensor attached to the circuit which prevents operation of the starter motor unless NEUTRAL or PARK are selected.

The sequence of operation is as follows:

Ignition switch in the start position III.

Starter relay activated.

Voltage provided to the starter motor solenoid.

Starter solenoid engages the drive pinion to the flywheel or flexiplate.

Starter solenoid switches the battery current to the starter motor.

System remains engaged until the ignition switch is returned to the run position.

Starting System

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

For information on the operation of the system,
Starting System

Inspection and verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
<p>Gear selector lever cable adjustment (vehicles with automatic transmission)</p> <p>Starter Motor</p> <p>Battery</p>	<p>Battery charge and condition</p> <p>Fuses</p> <p>Wiring harness(es)</p> <p>Damaged, loose or corroded connectors</p> <p>Ignition switch</p> <p>Starter relay</p> <p>Transmission control module (TCM)</p> <p>Engine control module (ECM)</p>

- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

- 4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC index, or the symptom chart if no DTCs are set.

Symptom chart

Symptom	Possible cause(s)	Action
The engine does not crank (starter motor does not turn)	Gear selector not in P or N position (vehicles with automatic transmission) Battery Harness/Connectors Starter motor Starter relay Ignition switch Transmission control module (TCM) Engine control module (ECM) Engine siezed	Make sure the gear selector is in the P or N position and correctly adjusted. Selector Lever Cable Adjustment (44.15.07) Check the battery condition and state of charge. Battery Check the starter motor and harness, GO to Pinpoint Test G557182p1. Check the starter relay and circuits. GO to Pinpoint Test G557182p2. Check that the engine turns.
The engine does not crank (starter motor does turn)	Starter motor fitment Starter motor Flywheel/Drive plate ring gear	Check the starter motor fitment (fasteners tight, starter motor square to engine, etc). Check the flywheel/drive plate ring gear teeth for damage, foreign objects, etc.
Engine cranks too slowly	Battery Harness/Connectors Starter motor Oil grade	Check the battery condition and state of charge. Battery Check the starter motor and harness, GO to Pinpoint Test G557182p3. Check the oil specification.
Excessive starter motor noise	Starter motor Flywheel/Drive plate ring gear Starter motor fitment/casing	Check the starter motor fitment (fasteners tight, motor square to engine, etc). Check the starter motor casing condition. Check the flywheel/drive plate ring gear teeth for damage, foreign objects, etc.

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of powertrain DTCs,
 Electronic Engine Controls - VIN Range: G00442->G45703
 Electronic Engine Controls - VIN Range: G45704->G99999
 Electronic Engine Controls - VIN Range: G00442->G45703
 Electronic Engine Controls - VIN Range: G45704->G99999
 Electronic Engine Controls

DTC	Description	Possible causes	Action
P05120C	Starter request circuit - circuit voltage above threshold	Starter relay coil to ECM/ignition switch circuit: short circuit to power Ignition switch failure	For starter request circuit tests, GO to Pinpoint Test G557182p2.
P05120E	Starter request circuit - circuit voltage below threshold	Starter relay coil to ECM/ignition switch circuit: short circuit to ground Starter relay coil to ECM/ignition switch circuit: high resistance Ignition switch failure	For starter request circuit tests, GO to Pinpoint Test G557182p2.
P06160E	Starter relay circuit low	Starter relay drive circuit: short circuit to ground Starter relay drive circuit: high resistance Starter relay failure	For starter relay and circuit tests, GO to Pinpoint Test G557182p2.
P061700	Starter relay circuit high	Starter relay drive circuit: short circuit to power Starter relay failure	For starter relay and circuit tests, GO to Pinpoint Test G557182p2.
P06170C	Starter relay circuit high	Starter relay drive circuit: short circuit to power	For starter relay and circuit tests, GO to Pinpoint Test

		Starter relay failure	G557182p2.
--	--	-----------------------	------------

Pinpoint tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

NOTE:

If diagnostic trouble codes (DTCs) are recorded and the symptom is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

PINPOINT TEST G557182p1 : BASE STARTER CIRCUIT TESTS

G557182t1 : CHECK THE SUPPLY VOLTAGE AT THE STARTER MOTOR

1. Key off. 2. Measure the voltage between:

Starter motor	Battery
Permanent supply terminal	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G557182t2.

-> **No**

REPAIR the battery power supply circuit as necessary. For additional information, refer to the wiring diagrams. Test the system for normal operation.

G557182t2 : CHECK THE GROUND AT THE STARTER MOTOR

1. Measure the resistance between:

Starter motor	Battery
Outer casing	Negative terminal

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G557182t3.

-> **No**

REPAIR the ground circuit as necessary. For additional information, refer to the wiring diagrams. Test the system for normal operation.

G557182t3 : BYPASS THE RELAY START SIGNAL

1. Disconnect the starter solenoid connector:

Vehicle	Connector
3.0L/3.5L/4.2L VIN Range: G00442->G45703	EL2
3.0L/3.5L/4.2L VIN Range: G45704->G99999	PI62
2.7L Diesel	C60

2. Connect a suitable remote start device between the starter solenoid connection and battery positive. 3. Operate the remote start device.

Does the engine crank?

-> **Yes**

CHECK the starter relay circuits. GO to Pinpoint Test G557182p2.

-> **No**

INSTALL a new starter motor.

Starter Motor - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (86.60.01)

Starter Motor - 2.7L V6 - TdV6 (86.60.01) Test the system for normal operation.

PINPOINT TEST G557182p2 : STARTER RELAY CIRCUIT TESTS

G557182t4 : CHECK THE STARTER RELAY OUTPUT VOLTAGE AT THE SOLENOID

1. Engine control module connector, PI1 (3.0L/3.5L/4.2L VIN Range: G00442->G45703)

Circuit	Pin
Crank request	06
Starter relay - control	41

2. Engine control module connector, EC300 (3.0L/3.5L/4.2L VIN Range: G45704->G99999)

Circuit	Pin
Crank request	17
Starter relay - control	51

3. Engine control module connector, EC66 (2.7L Diesel)

Circuit	Pin
Crank request	F3
Starter relay - control	B1

4. Front power distribution box connector, EC04

Circuit	Pin
---------	-----

Starter motor solenoid - supply	03
---------------------------------	----

5. Front power distribution box connector, EC41

Circuit	Pin
Starter motor relay - switched supply	01

6. Front power distribution box connector, EC28

Circuit	Pin
Starter motor relay - control	08

7. Key off. 8. Disconnect the starter solenoid connector (this is an eyelet):

Vehicle	Connector
3.0L/3.5L/4.2L VIN Range: G00442->G45703	EL2
3.0L/3.5L/4.2L VIN Range: G45704->G99999	PI62
2.7L Diesel	C60

9. Key on, engine cranking. 10. Measure the voltage between:

Connector, component side	Battery
EL2	Negative terminal
PI62	
C60	

Is the voltage greater than 10 volts?

-> Yes

RECHECK the starter motor. Possible connection fault between the starter motor solenoid connector and the solenoid. Rectify as necessary, test the system for normal operation.

-> No

GO to Pinpoint Test G557182t8.

G557182t8 : CHECK THE STARTER RELAY OUTPUT VOLTAGE AT THE FUSE BOX

1. Key off. 2. Disconnect the front power distribution box connector, EC04. 3. Key on, engine cranking. 4. Measure the voltage between:

EC04, component side	Battery
Pin 03	Negative terminal

Is the voltage less than 10 volts?

-> Yes

GO to Pinpoint Test G557182t6.

-> No

REPAIR the solenoid supply circuit as necessary. For additional information, refer to the wiring diagrams. Test the system for normal operation.

G557182t6 : CHECK THE IGNITION SWITCHED SUPPLY TO THE STARTER RELAY

1. Key off. 2. Disconnect the front power distribution box connector, EC41. 3. Key on, engine cranking. 4. Measure the voltage between:

EC41, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G557182t9.

-> No

REPAIR the switched supply circuit as necessary. For additional information, refer to the wiring diagrams. Test the system for normal operation.

G557182t9 : CHECK THE STARTER RELAY COIL RESISTANCE

1. .

Coil temperature (degrees C)	Coil temperature (degrees F)	Coil resistance (ohms)
23	73	70 to 86
85	185	84 to 100

2. Key off. 3. Disconnect the front power distribution box connector, EC28. 4. Measure the resistance between:

EC41, harness side	EC28, harness side
Pin 01	Pin 08

Is the reading as expected for the current engine temperature? (Refer to the table)

-> **Yes**

GO to Pinpoint Test G557182t5.

-> **No**

INSTALL a new front power distribution box (the relay cannot be changed separately). Test the system for normal operation.

G557182t5 : CHECK THE CRANK REQUEST SIGNAL TO THE ECM

1. Disconnect the engine control module connector:

Vehicle	Connector
3.0L/3.5L/4.2L VIN Range: G00442->G45703	PI1
3.0L/3.5L/4.2L VIN Range: G45704->G99999	EC300
2.7L Diesel	EC66

2. Key on, engine cranking. 3. Measure the voltage between:

ECM Connector	Pin, harness side	Battery
---------------	-------------------	---------

PI1	06	Negative terminal
EC300	17	
EC66	F3	

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G557182t7.

-> No

REPAIR the crank request circuit as necessary. For additional information, refer to the wiring diagrams. Test the system for normal operation.

G557182t7 : CHECK THE STARTER RELAY CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

ECM Connector	Pin, harness side	EC28, harness side
PI1	41	Pin 08
EC300	51	
EC66	B1	

Is the resistance less than 10 ohms?

-> Yes

CHECK for DTCs indicating a possible ECM or TCM fault. If no DTCs are set, an intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Front power distribution box connector. - Front power distribution box (starter relay). - ECM connector. - ECM.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Test the system for normal operation.

PINPOINT TEST G557182p3 : THE ENGINE CRANKS TOO SLOWLY

G557182t11 : CHECK THE VOLT DROP IN THE STARTER POSITIVE CIRCUIT

1. Connect a voltmeter between:

Starter motor	Battery
Permanent supply terminal	Positive terminal

2. Key on, engine cranking.

Is the voltage greater than 0.5 volts?

-> **Yes**

CLEAN and tighten all battery cable connections. Test the system for normal operation. Check the resistance of the battery cable, replace as necessary.

-> **No**

GO to Pinpoint Test G557182t12.

G557182t12 : CHECK THE VOLT DROP IN THE STARTER NEGATIVE CIRCUIT

1. Connect a voltmeter between:

Starter motor	Battery
Outer casing	Negative terminal

2. Key on, engine cranking.

Is the voltage greater than 0.5 volts?

-> **Yes**

CLEAN and tighten all battery cable connections, starter motor mounting and body to engine ground strap. Test the system for normal operation. Check the resistance of the ground cables, replace as necessary.

-> **No**

INSTALL a new starter motor.

Starter Motor - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (86.60.01)

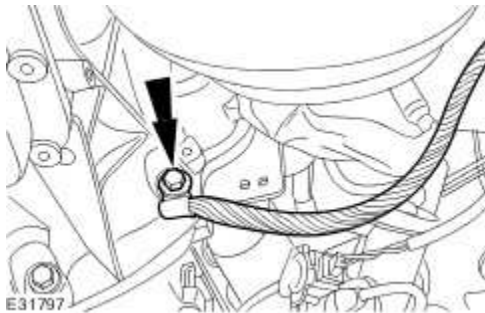
Starter Motor - 2.7L V6 - TdV6 (86.60.01) Test the system for normal operation.

Starter Motor - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (86.60.01)

Removal

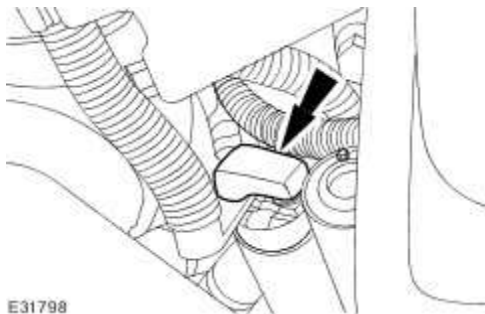
All vehicles

- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)
- 3 . Disconnect the engine ground cable.



Vehicles fitted with 3.0L engine

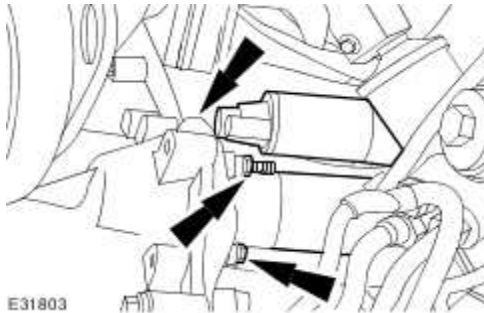
- 4 . Remove the starter motor positive cable cover.



5 . Detach the starter motor positive cables.

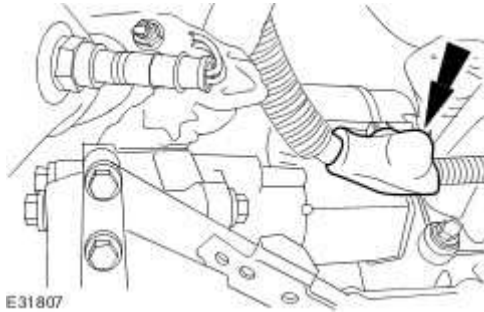


6 . Remove the starter motor.

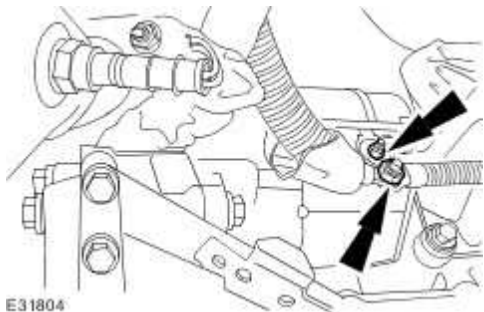


Vehicles fitted with 3.5L or 4.2L engine

7 . Remove the starter motor positive cable cover.



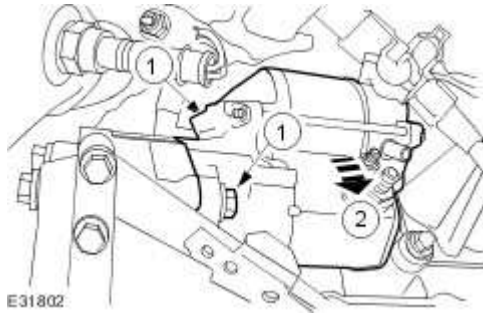
8 . Detach the starter motor positive cables.



9 . Remove the starter motor.

1) Remove the starter motor retaining bolts.

2) Remove the starter motor.

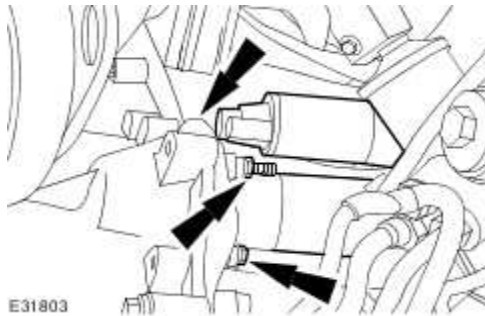


Installation

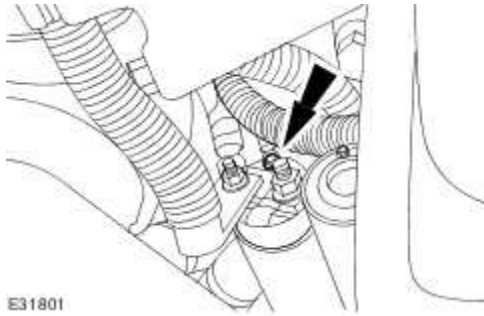
Vehicles with 3.0L engine

1 . To install, reverse the removal procedure.

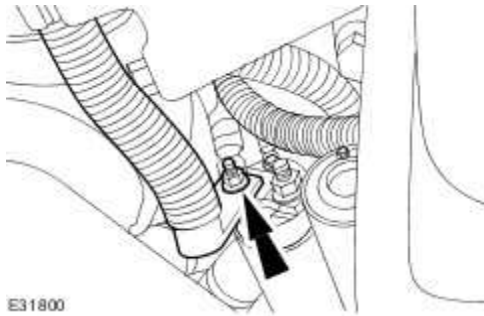
► Tighten to 25Nm



2 . Tighten to 7 Nm.

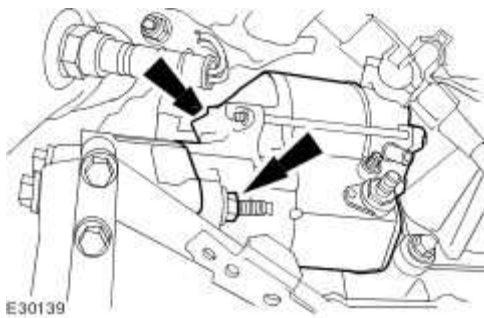


3 . Tighten to 13 Nm.

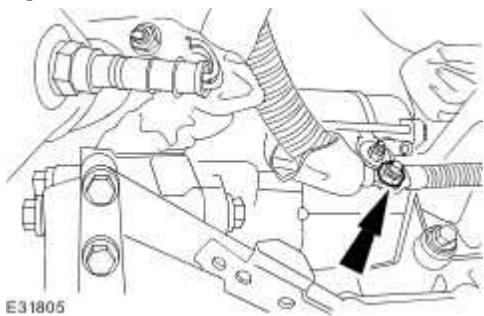


Vehicles with 3.5L or 4.2L engine

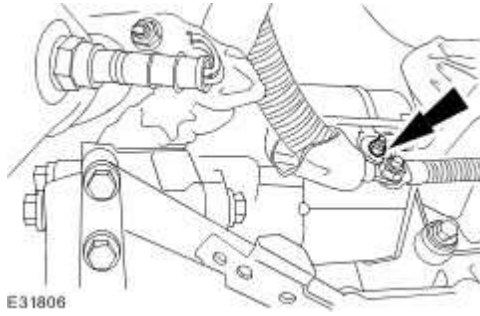
4 . Tighten to 45 Nm.



5 . Tighten to 10 Nm.



6 . Tighten to 7 Nm.



Starter Motor - 2.7L V6 - TdV6 (86.60.01)

Removal

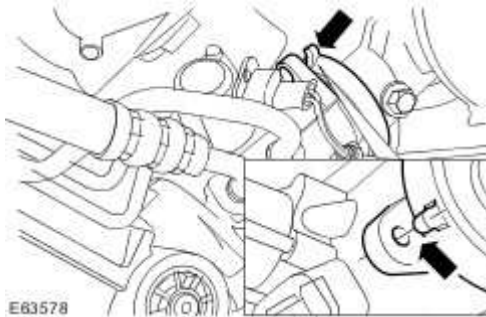
- 1 . Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

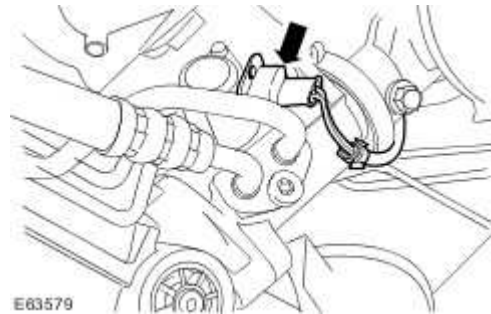
- 2 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

- 3 Make sure the alignment mark on the steering gear pinion seal protection cover is central to
the steering gear pinion casting.

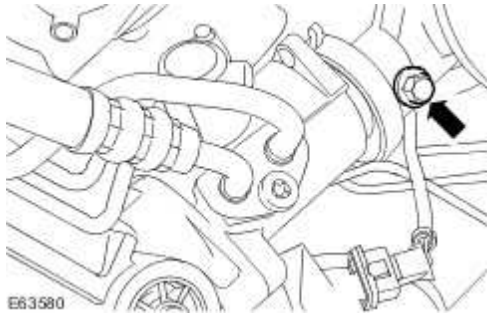


- 4 . Disconnect the power steering control valve actuator electrical connector.



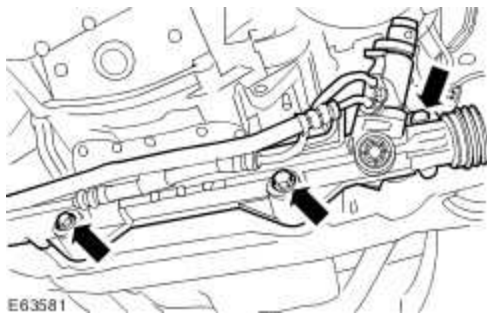
- 5 . Detach the lower steering column.

▶ Remove the steering gear shaft pinch bolt.

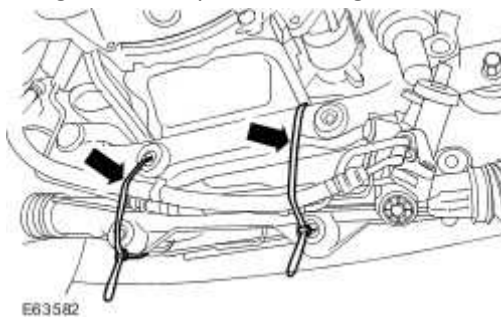


6 . Detach the steering gear.

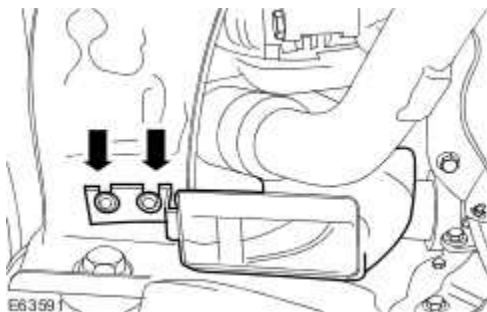
▶ Remove the steering gear retaining bolts.



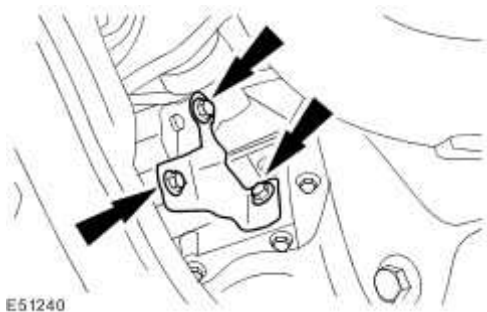
7 . Using a suitable piece of string secure the steering gear.



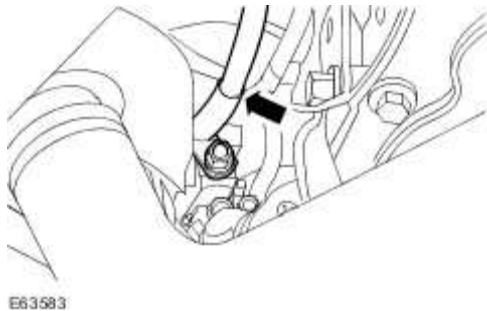
8 . Remove the generator cooling duct.



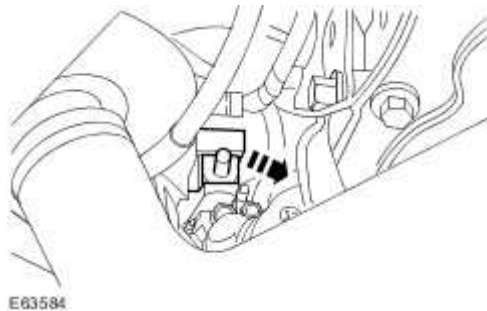
9 . Remove the starter motor retaining bracket.



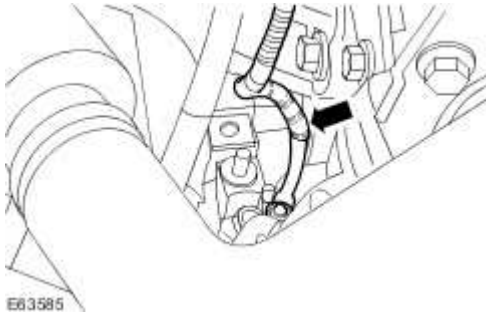
10 . Detach the starter motor positive cable.



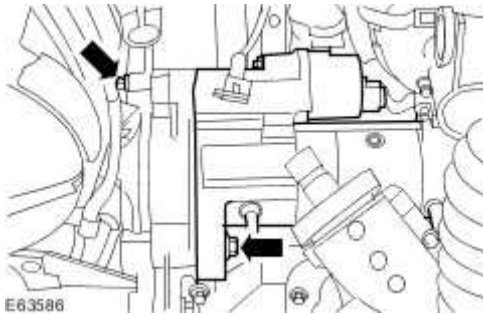
11 . Reposition the starter motor positive cable.



12 . Detach the starter motor solenoid harness.



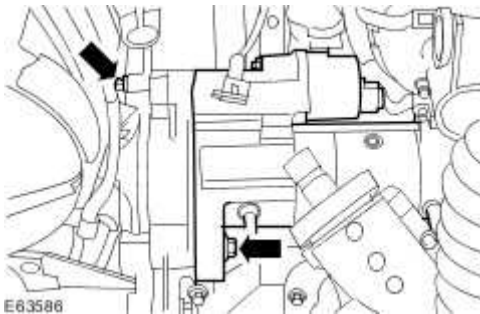
13 . Remove the starter motor.



Installation

1 . To install, reverse the removal procedure.

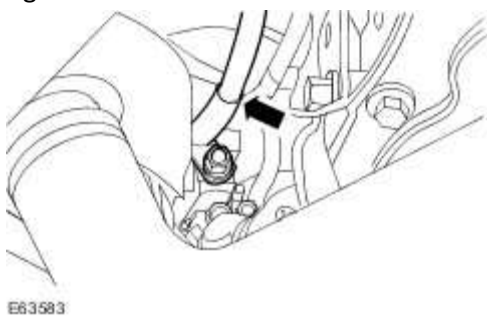
► Tighten to 48 Nm.



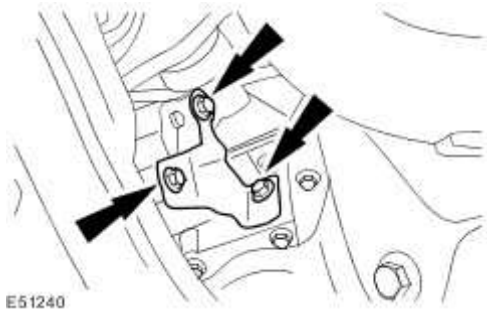
2 . Tighten to 7 Nm.



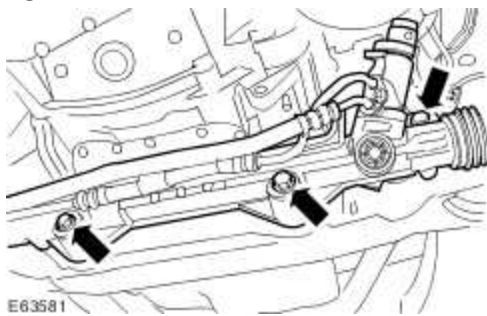
3 . Tighten to 10 Nm.



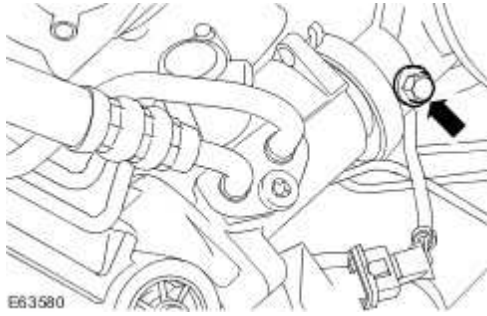
4 . Tighten to 23 Nm.



5 . Tighten to 100 Nm.



6 . Tighten to 35 Nm.



7 . Connect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)

303-07 : Engine Ignition – 3.0L NA V6 – AJ27

Specifications

Specifications

General Specifications

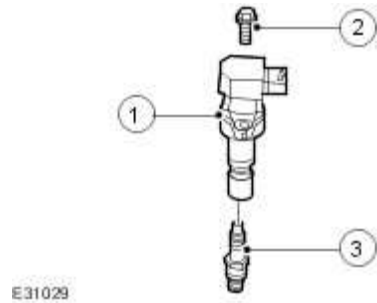
Item	Specification
Firing order	1-4-2-5-3-6
Spark plug gap	1.3-1.45mm (0.051-0.057in)
Spark plug type	AWSF22FS
High temperature nickel anti-seize lubricant F6AZ-9L494-AA (Spark plug thread)	ESE-M12A4-A

Torque Specifications

Description	Nm	lb-ft	lb-in
Spark plugs	15	11	-
Ignition coil-on-plug retaining bolts	6	-	53

Engine Ignition

Component Locations



Item	Part Number	Description
1	-	Ignition coil-on-plug
2	-	Ignition coil-on-plug retaining bolt
3	-	Spark plug

The right-hand cylinders are numbered 5,3,1 and the left-hand cylinders are numbered 6,4,2 when viewed from the rear of the engine.

The ignition system consists of an ignition coil located on each individual cylinder and each individual spark plug. The ignition timing can now be adjusted more rapidly and independently.

The crankshaft position sensor signal is the basis for ignition timing calculations. The alternating voltage signal from the crankshaft position sensor is converted by the engine control module (ECM). This digital signal is then used to position the closing time of the primary circuit of the ignition coil. The effective range for ignition timing control is increased to the fact that there are no rotating parts.

On the basis of engine speed and load inputs, the powertrain control module determines the ignition timing. This function also takes other inputs into consideration such as engine temperature, throttle position, knock control, cam position, traction control and electronic transmission control inputs.

This ignition system enables the customer to drive the vehicle home if a coil or coil wiring failure occurs. In the event of a wiring failure between the powertrain control module and the coil, the coil will fail instead of the coil fuse blowing, which will allow the remaining coils to continue to function and the engine to limp home.

Engine Ignition - VIN Range: G00442- >G45703

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Confirm which, if any, warning lights and/or messages were displayed on the instrument cluster.

NOTE:

If any warning lights and/or messages were displayed when the fault occurred, refer to the driver information table for DTCs associated with the display, then to the DTC index table for possible sources and actions. Some warnings will appear to clear when the ignition is cycled. This is often because the warning has flagged as a result of one of the vehicle's on-board diagnostic routines having run to detect the fault. If the same routine is not run when the ignition is switched **ON**, the warning will not reflag until the routine does run. See the DTC summaries for drive cycle routines.

- 3 . Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Engine oil level	Fuses
Cooling system coolant level	Wiring harness
Fuel level	Electrical connector(s)
Fuel contamination/grade/quality	Sensor(s)
Throttle body	Engine control module (ECM)
Poly-vee belt	Transmission control module

- 1 . Verify the following systems are working correctly:

Air intake system

Cooling system

Charging system

Fuel system

2 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

3 . Where the Jaguar approved diagnostic system is available, complete the S93 report before clearing any or all fault codes from the vehicle.

NOTE:

If a DTC cannot be cleared, then there is a permanent fault present that flags again as soon as it is cleared. (The exception to this is P1260, which will only clear following an ignition **OFF/ON** cycle after rectification).

4 . If the cause is not visually evident and the Jaguar approved diagnostic system is not available, use a fault code reader to retrieve the fault codes before proceeding to the Diagnostic Trouble Code (DTC) Index Chart, or the Symptom Chart if no DTCs are set.

5 . Using the Jaguar approved diagnostic system where available, and a scan tool where not, check the freeze frame data for information on the conditions applicable when the fault was flagged. The format of this will vary, depending on the tool used, but can provide information useful to the technician in diagnosing the fault.



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

Symptom	Possible source	Action
Engine cranks, but does	Engine breather system disconnected/restrict	Check engine breather system, <<303-08>>

not fire	<p>d</p> <p>Ignition system</p> <p>Fuel system</p> <p>Harness</p> <p>CKP sensor</p> <p>ECM fault</p>	For ignition system tests, refer to pinpoint tests in this section. Check fuel pressure. For CKP tests, <<303-14>> Contact dealer technical support for advice on possible ECM failure.
Engine cranks and fires, but will not start	<p>Purge valve</p> <p>Fuel pump</p> <p>Engine coolant temperature (ECT) sensor</p> <p>Spark plugs</p> <p>HT short to ground (tracking) check rubber boots for cracks/damage</p> <p>Ignition coil failure(s)</p> <p>Harness</p>	<p>For evaporative emissions components, <<303-13>> Check fuel pressure, <<310-01>> For ECT sensor tests, <<303-14>> For ignition coil circuit tests, GO to Pinpoint Test G290075p1.</p> <p>. For ignition coil information, Ignition Coil-On-Plug LH (18.20.44) and Ignition Coil-On-Plug RH (18.20.43)</p>
Difficult to start cold	<p>Check coolant anti-freeze content</p> <p>Battery</p> <p>CKP sensor</p> <p>EGR valve stuck open</p> <p>Fuel pump</p> <p>Engine coolant temperature (ECT) sensor</p> <p>Purge valve</p>	<p>For battery information, <<414-01>> For CKP sensor tests, <<303-14>> For EGR system information, <<303-08>> Check fuel pressure. For ECT sensor tests, <<303-14>> For evaporative emissions components, <<303-13>></p>
Difficult to start hot	<p>Injector leak</p> <p>Engine fuel temperature</p>	<p>For fuel injectors, <<303-04>> For EFT sensor, IAT sensor and MAF sensor tests, <<303-14>> For evaporative emissions components, <<303-13>> Check fuel</p>

	<p>(EFT) sensor</p> <p>IAT sensor</p> <p>MAF sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>ECT sensor</p> <p>EGR valve stuck open</p>	<p>pressure. <<310-01>> For ignition coil circuit tests, GO to Pinpoint Test G290075p1.</p> <p>. For ignition coil information, Ignition Coil-On-Plug LH (18.20.44) and Ignition Coil-On-Plug RH (18.20.43) For ECT sensor tests, <<303-14>> For EGR information, <<303-08>></p>
Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)	<p>Injector leak</p> <p>EFT sensor</p> <p>IAT sensor</p> <p>MAF sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>ECT sensor</p> <p>EGR valve stuck open</p>	<p>For fuel injectors, <<303-04>> For EFT sensor, IAT sensor and MAF sensor tests, <<303-14>> For evaporative emissions components, <<303-13>> Check fuel pressure. <<310-01>> For ignition coil circuit tests, GO to Pinpoint Test G290075p1.</p> <p>. For ignition coil information, Ignition Coil-On-Plug LH (18.20.44) and Ignition Coil-On-Plug RH (18.20.43) For ECT sensor tests, <<303-14>> For EGR information, <<303-08>></p>
Engine stalls soon after start	<p>Breather system disconnected/restricted</p> <p>ECM relay</p> <p>Harness</p> <p>MAF sensor</p> <p>ECT sensor</p> <p>Ignition system</p> <p>Air filter restricted</p> <p>Fuel lines</p>	<p>For breather system, <<303-08>> For ECM relay, MAF sensor and ECT sensor tests, <<303-14>> For ignition coil circuit tests, GO to Pinpoint Test G290075p1.</p> <p>. For ignition coil information, Ignition Coil-On-Plug LH (18.20.44) and Ignition Coil-On-Plug RH (18.20.43) For air filter information, <<303-12>> For fuel line information, <<310-01>> For FRP sensor tests, <<303-04>> For intake system information, <<303-12>></p>

	FRP sensor	
	Air leakage	
Engine hesitates/poor acceleration	Fuel pump Injector leak Fuel pressure Fuel lines Air leakage Throttle sensors Throttle motor Ignition system Exhaust gas recirculation HO2 sensors Transmission malfunction Restricted pedal travel (carpet, etc) APP sensor	Check fuel pressure, <<310-01>> For FRP sensor tests, <<303-04>> For fuel line information, <<310-01>> For intake system, <<303-12>> For throttle position sensor and throttle motor tests, <<303-14>> For ignition coil circuit tests, GO to Pinpoint Test G290075p1. . For ignition coil information, Ignition Coil-On-Plug LH (18.20.44) and Ignition Coil-On-Plug RH (18.20.43) For EGR system, <<303-08>> Check for DTCs relating to HO2 sensors. Refer to the DTC index for pinpoint tests for DTC set. For transmission information, <<307-01>> Check accelerator pedal travel. For APP sensor tests, <<303-14>>
Engine backfires	Fuel pump Fuel lines Air leakage MAF sensor HO2 sensors Ignition system Sticking VCT hub APP sensor	Check fuel pressure. For fuel line information, <<310-01>> For intake system, <<303-12>> For MAF sensor tests, <<303-14>> Check for DTCs relating to HO2 sensors. Refer to the DTC index for pinpoint tests for DTC set. For ignition coil circuit tests, GO to Pinpoint Test G290075p1. . For ignition coil information, Ignition Coil-On-Plug LH (18.20.44) and Ignition Coil-On-Plug RH (18.20.43) For VCT information, <<303-01>> For APP sensor tests, <<303-14>>
Engine surges	Fuel pump Fuel lines	Check fuel pressure. For fuel line information, <<310-01>> For MAF sensor, throttle sensor, and throttle motor relay tests, <<303-14>> For ignition coil circuit tests, GO to Pinpoint Test G290075p1.

	MAF sensor Harness Throttle sensors Throttle motor Ignition system	. For ignition coil information, Ignition Coil-On-Plug LH (18.20.44) and Ignition Coil-On-Plug RH (18.20.43)
Engine detonates/knocks	KS/circuit malfunction Fuel pump Fuel lines FRP sensor MAF sensor HO2 sensors Air leakage Sticking VCT hub BARO sensor malfunction	For KS circuit tests, <<303-14>> Check fuel pressure. For fuel line information, <<310-01>> For FRP sensor tests, <<303-04>> For MAF sensor and HO2 sensor tests, <<303-14>> For intake system, <<303-12>> Check DTCs for VCT range/performance fault. For VCT information, <<303-01>> For BARO sensor, contact dealer technical support for advice on possible ECM failure
No throttle response	APP sensor malfunction Throttle sensors Throttle motor	For APP sensor, throttle position sensor and throttle motor relay tests, <<303-14>>
Poor throttle response	APP sensor malfunction Throttle sensors ECT sensor MAF sensor Transmission malfunction Traction control event Air leakage Breather system disconnected/restricted	For APP sensor, throttle position sensor, ECT sensor and MAF sensor tests, <<303-14>> For transmission information, <<307-01>> For intake system, <<303-12>> For breather system information, <<303-08>>

Driver Information Chart

Warning light	Message	Default Mode	DTC
Red	Engine systems fault	Engine shut-down (all cylinders fuel cut)	P1224
Red	Engine systems fault	Limp-Home	P1229
Red	Engine systems fault	Limp-Home	P0121, P0122, P0123, P0222, P0223
Red	Engine systems fault	Limp-Home	P1251, P1631
Red	Engine systems fault	Limp-Home	P1611
Red	Engine systems fault	Limp-Home	P1633
Red	Engine systems fault	High idle	P1344, P1122, P1123, P1215, P1216
Red	Restricted Performance	Limp-Home unavailable	P1254
Red	Restricted Performance	Limp-Home unavailable	P1250
Red	Restricted Performance	Safety redundancy	P1657, P1658
Red	Restricted Performance	Safety redundancy	P16634
Amber	Restricted Performance	Engine speed limited	P0116, P0117, P0118, P0125
Amber	Restricted Performance	Engine speed limited	P0101, P0102, P0103, P0104
Amber	Restricted Performance	Engine speed limited	P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P1313, P1314
Amber	Restricted Performance	Engine speed limited	P0327, P0328, P0332, P0333, P1648
Amber	Restricted Performance	Engine speed limited	P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358, P1367, P1368
Amber	Restricted Performance	Engine speed limited	P0171, P0172, P0174, P0175

Amber	Restricted Performance	Engine speed limited	
Amber	Restricted Performance	Engine speed limited	P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208
Amber	Restricted Performance	Engine speed limited	P0335, P0336
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P1642
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P1643
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P0096, P0097, P0098
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P1474
Amber	Restricted Performance	Engine speed limited	P1234, P1236, P1338
Amber	None	None	P0506, P0507
Amber	None	None	P1656
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0725
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P1796
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0701
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P1603

Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0605
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P1719
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0720
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0715
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0705
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0610
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0606
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0750
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0753
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0755
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0758

Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0760
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0763
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0765
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0768
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0770
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0773
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0740
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0743
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0787
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0788
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0730

Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0731
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0732
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0733
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0734
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0735
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0729
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0781
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0782
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0783
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0784
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0829

Amber	Gearbox fault/Restricted performance	Engine speed limited, reverse throttle progression enabled	P1797
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0641
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0651
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0860
Amber	Gearbox fault/Restricted performance	Limp-home	P1783

Default mode Definitions

LIMP-HOME MODE

Throttle motor off

Throttle motor relay off

Throttle motor circuit off

Fuel intervention

Cruise control inhibited

LIMP-HOME UNAVAILABLE

Power limitation

Vehicle speed limited to 120 kph

Reverse throttle progression enabled

Cruise control inhibited

REVERSE THROTTLE PROGRESSION

Throttle opening limited to maximum 30%

NOTE:

The throttle operation uses the same map as for reverse gear.

ENGINE SPEED LIMITED

Engine runs normally, up to 3000 rpm

Engine speed restricted to 3000 rpm maximum, by fuel cut-off

HIGH IDLE

Throttle valve kept in fixed position by motor

Cruise control inhibited

SAFETY REDUNDANCY

Power limitation

Vehicle speed limited to 120 kph

Reverse throttle progression enabled

Cruise control inhibited

Diagnostic Trouble Code (DTC) Index

DTC	Description	Possible Source	Action
P0300	Random misfire detected	ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged) Fuel injector circuit fault(s) (injector DTCs also flagged) Ignition coil failure Spark plug failure/fouled/incorrect gap Cylinder compression low Fuel delivery pressure (low/high) Fuel injectors	For ignition coil circuit tests, GO to Pinpoint Test G290075p1. . For fuel system, <<303-04>> Check spark plug condition/gap. For spark plug test, GO to Pinpoint Test G290075p2. For engine information, <<303-00>>

		<p>restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Worn camshaft/broken valve springs</p>	
P0301	Misfire detected, Cyl 1	REFER to possible sources for P0300	REFER to actions for P0300
P0302	Misfire detected, Cyl 2	REFER to possible sources for P0300	REFER to actions for P0300
P0303	Misfire detected, Cyl 3	REFER to possible sources for P0300	REFER to actions for P0300
P0304	Misfire detected, Cyl 4	REFER to possible sources for P0300	REFER to actions for P0300
P0305	Misfire detected, Cyl 5	REFER to possible sources for P0300	REFER to actions for P0300
P0306	Misfire detected, Cyl 6	REFER to possible sources for P0300	REFER to actions for P0300
P0351	Ignition coil primary/secondary circuit malfunction, cyl 1	<p>ECM to ignition coil primary circuit open circuit, short circuit to ground, high resistance</p> <p>Ignition coil ground circuit open circuit, high resistance</p> <p>Ignition coil failure</p>	For ignition coil circuit tests, GO to Pinpoint Test G290075p1.
P0352	Ignition coil primary/secondary circuit malfunction, cyl 2	<p>ECM to ignition coil primary circuit open circuit, short circuit to ground, high resistance</p> <p>Ignition coil ground circuit open circuit, high resistance</p> <p>Ignition coil failure</p>	For ignition coil circuit tests, GO to Pinpoint Test G290075p1.

P0353	Ignition coil primary/secondary circuit malfunction, cyl 3	ECM to ignition coil primary circuit open circuit, short circuit to ground, high resistance Ignition coil ground circuit open circuit, high resistance Ignition coil failure	For ignition coil circuit tests, GO to Pinpoint Test G290075p1.
P0354	Ignition coil primary/secondary circuit malfunction, cyl 4	ECM to ignition coil primary circuit open circuit, short circuit to ground, high resistance Ignition coil ground circuit open circuit, high resistance Ignition coil failure	For ignition coil circuit tests, GO to Pinpoint Test G290075p1.
P0355	Ignition coil primary/secondary circuit malfunction, cyl 5	ECM to ignition coil primary circuit open circuit, short circuit to ground, high resistance Ignition coil ground circuit open circuit, high resistance Ignition coil failure	For ignition coil circuit tests, GO to Pinpoint Test G290075p1.
P0356	Ignition coil primary/secondary circuit malfunction, cyl 6	ECM to ignition coil primary circuit open circuit, short circuit to ground, high resistance Ignition coil ground circuit open circuit, high resistance Ignition coil failure	For ignition coil circuit tests, GO to Pinpoint Test G290075p1.
P0603	ECM data corrupted	ECM	Contact dealer technical support for advice on possible ECM failure.
P1000	System checks not complete since last memory clear	OBD monitors have not completed	Carry out comprehensive component monitor drive cycle. Refer to the DTC section of JTIS,

			accessed by the icon on the opening page.
P1111	System checks complete since last memory clear	OBD monitors have completed	No action necessary
P1313	Misfire rate catalyst damage, right-hand cylinders. NOTE. This DTC will flag only when accompanied by a random or individual cylinder misfire DTC; P0300 to P0306	Refer to P0300 possible sources	Refer to P0300 Actions
P1314	Misfire rate catalyst damage, left-hand cylinders. NOTE. This DTC will flag only when accompanied by a random or individual cylinder misfire DTC; P0300 to P0306	Refer to P0300 possible sources	Refer to P0300 Actions
P1316	Misfire excess emission. NOTE. This DTC will flag only when accompanied by an individual cylinder misfire DTC; P0300 to P0306	Refer to P0300 possible sources	Refer to P0300 Actions
P1367	Ignition monitor (right-hand cylinders)	<p>Ignition monitoring circuit between splice and ECM open circuit, short circuit to ground, or short circuit to B+ voltage</p> <p>Ignition coil group ground circuit fault</p> <p>Ignition coil relay failure</p>	For coil circuit tests, GO to Pinpoint Test G290075p1.
P1368	Ignition monitor (left-hand cylinders)	<p>Ignition monitoring circuit between splice and ECM open circuit, short circuit to ground, or short circuit to B+ voltage</p> <p>Ignition coil group ground circuit fault</p> <p>Ignition coil relay failure</p>	For coil circuit tests, GO to Pinpoint Test G290075p1.

Pinpoint Tests

PINPOINT TEST G290075p1 : DTC P0300, P0301-0306, P0351-0356; RANDOM MISFIRE DETECTED, MISFIRE DETECTED, (CYLINDERS 1-6) IGNITION COIL PRIMARY CIRCUIT MALFUNCTION, (CYLINDERS 1-6)

G290075t1 : CHECK COIL FUNCTION BY SUBSTITUTION

1. Swap the suspect coil for a known good unit. 2. CLEAR the DTC. TEST the system for normal operation.

Does the same DTC reoccur? The DTC will indicate if the same cylinder is misfiring.

-> Yes

INSTALL a new coil.

Ignition Coil-On-Plug LH (18.20.44)

Ignition Coil-On-Plug RH (18.20.43) CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290075t2.

G290075t2 : CHECK THE IGNITION COIL SUPPLY VOLTAGE CIRCUIT

1. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI04, right-hand cylinders, PI06 to PI08, left-hand cylinders). 2. Turn the ignition switch to the **ON** position. 3. Make sure the ignition relay is energized. 4. Measure the voltage between:

Cyl 1 PI02, pin 01 (RW) and GROUND.

Cyl 2 PI06, pin 01 (RW) and GROUND.

Cyl 3 PI03, pin 01 (RW) and GROUND.

Cyl 4 PI07, pin 01 (RW) and GROUND.

Cyl 5 PI04, pin 01 (RW) and GROUND.

Cyl 6 PI08, pin 01 (RW) and GROUND.

Is the voltage less than 10.5 Volts?

-> **Yes**

REPAIR the relevant ignition coil supply voltage circuit. This circuit includes the ignition relay, and the front power distribution box (fuse 30). For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G290075t3.

G290075t3 : CHECK THE IGNITION COIL GROUND CIRCUIT

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI04, right-hand cylinders, PI06 to PI08, left-hand cylinders). 3. Measure the resistance between:

Cyl 1 PI02, pin 03 (B) and GROUND.

Cyl 2 PI06, pin 03 (B) and GROUND.

Cyl 3 PI03, pin 03 (B) and GROUND.

Cyl 4 PI07, pin 03 (B) and GROUND.

Cyl 5 PI04, pin 03 (B) and GROUND.

Cyl 6 PI08, pin 03 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G290075t4.

G290075t4 : CHECK THE IGNITION COIL SWITCHING CIRCUITS FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector PI01. 3. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI04, right-hand cylinders, PI06 to PI08, left-hand cylinders). 4. Measure the resistance between:

Cyl 1 PI02, pin 04 (GU) and PI01, pin 87 (GU).

Cyl 2 PI06, pin 04 (GW) and PI01, pin 61 (GW).

Cyl 3 PI03, pin 04 (Y) and PI01, pin 88 (Y).

Cyl 4 PI07, pin 04 (GW) and PI01, pin 62 (GW).

Cyl 5 PI04, pin 04 (YR) and PI01, pin 89 (GO).

Cyl 6 PI08, pin 4 (GR) and PI01, pin 63 (GR).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290075t5.

G290075t5 : CHECK THE IGNITION COIL (CYLS 1, 3, 5) MONITOR CIRCUITS FOR HIGH RESISTANCE

1. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI04). 2. Measure the resistance between:

Cyl 1 PI02, pin 02 (GB) and PI01, pin 131 (GB).

Cyl 3 PI03, pin 02 (GB) and PI01, pin 131 (GB).

Cyl 5 PI04, pin 02 (GB) and PI01, pin 131 (GB).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. This circuit includes the harness splice, PIS09. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290075t6.

G290075t6 : CHECK THE IGNITION COIL (CYLS 1, 3, 5) MONITOR CIRCUITS FOR SHORT TO B+ VOLTAGE

1. Reconnect the battery negative terminal. 2. Disconnect the relevant ignition coil electrical connector(s). 3. Measure the voltage between:

Cyl 1 PI02, pin 02 (GB) and GROUND.

Cyl 3 PI03, pin 02 (GB) and GROUND.

Cyl 5 PI04, pin 02 (GB) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short to B+ voltage. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290075t7.

G290075t7 : CHECK THE IGNITION COIL (CYLS 1, 3, 5) MONITOR CIRCUITS FOR SHORT TO GROUND

1. Disconnect the relevant ignition coil electrical connector(s). 2. Measure the resistance between:

Cyl 1 PI02, pin 02 (GB) and GROUND.

Cyl 3 PI03, pin 02 (GB) and GROUND.

Cyl 5 PI04, pin 02 (GB) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290075t8.

G290075t8 : CHECK THE IGNITION COIL (CYLS 2, 4, 6) MONITOR CIRCUITS FOR HIGH RESISTANCE

1. Disconnect the relevant ignition coil electrical connector(s), (PI06 to PI08). 2. Measure the resistance between:

Cyl 2 PI06, pin 02 (YB) and PI01, pin 132 (YB).

Cyl 4 PI07, pin 02 (YB) and PI01, pin 132 (YB).

Cyl 6 PI08, pin 02 (YB) and PI01, pin 132 (YB).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. This circuit includes the harness splice, PIS12. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G290075t9.

G290075t9 : CHECK THE IGNITION COIL (CYLS 2, 4, 6) MONITOR CIRCUITS FOR SHORT TO B+ VOLTAGE

1. Reconnect the battery negative terminal. 2. Disconnect the relevant ignition coil electrical connector(s), (PI06 to PI08). 3. Measure the voltage between:

Cyl 2 PI06, pin 02 (YB) and GROUND.

Cyl 4 PI07, pin 02 (YB) and GROUND.

Cyl 6 PI08, pin 02 (YB) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short to B+ voltage. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G290075t10.

G290075t10 : CHECK THE IGNITION COIL (CYLS 2, 4, AND 6) MONITOR CIRCUITS FOR SHORT TO GROUND

1. Disconnect the relevant ignition coil electrical connector(s), (PI06 to PI08). 2. Measure the resistance between:

Cyl 2 PI06, pin 02 (YB) and GROUND.

Cyl 4 PI07, pin 02 (YB) and GROUND.

Cyl 6 PI08, pin 02 (YB) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> **No**

Contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G290075p2 : CHECK SPARK PLUG RESISTANCE

G290075t11 : CHECK SPARK PLUG RESISTANCE

1. Remove the suspect spark plug(s). 2. Measure the resistance between the spark plug center electrode tip and the spark plug HT contact.

Is the resistance between 8,000 and 12,000 ohms? (nominal 10,000 ohms)

-> Yes

Check ignition coil and circuits. See possible sources list for misfire.

-> No

INSTALL a new spark plug. CLEAR the DTC. TEST the system for normal operation.

Engine Ignition - VIN Range: G45704->G99999

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Engine oil level	Fuses
Cooling system coolant level	Wiring harness
Fuel level	Loose or corroded electrical connectors
Fuel contamination/grade/quality	Ignition coils
	Sensor(s)
	Engine control module (ECM)
	Transmission control module (TCM)

3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC Index.

Symptom Chart

Symptom	Possible source	Action
Engine cranks, but does not fire	Engine breather system disconnected/restricted Ignition system	Check the engine breather system, Engine Emission Control - VIN Range: G45704->G99999 For ignition system tests, refer to pinpoint tests in this

	<p>Fuel system</p> <p>Harness</p> <p>Crankshaft position (CKP) sensor</p> <p>ECM fault</p>	<p>section. Check the fuel pressure, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For CKP tests, Electronic Engine Controls - VIN Range: G45704->G99999 Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
Engine cranks and fires, but will not start	<p>Evaporative emissions purge valve</p> <p>Fuel pump</p> <p>Spark plugs</p> <p>HT short to ground (tracking) check rubber boots for cracks/damage</p> <p>Ignition coil failure(s)</p> <p>Harness</p>	<p>For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For spark plug tests, GO to Pinpoint Test G531326p2. For ignition coil circuit tests, GO to Pinpoint Test G531326p1.</p>
Difficult to start cold	<p>Coolant anti-freeze content</p> <p>Battery</p> <p>CKP sensor</p> <p>Exhaust gas recirculation (EGR) valve stuck open</p> <p>Fuel pump</p> <p>Purge valve</p>	<p>Check the anti-freeze content. For battery information, Battery For CKP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For EGR valve tests, Engine Emission Control - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999</p>
Difficult to start hot	<p>Injector leak</p> <p>Engine fuel temperature (EFT) sensor</p> <p>Intake air temperature (IAT)</p>	<p>For fuel injectors, Fuel Injectors (18.10.02) For EFT, IAT and MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For purge valve tests, Evaporative Emissions - VIN Range:</p>

	<p>sensor</p> <p>Mass air flow (MAF) sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>EGR valve stuck open</p>	<p>G45704->G99999 Check the fuel pressure,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For ignition coil circuit tests, GO to Pinpoint Test G531326p1.</p> <p>For EGR valve tests, Engine Emission Control - VIN Range: G45704->G99999</p>
Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)	<p>Injector leak</p> <p>EFT sensor</p> <p>IAT sensor</p> <p>MAF sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>EGR valve stuck open</p>	<p>For fuel injectors, Fuel Injectors (18.10.02) For EFT, IAT and MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999 Check the fuel pressure,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For ignition coil circuit tests, GO to Pinpoint Test G531326p1.</p> <p>For EGR valve tests, Engine Emission Control - VIN Range: G45704->G99999</p>
Engine stalls soon after start	<p>Breather system disconnected/restricted</p> <p>ECM relay</p> <p>Harness</p> <p>MAF sensor</p> <p>Ignition system</p> <p>Air filter restricted</p> <p>Fuel lines</p>	<p>For breather system, Engine Emission Control - VIN Range: G45704->G99999 For ECM relay and MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For ignition coil circuit tests, GO to Pinpoint Test G531326p1.</p> <p>For air filter information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the fuel lines,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range:</p>

	FRP sensor Air leakage	G45704->G99999 For FRP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999
Engine hesitates/poor acceleration	Fuel pump Injector leak Fuel pressure Fuel lines Air leakage Throttle position (TP) sensors Throttle motor Ignition system EGR valve stuck open HO2 sensors Transmission malfunction Restricted pedal travel (carpet, etc) Accelerator pedal position (APP) sensor	Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For TP sensor and throttle motor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For ignition coil circuit tests, GO to Pinpoint Test G531326p1. For EGR valve tests, Engine Emission Control - VIN Range: G45704->G99999 Check for DTCs relating to HO2 sensors. Refer to the DTC index for pinpoint tests for DTC set. For transmission information, Check the accelerator pedal travel. For APP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999
Engine backfires	Fuel pump Fuel lines Air leakage MAF sensor HO2 sensors Ignition system Sticking variable camshaft	Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 Check for DTCs relating to HO2 sensors. Refer to the

	<p>timing (VCT) hub</p> <p>APP sensor</p>	<p>DTC index for pinpoint tests for DTC set.</p> <p>For ignition coil circuit tests, GO to Pinpoint Test G531326p1.</p> <p>For VCT information,</p> <p>Engine For APP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999</p>
Engine surges	<p>Fuel pump</p> <p>Fuel lines</p> <p>MAF sensor</p> <p>Harness</p> <p>TP sensors</p> <p>Throttle motor</p> <p>Ignition system</p>	<p>Check the fuel pressure, check the fuel lines,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For MAF, TP sensor and throttle motor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For ignition coil circuit tests, GO to Pinpoint Test G531326p1.</p>
Engine detonates/knocks	<p>Knock sensor (KS) circuit malfunction</p> <p>Fuel pump</p> <p>Fuel lines</p> <p>FRP sensor</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Air leakage</p> <p>Sticking VCT hub</p> <p>BARO sensor malfunction (internal ECM fault)</p>	<p>For KS circuit tests, Electronic Engine Controls - VIN Range: G45704->G99999 Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For FRP, MAF and HO2 sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check DTCs for VCT range/performance fault. For VCT information,</p> <p>Engine Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
No throttle response	<p>APP sensor malfunction</p> <p>TP sensors</p> <p>Throttle motor</p>	<p>For APP, TP sensor and throttle motor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999</p>
Poor throttle response	<p>APP sensor malfunction</p>	<p>For APP, TP, ECT, and MAF sensor tests, Electronic Engine Controls - VIN Range:</p>

	TP sensors ECT sensor MAF sensor Transmission malfunction Traction control event Air leakage Breather system disconnected/restricted	G45704->G99999 For transmission information, For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For breather system information, Engine Emission Control - VIN Range: G45704->G99999
--	--	---

DTC Index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of DTCs,
Electronic Engine Controls - VIN Range: G45704->G99999

DTC	Description	Possible causes	Action
P035100	Cylinder 1 ignition coil primary/secondary circuit	ECM to ignition module/coil drive circuit: short circuit to ground, high resistance Ignition module/coil ground circuit: high resistance Ignition module/coil supply circuit: open circuit (including relay)	For ignition coil tests, GO to Pinpoint Test G531326p1.
P035200	Cylinder 2 ignition coil primary/secondary circuit	ECM to ignition module/coil drive circuit: short circuit to ground, high resistance Ignition module/coil ground	For ignition coil tests, GO to Pinpoint Test G531326p1.

		circuit: high resistance Ignition module/coil supply circuit: open circuit (including relay)	
P035300	Cylinder 3 ignition coil primary/secondary circuit	ECM to ignition module/coil drive circuit: short circuit to ground, high resistance Ignition module/coil ground circuit: high resistance Ignition module/coil supply circuit: open circuit (including relay)	For ignition coil tests, GO to Pinpoint Test G531326p1.
P035400	Cylinder 4 ignition coil primary/secondary circuit	ECM to ignition module/coil drive circuit: short circuit to ground, high resistance Ignition module/coil ground circuit: high resistance Ignition module/coil supply circuit: open circuit (including relay)	For ignition coil tests, GO to Pinpoint Test G531326p1.
P035500	Cylinder 5 ignition coil primary/secondary circuit	ECM to ignition module/coil drive circuit: short circuit to ground, high resistance Ignition module/coil ground circuit: high resistance Ignition module/coil supply circuit: open circuit (including relay)	For ignition coil tests, GO to Pinpoint Test G531326p1.
P035600	Cylinder 6 ignition coil primary/secondary circuit	ECM to ignition module/coil drive circuit: short circuit to ground, high resistance Ignition module/coil ground circuit: high resistance Ignition module/coil supply circuit: open circuit (including relay)	For ignition coil tests, GO to Pinpoint Test G531326p1.
P131500	Persistent misfire	Spark plug failure/fouled/incorrect gap ECM to ignition coil primary	For spark plug tests, GO to Pinpoint Test G531326p2. For ignition coil circuit tests, GO to Pinpoint Test

		<p>circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Fuel delivery pressure low</p> <p>Fuel injector circuit fault(s) (injector DTCs also flagged)</p> <p>Ignition coil failure</p> <p>Cylinder compression low</p>	<p>G531326p1.</p> <p>Check the fuel pressure, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999 Check the cylinder compressions, Engine - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8</p>
P136700	Ignition amplifier group A	<p>Ignition monitoring circuit to ECM: open circuit, short circuit to ground, short circuit to power</p> <p>Ignition module/coils right hand bank ground circuit fault</p>	<p>For ignition coil circuit tests, GO to Pinpoint Test G531326p1.</p>
P136800	Ignition amplifier group B	<p>Ignition monitoring circuit to ECM: open circuit, short circuit to ground, short circuit to power</p> <p>Ignition module/coils left hand bank ground circuit fault</p>	<p>For ignition coil circuit tests, GO to Pinpoint Test G531326p1.</p>

Pinpoint Tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

PINPOINT TEST G531326p1 : IGNITION COIL CIRCUITS

G531326t2 : CHECK THE IGNITION COIL SUPPLY VOLTAGE CIRCUIT

1. Disconnect the relevant ignition coil electrical connector:

Ignition coil connector
Cylinder 1, PI02
Cylinder 2, PI06
Cylinder 3, PI03
Cylinder 4, PI07
Cylinder 5, PI04
Cylinder 6, PI08

2. Key on, engine off. 3. Make sure the ignition relay is energized. 4. Measure the voltage between:

Ignition coil connector, harness side	Battery
Pin 01	Negative terminal

Is the voltage less than 10.5 Volts?

-> Yes

REPAIR the relevant ignition coil supply circuit. This circuit includes fuse 15 of the front power distribution box and the ignition relay. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531326t4.

G531326t4 : CHECK THE IGNITION COIL SWITCHING CIRCUITS FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Ignition coil connector, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531326t12.

G531326t12 : CHECK THE IGNITION COIL SWITCHING CIRCUITS FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Ignition coil connector, harness side	Battery
Pin 04	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531326t5.

G531326t5 : CHECK THE IGNITION COIL MONITOR CIRCUITS FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Ignition coil connector, harness side	Battery
---------------------------------------	---------

Pin 02	Negative terminal
--------	-------------------

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531326t6.

G531326t6 : CHECK THE IGNITION COIL MONITOR CIRCUITS FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Ignition coil connector, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531326t3.

G531326t3 : CHECK THE IGNITION COIL GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Cylinder 1 ignition coil connector, harness side	Battery
PI02, pin 03	Negative terminal

Cylinder 2 ignition coil connector, harness side	Battery
---	----------------

PI06, pin 03	Negative terminal
--------------	-------------------

Cylinder 3 ignition coil connector, harness side	Battery
PI03, pin 03	Negative terminal

Cylinder 4 ignition coil connector, harness side	Battery
PI07, pin 03	Negative terminal

Cylinder 5 ignition coil connector, harness side	Battery
PI04, pin 03	Negative terminal

Cylinder 6 ignition coil connector, harness side	Battery
PI08, pin 03	Negative terminal

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531326t13.

G531326t13 : CHECK THE IGNITION COIL SWITCHING CIRCUITS FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

Cylinder 1 ignition coil connector, harness side	ECM connector PI300, harness side
PI02, pin 04	Pin 61

Cylinder 2 ignition coil connector, harness side	ECM connector PI300, harness side
PI06, pin 04	Pin 60

Cylinder 3 ignition coil connector, harness side	ECM connector PI300, harness side
PI03, pin 04	Pin 59

Cylinder 4 ignition coil connector, harness side	ECM connector PI300, harness side
PI07, pin 04	Pin 58

Cylinder 5 ignition coil connector, harness side	ECM connector PI300, harness side
PI04, pin 04	Pin 57

Cylinder 6 ignition coil connector, harness side	ECM connector PI300, harness side
PI08, pin 04	Pin 56

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531326t14.

G531326t14 : CHECK THE IGNITION COIL MONITOR CIRCUITS FOR HIGH RESISTANCE

1. Measure the resistance between:

Cylinder 1 ignition coil connector, harness side	ECM connector PI300, harness side
---	--

PI02, pin 02	Pin 62
--------------	--------

Cylinder 2 ignition coil connector, harness side	ECM connector PI300, harness side
PI06, pin 02	Pin 64

Cylinder 3 ignition coil connector, harness side	ECM connector PI300, harness side
PI03, pin 02	Pin 64

Cylinder 4 ignition coil connector, harness side	ECM connector PI300, harness side
PI07, pin 02	Pin 62

Cylinder 5 ignition coil connector, harness side	ECM connector PI300, harness side
PI04, pin 02	Pin 64

Cylinder 6 ignition coil connector, harness side	ECM connector PI300, harness side
PI08, pin 02	Pin 62

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

INSTALL a new ignition coil to the relevant cylinder.

Ignition Coil-On-Plug LH (18.20.44) or

Ignition Coil-On-Plug RH (18.20.43) Clear the DTC and test the system for normal operation. Refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531326p2 : CHECK SPARK PLUG RESISTANCE

G531326t11 : CHECK SPARK PLUG RESISTANCE

1. Remove the suspect spark plug(s). 2. Measure the resistance between:

Spark plug	Spark plug
Center electrode tip	HT contact

Is the resistance between 8,000 and 12,000 ohms? (nominal 10,000 ohms)

-> Yes

CHECK the ignition coil and circuits. GO to Pinpoint Test G531326p1.

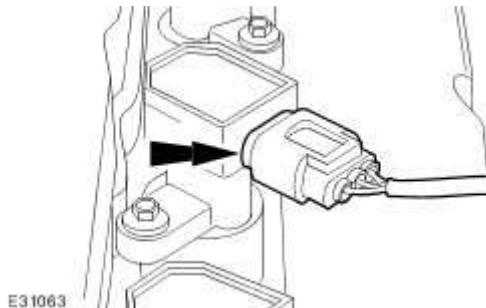
-> No

INSTALL a new spark plug. CLEAR the DTC and test the system for normal operation.

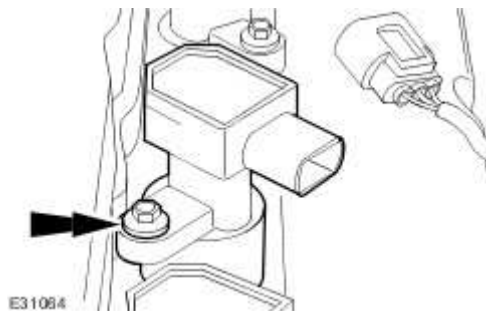
Ignition Coil-On-Plug LH (18.20.44)

Removal

- 1 . Disconnect the ignition coil-on-plug electrical connector.



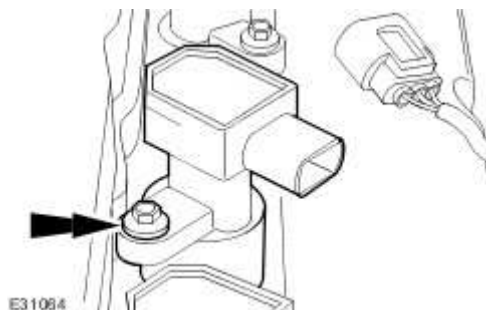
- 2 . Remove the ignition coil-on-plug.



Installation

- 1 . To install, reverse the removal procedure.

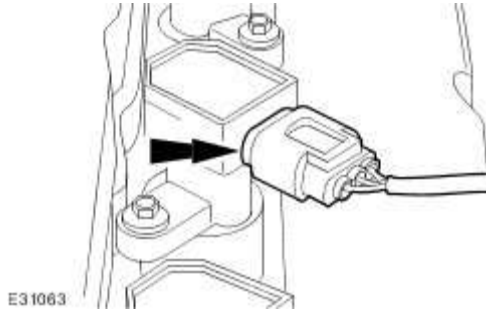
► Tighten to 6 Nm.



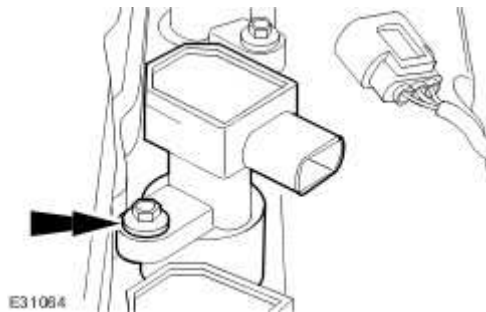
Ignition Coil-On-Plug RH (18.20.43)

Removal

- 1 . Remove the intake manifold. <<303-01A>>
- 2 . Disconnect the ignition coil-on-plug electrical connector.



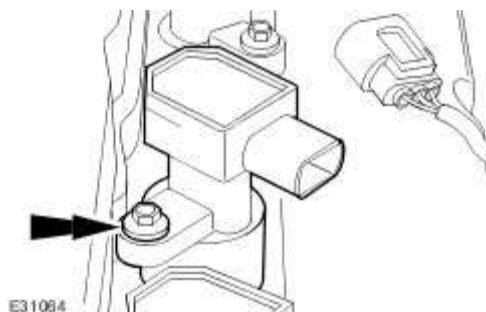
- 3 . Remove the ignition coil-on-plug.



Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 6 Nm.



303-07B : Engine Ignition – 4.2L NA V8 – AJV8/4.2L SC V8 – AJV8/3.5L NA V8 – AJV8

Specifications

Specifications

General Specifications

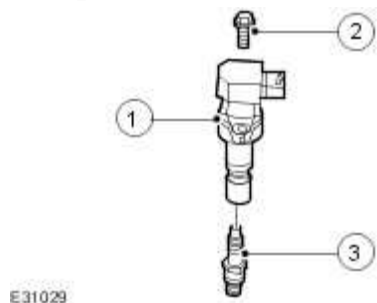
Item	Specification
Firing order	1-5-4-2-6-3-7-8
Spark plug type - Vehicles with supercharger	NGK-IFR-5N10
Spark plug type - Vehicles without supercharger	NGK-IFR-5N10

Torque Specifications

Description	Nm	lb-ft	lb-in
Spark plugs	27	18	-
Ignition coil-on-plug retaining bolts	5	-	44

Engine Ignition

Component Locations



Item	Part Number	Description
1	-	Ignition coil-on-plug
2	-	Ignition coil-on-plug retaining bolt
3	-	Spark plug

The right-hand cylinders are numbered 7, 5, 3, 1 and the left-hand cylinders are numbered 8, 6, 4, 2 when viewed from the rear of the engine.

An ignition coil is located on each individual spark plug allowing the ignition timing to be adjusted independently.

The crankshaft position (CKP) sensor signal is the basis for ignition timing calculations. The alternating voltage signal from the CKP sensor is converted to a digital signal by the engine control module (ECM). This digital signal is then used to position the closing time of the primary circuit of the ignition coil. The effective range for ignition timing control is increased to the fact that there are no rotating parts.

On the basis of engine speed and load inputs, the ECM determines the ignition timing. This function also takes other inputs into consideration such as engine temperature, throttle position, knock control, camshaft position, traction control and electronic transmission control inputs.

This ignition system enables the customer to drive the vehicle home if an ignition coil or ignition coil wiring failure occurs. In the event of a wiring failure between the ECM and the ignition coil, the ignition coil will fail instead of the ignition coil fuse blowing, which will allow the remaining ignition coils to continue to function and the engine to limp home.

Engine Ignition - VIN Range: G00442- >G45703

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Confirm which, if any, warning lights and/or messages were displayed on the instrument cluster.

NOTE:

If any warning lights and/or messages were displayed when the fault occurred, refer to the Driver Information table for DTCs associated with the display, then to the DTC index table for possible sources and actions. Some warnings will appear to clear when the ignition is cycled. This is often because the warning has flagged as a result of one of the vehicle's on-board diagnostic routines having run to detect the fault. If the same routine is not run when the ignition is switched **ON**, the warning will not reflag until the routine does run. See the DTC summaries for drive cycle routines.

- 3 . Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Engine oil level	Fuses
Cooling system coolant level	Wiring harness
Fuel level	Electrical connector(s)
Fuel contamination/grade/quality	Sensor(s)
Throttle body	Engine control module (ECM)
Poly-vee belt	Transmission control module

- 1 . Verify the following systems are working correctly:

Air intake system

Cooling system

Charging system

Fuel system

2 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

3 . Where the Jaguar approved diagnostic system is available, complete the S93 report before clearing any or all fault codes from the vehicle.

NOTE:

If a DTC cannot be cleared, then there is a permanent fault present that flags again as soon as it is cleared. (The exception to this is P1260, which will only clear following an ignition **OFF/ON** cycle after rectification).

4 . If the cause is not visually evident and the Jaguar approved diagnostic system is not available, use a fault code reader to retrieve the fault codes before proceeding to the Diagnostic Trouble Code (DTC) Index Chart, or the Symptom Chart if no DTCs are set.

5 . Using the Jaguar approved diagnostic system where available, and a scan tool where not, check the freeze frame data for information on the conditions applicable when the fault was flagged. The format of this will vary, depending on the tool used, but can provide information useful to the technician in diagnosing the fault.



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

Symptom	Possible source	Action
Engine cranks, but does	Engine breather system disconnected/restrict	Check engine breather system, <<303-08>>

not fire	<p>d</p> <p>Ignition system</p> <p>Fuel system</p> <p>Harness</p> <p>CKP sensor</p> <p>ECM fault</p>	<p>For ignition system circuit tests, GO to Pinpoint Test G290076p1.</p> <p>. Check fuel pressure, <<310-01>> For CKP tests, <<303-14>> Contact dealer technical support for advice on possible ECM failure.</p>
Engine cranks and fires, but will not start	<p>Purge valve</p> <p>Fuel pump</p> <p>Engine coolant temperature (ECT) sensor</p> <p>Spark plugs</p> <p>Check for water ingress into spark plug wells</p> <p>HT short to ground (tracking) check rubber boots for cracks/damage</p> <p>Ignition coil failure(s)</p> <p>Harness</p>	<p>For evaporative emissions components, <<303-13>> Check fuel pressure, <<310-01>> For ECT sensor tests, <<303-14>> For ignition system circuit tests, GO to Pinpoint Test G290076p1.</p> <p>.</p>
Difficult to start cold	<p>Check coolant anti-freeze content</p> <p>Battery</p> <p>CKP sensor</p> <p>EGR valve stuck open</p> <p>Fuel pump</p> <p>Engine coolant temperature (ECT) sensor</p> <p>Purge valve</p>	<p>For battery information, <<414-01>> For CKP sensor tests, <<303-14>> For EGR system information, <<303-08>> Check fuel pressure. For ECT sensor tests, <<303-14>> For evaporative emissions components, <<303-13>></p>

Difficult to start hot	<p>Injector leak</p> <p>Fuel temperature sensor</p> <p>IAT sensor</p> <p>MAF sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>Engine coolant temperature (ECT) sensor</p> <p>EGR valve stuck open</p>	<p>For fuel injectors, <<303-04>> For fuel temperature sensor, IAT sensor and MAF sensor tests, <<303-14>> For evaporative emissions components, <<303-13>> Check fuel pressure. For ignition system circuit tests, GO to Pinpoint Test G290076p1. . For ECT sensor tests, <<303-14>></p>
Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)	<p>Injector leak</p> <p>Fuel temperature sensor</p> <p>IAT sensor</p> <p>MAF sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>Engine coolant temperature (ECT) sensor</p> <p>EGR valve stuck open</p>	<p>For fuel injectors, <<303-04>> For fuel temperature sensor, IAT sensor and MAF sensor tests, <<303-14>> For evaporative emissions components, <<303-13>> Check fuel pressure. For ignition system circuit tests, GO to Pinpoint Test G290076p1. . For ECT sensor tests, <<303-14>> For EGR information, <<303-08>></p>
Engine stalls soon after start	<p>Breather system disconnected/restricted</p> <p>ECM relay</p> <p>Harness</p> <p>MAF sensor</p> <p>Engine coolant temperature (ECT)</p>	<p>For breather system, <<303-08>> For ECM relay, MAF sensor and ECT sensor tests, <<303-14>> For ignition system circuit tests, GO to Pinpoint Test G290076p1. . For air filter information, <<303-12>> For fuel line information, <<310-01>> For fuel pressure sensor tests, <<303-04>> For intake system information, <<303-12>></p>

	<p>sensor</p> <p>Ignition system</p> <p>Air filter restricted</p> <p>Fuel lines</p> <p>Fuel pressure sensor</p> <p>Air leakage</p>	
Engine hesitates/poor acceleration	<p>Fuel pump</p> <p>Injector leak</p> <p>Fuel pressure</p> <p>Fuel lines</p> <p>Air leakage</p> <p>Throttle sensors</p> <p>Throttle motor</p> <p>Ignition system</p> <p>Exhaust gas recirculation</p> <p>HO2 sensors</p> <p>Transmission malfunction</p> <p>Restricted pedal travel (carpet, etc)</p> <p>APP sensor</p>	<p>Check fuel pressure, <<310-01>> For fuel pressure sensor tests, <<303-04>> For fuel line information, <<310-01>> For intake system, <<303-12>> For throttle position sensor and throttle motor tests, <<303-14>> For ignition system circuit tests, GO to Pinpoint Test G290076p1.</p> <p>. For exhaust gas recirculation, <<303-08>> Check for DTCs relating to HO2 sensors. For transmission information, <<307-01>> Check accelerator pedal travel. For APP sensor tests, <<303-14>></p>
Engine backfires	<p>Fuel pump</p> <p>Fuel lines</p> <p>Air leakage</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Ignition system</p>	<p>Check fuel pressure. For fuel line information, <<310-01>> For intake system, <<303-12>> For MAF sensor tests, <<303-14>> Check for DTCs relating to HO2 sensors. For ignition system circuit tests, GO to Pinpoint Test G290076p1.</p> <p>. For VCT information, <<303-01>> For APP sensor tests, <<303-14>></p>

	<p>Sticking VCT hub</p> <p>APP sensor</p>	
Engine surges	<p>Fuel pump</p> <p>Fuel lines</p> <p>MAF sensor</p> <p>Harness</p> <p>Throttle sensors</p> <p>Throttle motor</p> <p>Ignition system</p>	<p>Check fuel pressure. For fuel line information, <<310-01>> For MAF sensor, throttle sensor, and throttle motor relay tests, <<303-14>> For ignition system circuit tests, GO to Pinpoint Test G290076p1.</p> <p>.</p>
Engine detonates/knocks	<p>KS/circuit malfunction</p> <p>Fuel pump</p> <p>Fuel lines</p> <p>Fuel pressure sensor</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Air leakage</p> <p>Sticking VCT hub</p> <p>BARO sensor malfunction</p>	<p>For KS circuit tests, <<303-14>> Check fuel pressure. For fuel line information, <<310-01>> For fuel pressure sensor tests, <<303-04>> For MAF sensor and HO2 sensor tests, <<303-14>> For intake system, <<303-12>> Check DTCs for VCT range/performance fault. For VCT information, <<303-01>> For BARO sensor, contact dealer technical support for advice on possible ECM failure</p>
No throttle response	<p>APP sensor malfunction</p> <p>Throttle sensors</p> <p>Throttle motor</p>	<p>For APP sensor, throttle position sensor and throttle motor relay tests, <<303-14>></p>
Poor throttle response	<p>APP sensor malfunction</p> <p>Throttle sensors</p> <p>Engine coolant temperature (ECT) sensor</p> <p>MAF sensor</p>	<p>For APP sensor, throttle position sensor, ECT sensor and MAF sensor tests, <<303-14>> For transmission information, <<307-01>> For intake system, <<303-12>> For breather system information, <<303-08>></p>

	Transmission malfunction Traction control event Air leakage Breather system disconnected/restricted	
--	---	--

Driver Information Chart

Warning light	Message	Default Mode	DTC
Red	Engine systems fault	Engine shut-down (all cylinders fuel cut)	P1224
Red	Engine systems fault	Limp-Home	P1229
Red	Engine systems fault	Limp-Home	P0121, P0122, P0123, P0222, P0223
Red	Engine systems fault	Limp-Home	P1251, P1631
Red	Engine systems fault	Limp-Home	P1611
Red	Engine systems fault	Limp-Home	P1633
Red	Engine systems fault	High idle	P1344, P1122, P1123, P1215, P1216
Red	Restricted Performance	Limp-Home unavailable	P1254
Red	Restricted Performance	Limp-Home unavailable	P1250
Red	Restricted Performance	Safety redundancy	P1657, P1658
Red	Restricted Performance	Safety redundancy	P16634
Amber	Restricted Performance	Engine speed limited	P0116, P0117, P0118, P0125
Amber	Restricted Performance	Engine speed limited	P0101, P0102, P0103, P0104
Amber	Restricted Performance	Engine speed limited	P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307,

			P0308, P1313, P1314
Amber	Restricted Performance	Engine speed limited	P0327, P0328, P0332, P0333, P1648
Amber	Restricted Performance	Engine speed limited	P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358, P1367, P1368
Amber	Restricted Performance	Engine speed limited	P0171, P0172, P0174, P0175
Amber	Restricted Performance	Engine speed limited	
Amber	Restricted Performance	Engine speed limited	P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208
Amber	Restricted Performance	Engine speed limited	P0335, P0336
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P1642
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P1643
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P0096, P0097, P0098
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P1474
Amber	Restricted Performance	Engine speed limited	P1234, P1236, P1338
Amber	None	None	P0506, P0507
Amber	None	None	P1656
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0725
Amber	Gearbox	Gearbox default to set gear	P1796

	fault/Restricted performance		
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0701
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P1603
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0605
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P1719
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0720
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0715
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0705
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0610
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0606
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0750
Amber	Gearbox fault/Restricted	Gearbox default to set gear	P0753

	performance		
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0755
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0758
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0760
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0763
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0765
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0768
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0770
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0773
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0740
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0743
Amber	Gearbox fault/Restricted	Gearbox default to set gear	P0787

	performance		
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0788
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0730
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0731
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0732
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0733
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0734
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0735
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0729
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0781
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0782
Amber	Gearbox fault/Restricted	Gearbox default to set gear	P0783

	performance		
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0784
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0829
Amber	Gearbox fault/Restricted performance	Engine speed limited, reverse throttle progression enabled	P1797
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0641
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0651
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0860
Amber	Gearbox fault/Restricted performance	Limp-home	P1783

Default mode Definitions

LIMP-HOME MODE

Throttle motor off

Throttle motor relay off

Throttle motor circuit off

Fuel intervention

Cruise control inhibited

LIMP-HOME UNAVAILABLE

Power limitation

Vehicle speed limited to 120 kph

Reverse throttle progression enabled

Cruise Control Inhibited

REVERSE THROTTLE PROGRESSION

Throttle opening limited to maximum 30%

NOTE:

The throttle operation uses the same map as for reverse gear.

ENGINE SPEED LIMITED

Engine runs normally, up to 3000 rpm

Engine speed restricted to 3000 rpm maximum, by fuel cut-off

HIGH IDLE

Throttle valve kept in fixed position by motor

Cruise control Inhibited

SAFETY REDUNDANCY

Power limitation

Vehicle speed limited to 120 kph

Reverse throttle progression enabled

Cruise control Inhibited

Diagnostic Trouble Code (DTC) Index

DTC	Description	Possible Source	Action
P0300	Random misfire detected	ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged) Fuel injector circuit fault(s) (injector DTCs also flagged)	For ignition coil circuit tests, GO to Pinpoint Test G290076p1. . For fuel system, <<303-04>> Check spark plug condition/gap, For spark plug test, GO to Pinpoint

		<p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Cylinder compression low</p> <p>Fuel delivery pressure (low/high)</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Worn camshaft/broken valve springs</p>	<p>Test G290076p2.</p> <p>. For engine information, <<303-00>></p>
P0301	Misfire detected, Cyl 1	REFER to possible sources for P0300	REFER to actions for P0300
P0302	Misfire detected, Cyl 3	REFER to possible sources for P0300	REFER to actions for P0300
P0303	Misfire detected, Cyl 5	REFER to possible sources for P0300	REFER to actions for P0300
P0304	Misfire detected, Cyl 7	REFER to possible sources for P0300	REFER to actions for P0300
P0305	Misfire detected, Cyl 2	REFER to possible sources for P0300	REFER to actions for P0300
P0306	Misfire detected, Cyl 4	REFER to possible sources for P0300	REFER to actions for P0300
P0307	Misfire detected, Cyl 6	REFER to possible sources for P0300	REFER to actions for P0300
P0308	Misfire detected, Cyl 8	REFER to possible sources for P0300	REFER to actions for P0300
P0351	Ignition coil primary/secondary	REFER to possible sources for	REFER to actions for

	circuit malfunction, cyl 1	P0300	P0300
P0352	Ignition coil primary/secondary circuit malfunction, cyl 3	REFER to possible sources for P0300	REFER to actions for P0300
P0353	Ignition coil primary/secondary circuit malfunction, cyl 5	REFER to possible sources for P0300	REFER to actions for P0300
P0354	Ignition coil primary/secondary circuit malfunction, cyl 7	REFER to possible sources for P0300	REFER to actions for P0300
P0355	Ignition coil primary/secondary circuit malfunction, cyl 2	REFER to possible sources for P0300	REFER to actions for P0300
P0356	Ignition coil primary/secondary circuit malfunction, cyl 4	REFER to possible sources for P0300	REFER to actions for P0300
P0357	Ignition coil primary/secondary circuit malfunction, cyl 6	REFER to possible sources for P0300	REFER to actions for P0300
P0358	Ignition coil primary/secondary circuit malfunction, cyl 8	REFER to possible sources for P0300	REFER to actions for P0300
P0603	ECM data corrupted	ECM	Contact dealer technical support for advice on possible ECM failure.
P1000	System checks not complete since last memory clear	OBD monitors have not completed	Carry out comprehensive component monitor drive cycle. Refer to the DTC section of JTIS, accessed by the icon on the opening page.
P1111	System checks complete since last memory clear	OBD monitors have completed	No action necessary
P1313	Misfire rate catalyst damage, right-hand cylinders. NOTE. This DTC will flag only when accompanied by a random or individual cylinder misfire DTC; P0300, P0301 to P0304	Refer to P0300 possible sources	Refer to P0300 Actions

P1314	Misfire rate catalyst damage, left-hand cylinders. NOTE. This DTC will flag only when accompanied by a random or individual cylinder misfire DTC; P0300 to P0308	Refer to P0300 possible sources	Refer to P0300 Actions
P1316	Misfire excess emission. NOTE. This DTC will flag only when accompanied by an individual cylinder misfire DTC; P0300 to P0308	Refer to P0300 possible sources	Refer to P0300 Actions
P1367	Ignition monitor (right-hand cylinders)	<p>Ignition monitoring circuit between splice and ECM open circuit, short circuit to ground, or short circuit to B+ voltage</p> <p>Ignition coil group ground circuit fault</p> <p>Ignition coil relay failure</p>	<p>For coil circuit tests, GO to Pinpoint Test G290076p1.</p> <p>.</p>
P1368	Ignition monitor (left-hand cylinders)	<p>Ignition monitoring circuit between splice and ECM open circuit, short circuit to ground, or short circuit to B+ voltage</p> <p>Ignition coil group ground circuit fault</p> <p>Ignition coil relay failure</p>	<p>For coil circuit tests, GO to Pinpoint Test G290076p1.</p> <p>.</p>

Pinpoint Tests

PINPOINT TEST G290076p1 : DTC P0300, P0301-0308, P0351-0358; RANDOM MISFIRE DETECTED, MISFIRE DETECTED, (CYLINDERS 1-8)

IGNITION COIL PRIMARY CIRCUIT MALFUNCTION, (CYLINDERS 1-8)

G290076t1 : CHECK COIL FUNCTION BY SUBSTITUTION

1. Swap the suspect coil for a known good unit. 2. CLEAR the DTC. TEST the system for normal operation.

Does the same DTC reoccur? The DTC will indicate if the same cylinder is misfiring.

-> Yes

INSTALL a new coil.

Ignition Coil-On-Plug (18.20.40) CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290076t2.

G290076t2 : CHECK THE IGNITION COIL SUPPLY VOLTAGE CIRCUIT

1. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI09). 2. Turn the ignition switch to the **ON** position. 3. Make sure the ignition relay is energised. 4. Measure the voltage between:

Cyl 1 PI02, pin 01 (RW) and GROUND.

Cyl 2 PI06, pin 01 (RW) and GROUND.

Cyl 3 PI03, pin 01 (RW) and GROUND.

Cyl 4 PI07, pin 01 (RW) and GROUND.

Cyl 5 PI04, pin 01 (RW) and GROUND.

Cyl 6 PI08, pin 01 (RW) and GROUND.

Cyl 7 PI05, pin 01 (RW) and GROUND.

Cyl 8 PI09, pin 01 (RW) and GROUND.

Is the voltage less than 10.5 Volts?

-> Yes

REPAIR the relevant ignition coil supply voltage circuit. This circuit includes the ignition relay, and the front power distribution box (fuse 1). For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290076t3.

G290076t3 : CHECK THE IGNITION COIL GROUND CIRCUIT

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI09). 3. Measure the resistance between:

Cyl 1 PI02, pin 03 (B) and GROUND.

Cyl 2 PI06, pin 03 (B) and GROUND.

Cyl 3 PI03, pin 03 (B) and GROUND.

Cyl 4 PI07, pin 03 (B) and GROUND.

Cyl 5 PI04, pin 03 (B) and GROUND.

Cyl 6 PI08, pin 03 (B) and GROUND.

Cyl 7 PI05, pin 03 (B) and GROUND.

Cyl 8 PI09, pin 03 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290076t4.

G290076t4 : CHECK THE IGNITION COIL SWITCHING CIRCUITS FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI09). 4. Measure the resistance between:

Cyl 1 PI02, pin 04 (GU) and PI01, pin 87 (GU).

Cyl 2 PI06, pin 04 (GW) and PI01, pin 61 (GW).

Cyl 3 PI03, pin 04 (Y) and PI01, pin 88 (Y).

Cyl 4 PI07, pin 04 (GW) and PI01, pin 62 (GW).

Cyl 5 PI04, pin 04 (YR) and PI01, pin 89 (YR).

Cyl 6 PI08, pin 04 (GR) and PI01, pin 63 (GR).

Cyl 7 PI05, pin 04 (GR) and PI01, pin 90 (GR).

Cyl 8 PI09, pin 04 (YR) and PI01, pin 64 (YR).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290076t5.

G290076t5 : CHECK THE IGNITION COIL (CYLS 1, 4, 6, AND 7) MONITOR CIRCUITS FOR HIGH RESISTANCE

1. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI09). 2. Measure the resistance between:

Cyl 1 PI02, pin 02 (GB) and PI01, pin 131 (GB).

Cyl 4 PI07, pin 02 (GB) and PI01, pin 131 (GB).

Cyl 6 PI08, pin 02 (GB) and PI01, pin 131 (GB).

Cyl 7 PI05, pin 02 (GB) and PI01, pin 131 (GB).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. This circuit includes the harness splice, PIS09. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290076t6.

G290076t6 : CHECK THE IGNITION COIL (CYLS 1, 4, 6, AND 7) MONITOR CIRCUITS FOR SHORT TO B+ VOLTAGE

1. Reconnect the battery negative terminal. 2. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI09). 3. Measure the voltage between:

Cyl 1 PI02, pin 02 (GB) and GROUND.

Cyl 4 PI07, pin 02 (GB) and GROUND.

Cyl 6 PI08, pin 02 (GB) and GROUND.

Cyl 7 PI05, pin 02 (GB) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short to B+ voltage. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G290076t7.

G290076t7 : CHECK THE IGNITION COIL (CYLS 1, 4, 6, AND 7) MONITOR CIRCUITS FOR SHORT TO GROUND

1. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI09). 2. Measure the resistance between:

Cyl 1 PI02, pin 02 (GB) and GROUND.

Cyl 4 PI07, pin 02 (GB) and GROUND.

Cyl 6 PI08, pin 02 (GB) and GROUND.

Cyl 7 PI05, pin 02 (GB) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G290076t8.

G290076t8 : CHECK THE IGNITION COIL (CYLS 2, 3, 5, AND 8) MONITOR CIRCUITS FOR HIGH RESISTANCE

1. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI09). 2. Measure the resistance between:

Cyl 2 PI06, pin 02 (YB) and PI01, pin 132 (YB).

Cyl 3 PI03, pin 02 (YB) and PI01, pin 132 (YB).

Cyl 5 PI04, pin 02 (YB) and PI01, pin 132 (YB).

Cyl 8 PI09, pin 02 (YB) and PI01, pin 132 (YB).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. This circuit includes the harness splice, PIS10. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290076t9.

G290076t9 : CHECK THE IGNITION COIL (CYLS 2, 3, 5, AND 8) MONITOR CIRCUITS FOR SHORT TO B+ VOLTAGE

1. Reconnect the battery negative terminal. 2. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI09). 3. Measure the voltage between:

Cyl 2 PI06, pin 02 (YB) and GROUND.

Cyl 3 PI03, pin 02 (YB) and GROUND.

Cyl 5 PI04, pin 02 (YB) and GROUND.

Cyl 8 PI09, pin 02 (YB) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short to B+ voltage. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> No

GO to Pinpoint Test G290076t10.

G290076t10 : CHECK THE IGNITION COIL (CYLS 2, 3, 5, AND 8) MONITOR CIRCUITS FOR SHORT TO GROUND

1. Disconnect the relevant ignition coil electrical connector(s), (PI02 to PI09). 2. Measure the resistance between:

Cyl 2 PI06, pin 02 (YB) and GROUND.

Cyl 3 PI03, pin 02 (YB) and GROUND.

Cyl 5 PI04, pin 02 (YB) and GROUND.

Cyl 8 PI09, pin 02 (YB) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

-> No

Contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G290076p2 : CHECK SPARK PLUG RESISTANCE

G290076t11 : CHECK SPARK PLUG RESISTANCE

1. Remove the suspect spark plug(s). 2. Measure the resistance between the spark plug center electrode tip and the spark plug HT contact.

Is the resistance between 8,000 and 12,000 ohms? (nominal 10,000 ohms)

-> Yes

Check ignition coil and circuits. See possible sources list for misfire.

-> No

INSTALL a new spark plug. CLEAR the DTC. TEST the system for normal operation.

Engine Ignition - VIN Range: G45704->G99999

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Engine oil level	Fuses
Cooling system coolant level	Wiring harness
Fuel level	Loose or corroded electrical connectors
Fuel contamination/grade/quality	Ignition coils
	Sensor(s)
	Engine control module (ECM)
	Transmission control module (TCM)

3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC Index.

Symptom Chart

Symptom	Possible source	Action
Engine cranks, but does not fire	Engine breather system disconnected/restricted Ignition system	Check the engine breather system, Engine Emission Control - VIN Range: G45704->G99999 For ignition system tests, refer to pinpoint tests in this

	<p>Fuel system</p> <p>Harness</p> <p>Crankshaft position (CKP) sensor</p> <p>ECM fault</p>	<p>section. Check the fuel pressure, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For CKP tests, Electronic Engine Controls - VIN Range: G45704->G99999 Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
Engine cranks and fires, but will not start	<p>Evaporative emissions purge valve</p> <p>Fuel pump</p> <p>Spark plugs</p> <p>HT short to ground (tracking) check rubber boots for cracks/damage</p> <p>Ignition coil failure(s)</p> <p>Harness</p>	<p>For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For spark plug tests, GO to Pinpoint Test G531328p2. For ignition coil circuit tests, GO to Pinpoint Test G531328p1.</p>
Difficult to start cold	<p>Coolant anti-freeze content</p> <p>Battery</p> <p>CKP sensor</p> <p>Exhaust gas recirculation (EGR) valve stuck open</p> <p>Fuel pump</p> <p>Purge valve</p>	<p>Check the anti-freeze content. For battery information, Battery For CKP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For EGR valve tests, Engine Emission Control - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999</p>
Difficult to start hot	<p>Injector leak</p> <p>Engine fuel temperature (EFT) sensor</p> <p>Intake air temperature (IAT)</p>	<p>For fuel injectors, Fuel Injectors (18.10.02) For EFT, IAT and MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For purge valve tests, Evaporative Emissions - VIN Range:</p>

	<p>sensor</p> <p>Mass air flow (MAF) sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>EGR valve stuck open</p>	<p>G45704->G99999 Check the fuel pressure,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For ignition coil circuit tests, GO to Pinpoint Test G531328p1.</p> <p>For EGR valve tests, Engine Emission Control - VIN Range: G45704->G99999</p>
Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)	<p>Injector leak</p> <p>EFT sensor</p> <p>IAT sensor</p> <p>MAF sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>EGR valve stuck open</p>	<p>For fuel injectors, Fuel Injectors (18.10.02) For EFT, IAT and MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999 Check the fuel pressure,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For ignition coil circuit tests, GO to Pinpoint Test G531328p1.</p> <p>For EGR valve tests, Engine Emission Control - VIN Range: G45704->G99999</p>
Engine stalls soon after start	<p>Breather system disconnected/restricted</p> <p>ECM relay</p> <p>Harness</p> <p>MAF sensor</p> <p>Ignition system</p> <p>Air filter restricted</p> <p>Fuel lines</p>	<p>For breather system, Engine Emission Control - VIN Range: G45704->G99999 For ECM relay and MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For ignition coil circuit tests, GO to Pinpoint Test G531328p1.</p> <p>For air filter information, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 Check the fuel lines,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range:</p>

	FRP sensor Air leakage	G45704->G99999 For FRP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For intake system information, Intake Air Distribution and Filtering - VIN Range: G00442->G45703
Engine hesitates/poor acceleration	Fuel pump Injector leak Fuel pressure Fuel lines Air leakage Throttle position (TP) sensors Throttle motor Ignition system EGR valve stuck open HO2 sensors Transmission malfunction Restricted pedal travel (carpet, etc) Accelerator pedal position (APP) sensor	Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For intake system, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For TP sensor and throttle motor tests, Electronic Engine Controls - VIN Range: G45704->G99999 For ignition coil circuit tests, GO to Pinpoint Test G531328p1. For EGR valve tests, Engine Emission Control - VIN Range: G45704->G99999 Check for DTCs relating to HO2 sensors. Refer to the DTC index for pinpoint tests for DTC set. For transmission information, Check the accelerator pedal travel. For APP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999
Engine backfires	Fuel pump Fuel lines Air leakage MAF sensor HO2 sensors Ignition system Sticking variable camshaft	Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For intake system, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 Check for DTCs relating to HO2 sensors. Refer to the

	<p>timing (VCT) hub</p> <p>APP sensor</p>	<p>DTC index for pinpoint tests for DTC set.</p> <p>For ignition coil circuit tests, GO to Pinpoint Test G531328p1.</p> <p>For VCT information,</p> <p>Engine For APP sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999</p>
Engine surges	<p>Fuel pump</p> <p>Fuel lines</p> <p>MAF sensor</p> <p>Harness</p> <p>TP sensors</p> <p>Throttle motor</p> <p>Ignition system</p>	<p>Check the fuel pressure, check the fuel lines,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For MAF, TP sensor and throttle motor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 For ignition coil circuit tests, GO to Pinpoint Test G531328p1.</p>
Engine detonates/knocks	<p>Knock sensor (KS) circuit malfunction</p> <p>Fuel pump</p> <p>Fuel lines</p> <p>FRP sensor</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Air leakage</p> <p>Sticking VCT hub</p> <p>BARO sensor malfunction (internal ECM fault)</p>	<p>For KS circuit tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 Check the fuel pressure, check the fuel lines,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For FRP, MAF and HO2 sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 For intake system, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 Check DTCs for VCT range/performance fault.</p> <p>For VCT information,</p> <p>Engine Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
No throttle response	<p>APP sensor malfunction</p> <p>TP sensors</p> <p>Throttle motor</p>	<p>For APP, TP sensor and throttle motor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999</p>
Poor throttle response	<p>APP sensor malfunction</p>	<p>For APP, TP, ECT and MAF sensor tests,</p> <p>Electronic Engine Controls - VIN Range:</p>

	TP sensors ECT sensor MAF sensor Transmission malfunction Traction control event Air leakage Breather system disconnected/restricted	G45704->G99999 For transmission information, For intake system, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For breather system information, Engine Emission Control - VIN Range: G45704->G99999
--	--	---

Diagnostic Trouble Code (DTC) Index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of DTCs,
Electronic Engine Controls - VIN Range: G45704->G99999

DTC	Description	Possible causes	Action
P035100	Cylinder 1 ignition coil primary/secondary circuit	ECM to ignition module/coil drive circuit: short circuit to ground, high resistance Ignition module/coil ground circuit: high resistance Ignition module/coil supply circuit: open circuit (including relay)	For ignition coil tests, GO to Pinpoint Test G531328p1.
P035200	Cylinder 2 ignition coil primary/secondary circuit	ECM to ignition module/coil drive circuit: short circuit to ground, high resistance Ignition module/coil ground	For ignition coil tests, GO to Pinpoint Test G531328p1.

		<p>circuit: high resistance</p> <p>Ignition module/coil supply circuit: open circuit (including relay)</p>	
P035300	Cylinder 3 ignition coil primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil supply circuit: open circuit (including relay)</p>	For ignition coil tests, GO to Pinpoint Test G531328p1.
P035400	Cylinder 4 ignition coil primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil supply circuit: open circuit (including relay)</p>	For ignition coil tests, GO to Pinpoint Test G531328p1.
P035500	Cylinder 5 ignition coil primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil supply circuit: open circuit (including relay)</p>	For ignition coil tests, GO to Pinpoint Test G531328p1.
P035600	Cylinder 6 ignition coil primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil supply circuit: open circuit (including relay)</p>	For ignition coil tests, GO to Pinpoint Test G531328p1.
P035700	Cylinder 7 ignition coil primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p>	For ignition coil tests, GO to Pinpoint Test G531328p1.

		<p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil supply circuit: open circuit (including relay)</p>	
P035800	Cylinder 8 ignition coil primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil supply circuit: open circuit (including relay)</p>	For ignition coil tests, GO to Pinpoint Test G531328p1.
P131500	Persistent misfire	<p>Spark plug failure/fouled/incorrect gap</p> <p>Ignition coil failure</p> <p>ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Fuel delivery pressure low</p> <p>Fuel injector circuit fault(s) (injector DTCs also flagged)</p> <p>Cylinder compression low</p>	<p>For spark plug tests, GO to Pinpoint Test G531328p2.</p> <p>For ignition coil circuit tests, GO to Pinpoint Test G531328p1.</p> <p>Check the fuel pressure, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999 Check the cylinder compressions, Engine - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8</p>
P136700	Ignition amplifier group A	<p>Ignition monitoring circuit to ECM: open circuit, short circuit to ground, short circuit to power</p> <p>Ignition module/coils right hand bank ground circuit fault</p>	For ignition coil tests, GO to Pinpoint Test G531328p1.
P136800	Ignition amplifier group B	Ignition monitoring circuit to ECM: open circuit, short circuit to ground, short	For ignition coil tests, GO to Pinpoint Test G531328p1.

		circuit to power	
		Ignition module/coils left hand bank ground circuit fault	

Pinpoint Tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

PINPOINT TEST G531328p1 : IGNITION COIL CIRCUITS

G531328t2 : CHECK THE IGNITION COIL SUPPLY VOLTAGE CIRCUIT

1. Disconnect the relevant ignition coil electrical connector:

Ignition coil connector
Cylinder 1, PI02
Cylinder 2, PI06
Cylinder 3, PI03
Cylinder 4, PI07
Cylinder 5, PI04
Cylinder 6, PI08

Cylinder 7, PI05
Cylinder 8, PI09

2. Key on, engine off. 3. Make sure the ignition relay is energized. 4. Measure the voltage between:

Ignition coil connector, harness side	Battery
Pin 01	Negative terminal

Is the voltage less than 10.5 Volts?

-> Yes

REPAIR the relevant ignition coil supply circuit. This circuit includes fuse 30 of the front power distribution box and the ignition relay. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531328t12.

G531328t12 : CHECK THE IGNITION COIL SWITCHING CIRCUITS FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Ignition coil connector, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531328t13.

G531328t13 : CHECK THE IGNITION COIL SWITCHING CIRCUITS FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Ignition coil connector, harness side	Battery
Pin 04	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531328t4.

G531328t4 : CHECK THE IGNITION COIL MONITOR CIRCUITS FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Ignition coil connector, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531328t5.

G531328t5 : CHECK THE IGNITION COIL MONITOR CIRCUITS FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Ignition coil connector, harness side	Battery
--	----------------

Pin 02	Positive terminal
--------	-------------------

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531328t3.

G531328t3 : CHECK THE IGNITION COIL GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Cylinder 1 ignition coil connector, harness side	Battery
PI02, pin 03	Negative terminal

Cylinder 2 ignition coil connector, harness side	Battery
PI06, pin 03	Negative terminal

Cylinder 3 ignition coil connector, harness side	Battery
PI03, pin 03	Negative terminal

Cylinder 4 ignition coil connector, harness side	Battery
PI07, pin 03	Negative terminal

Cylinder 5 ignition coil connector, harness side	Battery
PI04, pin 03	Negative terminal

Cylinder 6 ignition coil connector, harness side	Battery
PI08, pin 03	Negative terminal

Cylinder 7 ignition coil connector, harness side	Battery
PI05, pin 03	Negative terminal

Cylinder 8 ignition coil connector, harness side	Battery
PI09, pin 03	Negative terminal

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531328t6.

G531328t6 : CHECK THE IGNITION COIL SWITCHING CIRCUITS FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

Cylinder 1 ignition coil connector, harness side	ECM connector PI300, harness side
PI02, pin 04	Pin 61

Cylinder 2 ignition coil connector, harness side	ECM connector PI300, harness side
PI06, pin 04	Pin 60

Cylinder 3 ignition coil connector, harness side	ECM connector PI300, harness side

PI03, pin 04	Pin 59
--------------	--------

Cylinder 4 ignition coil connector, harness side	ECM connector PI300, harness side
PI07, pin 04	Pin 58

Cylinder 5 ignition coil connector, harness side	ECM connector PI300, harness side
PI04, pin 04	Pin 57

Cylinder 6 ignition coil connector, harness side	ECM connector PI300, harness side
PI08, pin 04	Pin 56

Cylinder 7 ignition coil connector, harness side	ECM connector PI300, harness side
PI05, pin 04	Pin 55

Cylinder 8 ignition coil connector, harness side	ECM connector PI300, harness side
PI09, pin 04	Pin 54

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G531328t7.

G531328t7 : CHECK THE IGNITION COIL MONITOR CIRCUITS FOR HIGH RESISTANCE

1. Measure the resistance between:

Cylinder 1 ignition coil connector, harness side	ECM connector PI300, harness side
PI02, pin 02	Pin 62

Cylinder 2 ignition coil connector, harness side	ECM connector PI300, harness side
PI06, pin 02	Pin 64

Cylinder 3 ignition coil connector, harness side	ECM connector PI300, harness side
PI03, pin 02	Pin 64

Cylinder 4 ignition coil connector, harness side	ECM connector PI300, harness side
PI07, pin 02	Pin 62

Cylinder 5 ignition coil connector, harness side	ECM connector PI300, harness side
PI04, pin 02	Pin 64

Cylinder 6 ignition coil connector, harness side	ECM connector PI300, harness side
PI08, pin 02	Pin 62

Cylinder 7 ignition coil connector, harness side	ECM connector PI300, harness side
PI05, pin 02	Pin 62

Cylinder 8 ignition coil connector, harness side	ECM connector PI300, harness side
PI09, pin 02	Pin 64

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

INSTALL a new ignition coil to the relevant cylinder.

Ignition Coil-On-Plug (18.20.40) Clear the DTC and test the system for normal operation. Refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531328p2 : CHECK SPARK PLUG RESISTANCE

G531328t11 : CHECK SPARK PLUG RESISTANCE

1. Remove the suspect spark plug(s). 2. Measure the resistance between:

Spark plug	Spark plug
Center electrode tip	HT contact

Is the resistance between 8,000 and 12,000 ohms? (nominal 10,000 ohms)

-> Yes

Check ignition coil and circuits. See possible sources list for misfire.

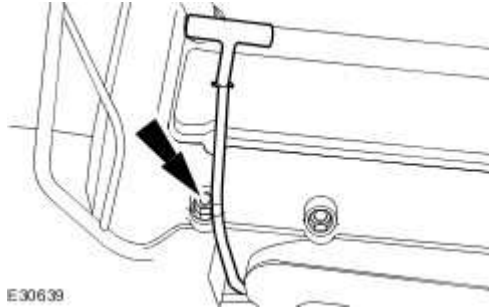
-> No

INSTALL a new spark plug. CLEAR the DTC and test the system for normal operation.

Ignition Coil-On-Plug (18.20.40)

Removal

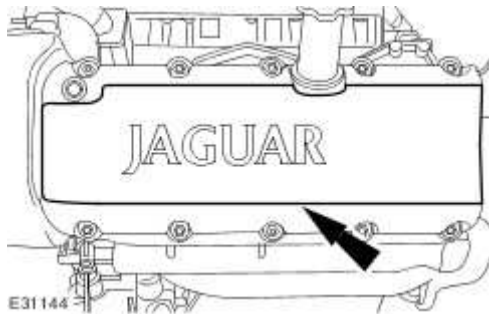
- 1 . Remove the oil level indicator.



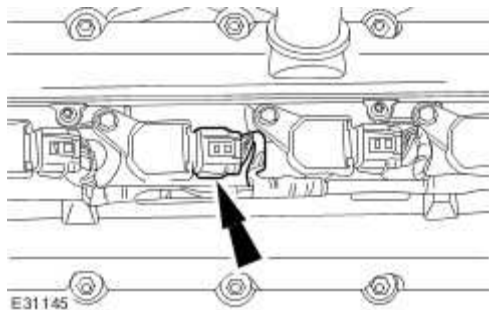
- 2 . **NOTE:**

Left-hand shown, right hand similar.

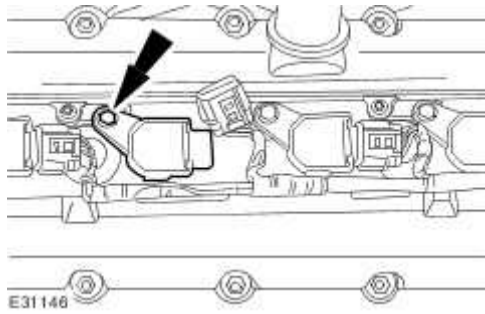
Remove the ignition coil-on-plug cover.



- 3 . Disconnect the ignition coil-on-plug electrical connector.

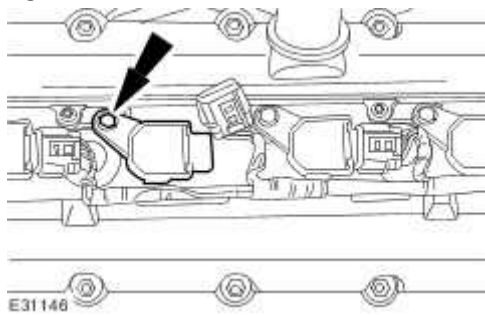


- 4 . Remove the ignition coil-on-plug.



Installation

- 1 . To install, reverse the removal procedure.
- 2 . Tighten to 5 Nm.



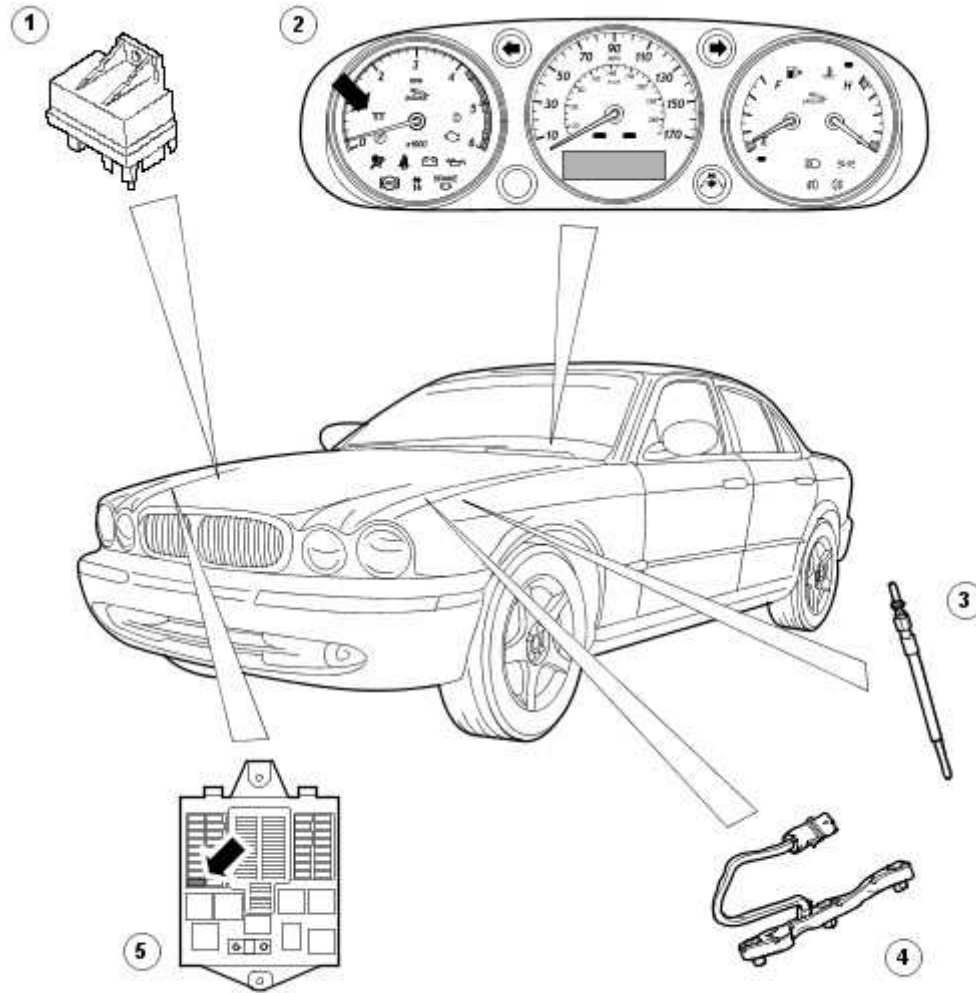
303-07C : Glow Plug System

Specifications

Specifications

Description	Nm	lb-ft	lb-in
Glow plug	10	-	89

Glow Plug System



E66850

Item	Part Number	Description
1		Glow plug module
2		Pre-heat warning light
3		Glow plug
4		Glow plug harness
5		Glow plug fuse

The fundamental purpose of the glow plugs is to improve the cold start capability, cold start emissions and customer perception of the vehicle, such as short glow plug times and minimum cranking times, as well as low combustion noise at low ambient temperatures.

The maximum current when switched on will be approximately 18 Amps per glow plug at 40°

C (104° F) with a 12 Volt supply.

The glow plug control module (GPCM) is located in the engine bay on the right-hand side. It acts as a switch for the current to the glow plugs and is controlled via the engine control module (ECM). Above a given coolant temperature, glow plugs will not be switched on before, during or after starting. Within a certain coolant temperature range, the glow plugs will be active before cranking to increase combustion chamber temperature, during cranking to assist engine starting, and after the engine has started in order to reduce the emissions of white and possibility black smoke from the tail pipe immediately following a cold start.

The ECM is connected to the GPCM via a reference control line and a diagnostic line. The former will be pulled down by the ECM causing the GPCM to switch on and to remain switched on while the reference voltage is low. The ECM will store the error information generated by the GPCM in the case of glow plug failure.

Glow Plug System

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

For information on the operation of the system,
Glow Plug System

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of electrical damage.

Electrical
Glow plug lamp
Fuses (100 Amp midifuse and fuse 9 of the front power distribution box)
Glow plug control module (GPCM)
Engine management control relay
Wiring harness(es)
Electrical connector(s)
Glow plug(s)
Engine control module (ECM)

- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) and test the system for normal operation before proceeding to the next step.
- 4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC index, or the symptom chart if no DTCs are set.

Symptom chart

Symptom	Possible cause	Action
Poor starting (extreme weather conditions)	Glow plugs inoperative/inefficient Fuel temperature too low	Check the glow plug harnesses at the glow plugs and at the connection to the main harness. For additional information, refer to the wiring diagrams. Check for DTCs indicating a control module or circuit fault. The fuel system recycles fuel until operating temperature is reached to reduce this possibility.
High cold-engine emissions	After-glow phase inoperative	Check the glow plug harnesses at the glow plugs and at the connection to the main harness. For additional information, refer to the wiring diagrams. Check for DTCs indicating a control module or circuit fault. After-glow is designed to function at engine temperatures below 50° C (122° F), and below 2500 rpm.
High cold-engine noise, vibration or harshness	After-glow phase inoperative	Check the glow plug harnesses at the glow plugs and at the connection to the main harness. For additional information, refer to the wiring diagrams. Check for DTCs indicating a control module or circuit fault. After-glow is designed to function at engine temperatures below 50° C (122° F), and below 2500 rpm.

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of powertrain DTCs,
Electronic Engine Controls

DTC	Description	Possible source	Action
P038000	Glow plug control module (GPCM)	The GPCM is driven, but the glow plugs are not powered	For GPCM circuit tests, GO to Pinpoint Test G552799p2.

P038200	Glow plug control module (GPCM)	The GPCM is not driven, but the glow plugs are powered	For GPCM circuit tests, GO to Pinpoint Test G552799p2.
P038300	Glow plug control module (GPCM) circuit low	GPCM control circuit: short circuit to ground	For GPCM control circuit tests, GO to Pinpoint Test G552799p1.
P038400	Glow plug control module (GPCM) circuit high	GPCM control circuit: short circuit to power	For GPCM control circuit tests, GO to Pinpoint Test G552799p1.
P067000	Glow plug control module (GPCM) circuit open	GPCM control circuit: high resistance	For GPCM control circuit tests, GO to Pinpoint Test G552799p1.

Pinpoint Tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

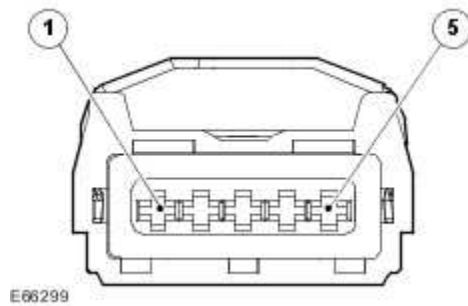
NOTE:

If DTCs are recorded and a fault is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

PINPOINT TEST G552799p1 : GLOW PLUG CONTROL MODULE (GPCM) CONTROL CIRCUIT

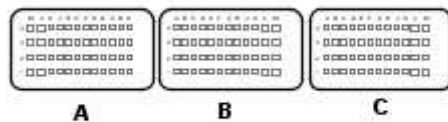
G552799t1 : CHECK THE GPCM CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1.



Circuit	Pin
Ground	01
Control from ECM	02
Power supply from FPDB	03
Logic monitor	05

2.



E54251

Circuit	Pin
Glow plug control module signal	G3
Logic monitor	E3

3. Key off. 4. Disconnect the GPCM electrical connector, EC69. 5. Measure the resistance between:

E69, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 10 Kohms?

-> Yes

GO to Pinpoint Test G552799t3.

-> No

GO to Pinpoint Test G552799t2.

G552799t2 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1. Disconnect the ECM connector, C100. 2. Measure the resistance between:

EC69, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 10 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

G552799t3 : CHECK THE GPCM CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key off. 2. Measure the resistance between:

EC69, harness side	Battery

Pin 02	Positive terminal
--------	-------------------

Is the resistance greater than 10 Kohms?

-> Yes

GO to Pinpoint Test G552799t5.

-> No

GO to Pinpoint Test G552799t4.

G552799t4 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE module

1. Disconnect the ECM connector, C100. 2. Measure the resistance between:

EC69, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 10 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

G552799t5 : CHECK THE GPCM CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM connector, C100. 2. Measure the resistance between:

EC69, harness side	C100, harness side
Pin 02	Pin G3

Is the resistance less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. Refer to the warranty policy and procedures manual if a module is suspect.

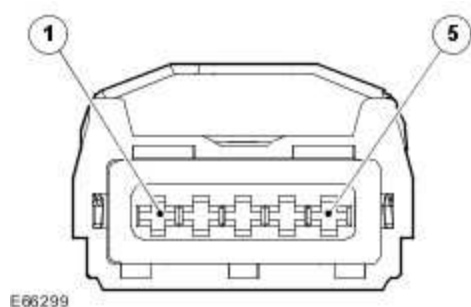
-> **No**

REPAIR the high resistance circuit. This circuit includes connector, PI41. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

PINPOINT TEST G552799p2 : GLOW PLUG CONTROL MODULE (GPCM) OUTPUT

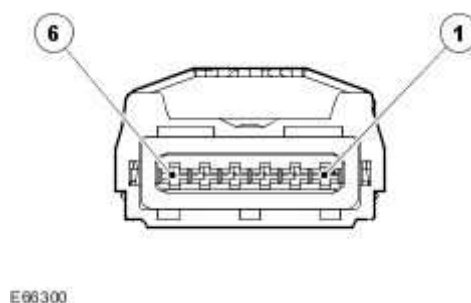
G552799t6 : CHECK THE PERMANENT POWER SUPPLY TO THE GPCM

1.



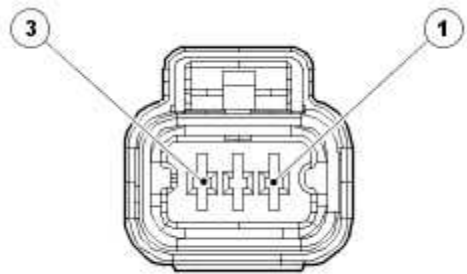
Circuit	Pin
Ground	01
Control from ECM	02
Power supply from FPDB	03
Logic monitor	05

2.



Circuit	Pin
Cylinder 1 output	Pin 01
Cylinder 2 output	Pin 02
Cylinder 3 output	Pin 03
Cylinder 4 output	Pin 04
Cylinder 5 output	Pin 05
Cylinder 6 output	Pin 06

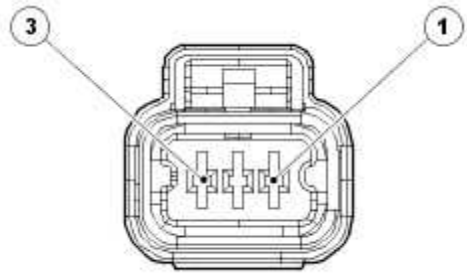
3.



E66319

Circuit	Pin
Cylinder 1	01
Cylinder 2	02
Cylinder 3	03

4.



E66319

Circuit	Pin
---------	-----

Cylinder 4	01
Cylinder 5	02
Cylinder 6	03

5. Disconnect the glow plug module connector, EC73 (this is an eyelet). 6. Measure the voltage between:

EC73, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G552799t7.

-> No

REPAIR the permanent power supply circuit. This circuit includes the 100A midi fuse. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552799t7 : CHECK THE IGNITION POWER SUPPLY TO THE GPCM

1. Disconnect the glow plug module connector, EC69. 2. Key on, engine off.

Make sure the EMS relay is energized 3. Measure the voltage between:

EC69, harness side	Battery
Pin 03	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G552799t8.

-> No

REPAIR the ignition power supply circuit. This circuit includes fuse 9 of the front power distribution

box. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552799t8 : CHECK THE GROUND TO THE GPCM

1. Key off. 2. Measure the resistance between:

EC69, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552799t9.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552799t9 : CHECK THE GLOW PLUG OUTPUT CIRCUITS FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Disconnect the glow plug module connector, EC74 3. Disconnect the glow plug connectors, EC76 and EC77. 4. Measure the resistance between:

EC76, harness side	Battery
Pin 01	Negative terminal
Pin 02	
Pin 03	

EC77, harness side	Battery
Pin 04	Negative terminal
Pin 05	
Pin 06	

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552799t10.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552799t10 : CHECK THE GLOW PLUG OUTPUT CIRCUITS FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

EC76, harness side	Battery
Pin 01	Positive terminal
Pin 02	
Pin 03	

EC77, harness side	Battery
Pin 04	Positive terminal
Pin 05	
Pin 06	

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552799t11.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552799t11 : CHECK THE GLOW PLUG OUTPUT CIRCUITS FOR HIGH RESISTANCE

1. Measure the resistance between:

EC74, harness side	EC76, harness side
Pin 01	Pin 01
Pin 02	Pin 02
Pin 03	Pin 03

EC74, harness side	EC77, harness side
Pin 04	Pin 01
Pin 05	Pin 02
Pin 06	Pin 03

Is the resistance less than 10 ohms?

-> Yes

If DTCs P0380 or P0382 are logged and the tests above have not identified a circuit fault, a control module may be at fault.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

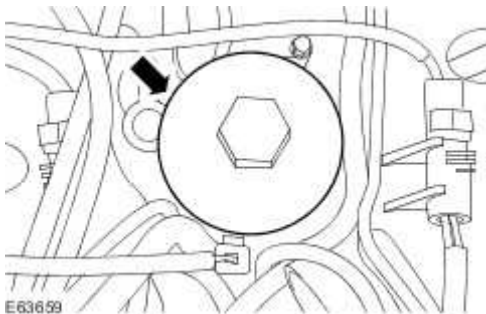
Glow Plugs

Removal

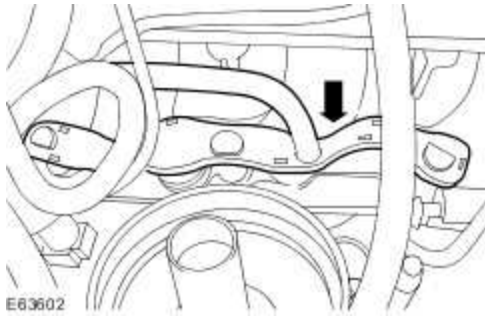
- 1 . Remove the intake air shutoff throttle.
For additional information, refer to Intake Air Shutoff Throttle
- 2 . Remove the crankcase vent oil separator.
For additional information, refer to Crankcase Vent Oil Separator
- 3 **NOTE:**
.
Remove and discard the O-ring seal.

Remove the oil filter element housing.

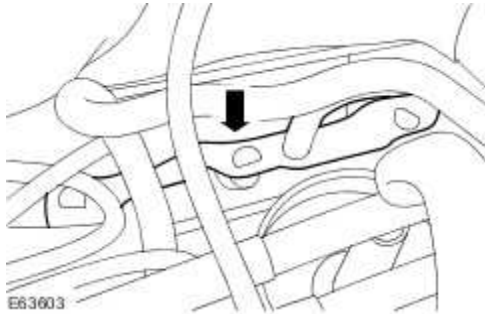
- ▶ Rotate the oil filter element housing five complete turns counter-clockwise.
- ▶ Allow the engine oil to drain from the oil filter element housing for two minutes.
- ▶ Remove the oil filter element housing.



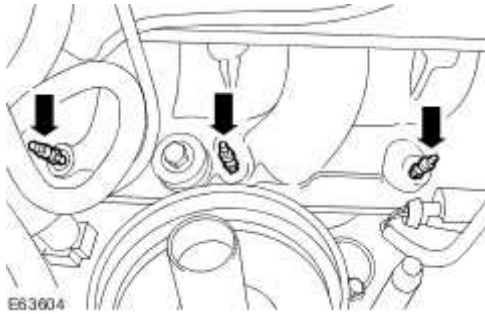
- 4 . Detach the right-hand glow plug electrical connector.



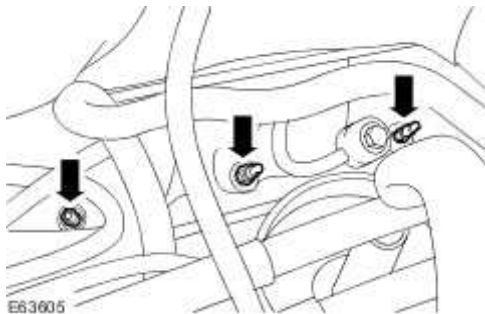
5 . Detach the left-hand glow plug electrical connector.



6 . Remove the right-hand bank glow plugs.



7 . Remove the left-hand bank glow plugs.




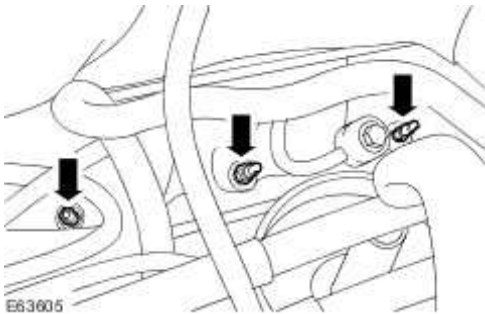
Installation

1 NOTE:

Make sure glow plug electrical connector is correctly fitted to all glow plugs on the left-hand bank.

To install, reverse the removal procedure.

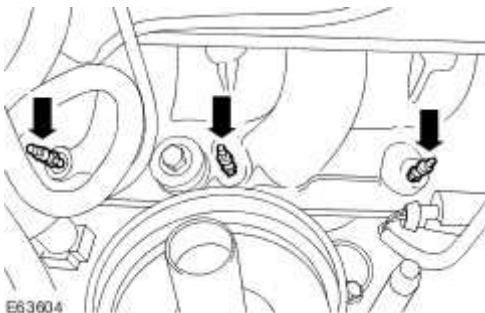
 Tighten to 10 Nm.



2 NOTE:

Make sure glow plug electrical connector is correctly fitted to all glow plugs on the right-hand bank.

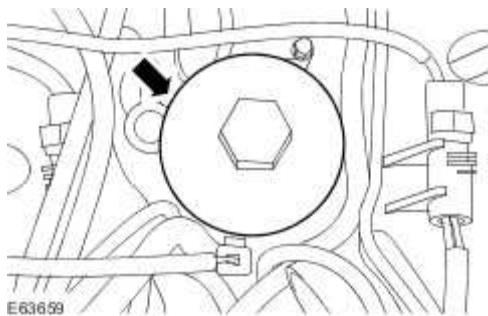
Tighten to 10 Nm.



3 . NOTE:

Install a new O-ring seal.

Tighten to 25 Nm.



303-08A : Engine Emission Control – 4.2L NA V8 –
AJV8/4.2L SC V8 – AJV8/3.0L NA V6 – AJ27/3.5L NA V8
– AJV8

Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Exhaust gas recirculation (EGR) valve to intake manifold retaining bolts	10	7	-
EGR valve tube to EGR valve retaining bolts	21	15	-
Exhaust manifold to EGR valve tube retaining nuts	21	15	-

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Exhaust gas recirculation (EGR) valve to intake manifold retaining bolts - Vehicles with 3.5L or 4.2L engine	10	7	-
EGR valve tube to EGR valve retaining bolts - Vehicles with 3.5L or 4.2L engine	21	15	-
Exhaust manifold to EGR valve tube retaining nuts - Vehicles with 3.5L or 4.2L engine	21	15	-
Secondary air injection (AIR) control valve to exhaust manifold tube retaining nuts	35	26	-
AIR control valve to exhaust manifold tube to exhaust manifold adaptor	35	26	-
Exhaust manifold blanking plug - Vehicles without AIR	35	26	-
AIR control valve bracket retaining bolt - Vehicles with 3.0L engine	8	-	71
AIR control valve bracket retaining nut - Vehicles with 3.0L engine	8	-	71
AIR control valve retaining bolts - Vehicles with 3.5L or 4.2L engine	25	18	-
AIR pump retaining nuts	20	15	-
AIR vacuum reservoir retaining nut	5	-	44
AIR vacuum reservoir retaining bolt	5	-	44

Engine Emission Control - VIN Range: G00442->G45703

Positive Crankcase Ventilation System

Vehicles fitted with 3.5L or 4.2L engine

On vehicles fitted with a 3.5L or 4.2L engine the positive crankcase ventilation (PCV) system consists of a PCV valve, and two PCV hoses. The PCV valve is mounted on the right-hand valve cover and a hose is connected between PCV valve and the throttle body elbow. The PCV valve regulates the amount of ventilation air and crankcase gas supplied to the intake manifold and also prevents backfiring into the crankcase. The left-hand valve cover PCV hose is connected to the air cleaner outlet pipe.

Vehicles fitted with 3.0L engine

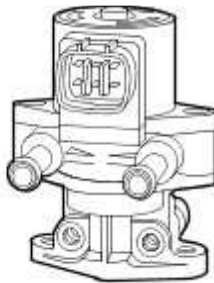
On vehicles fitted with 3.0L engine the PCV system consists of two hoses, connected between the left-hand valve cover and the intake manifold and the right-hand valve cover and the air cleaner outlet pipe.

The PCV system recycles crankcase gases back through the engine where they mix with incoming air/fuel charge.

The positive crankcase ventilation system helps to reduce hydrocarbon emissions from the engine.

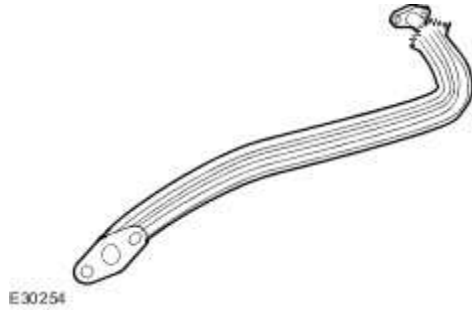
Exhaust Gas Recirculation System

Exhaust Gas Recirculation (EGR) Valve



E30253

Exhaust Manifold to Exhaust Gas Recirculation (EGR) Valve Tube



The exhaust gas recirculation (EGR) system is fitted on all vehicles fitted with a 3.5L or 4.2L engine. It comprises of an EGR valve and exhaust manifold to EGR valve tube. The EGR system allows a measured quantity of exhaust gas to be directed back to the intake manifold. The exhaust gas is introduced to the incoming charge in the intake manifold, where it mixes with the air/fuel mixture and lowers the peak gas temperature, reducing nitrogen oxide (NOX) exhaust emissions. The gas is drawn through the exhaust manifold to EGR valve tube from the exhaust to the inlet manifold via the EGR valve. The EGR valve is electrically operated and is controlled via an input from the engine control module (ECM).

On vehicles without supercharger the EGR valve is mounted on the intake manifold. On vehicles with supercharger the EGR valve is mounted on the throttle body elbow.

The ECM can monitor the operation of the EGR system by receiving inputs from the manifold absolute pressure (MAP) sensor. The MAP sensor monitors the EGR flow by the change in intake manifold pressure when the EGR valve is operated. If at any time the input signal to the ECM exceeds pre-defined thresholds due to low pressure reading for a calibrated period of time, a diagnostic trouble code (DTC) is recorded.

On vehicles without supercharger the MAP sensor is mounted on the rear of intake manifold. On vehicles with supercharger the MAP sensor is mounted on the rear of the throttle body elbow.

<<303-14B>>

Engine Emission Control - VIN Range: G45704->G99999

Positive Crankcase Ventilation (PCV) System

The PCV system recycles crankcase gases back through the engine where they mix with incoming air/fuel charge and help to reduce hydrocarbon emissions.

Vehicles with 3.0L engine

The PCV system consists of two hoses, connected between the left-hand valve cover and the intake manifold and the right-hand valve cover and the air cleaner outlet pipe.

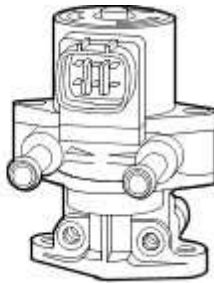
Vehicles with 3.5L or 4.2L engine

The PCV system consists of a valve, and two hoses. The PCV valve is mounted on the right-hand valve cover and a hose is connected between PCV valve and the throttle body elbow. The left-hand valve cover PCV hose is connected to the air cleaner outlet pipe.

The PCV valve regulates the amount of ventilation air and crankcase gas supplied to the intake manifold and also prevents backfiring into the crankcase.

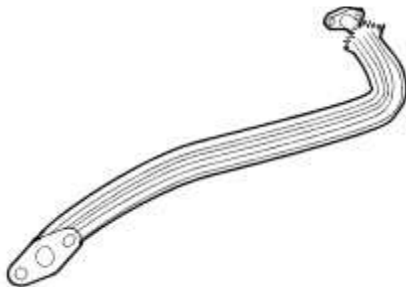
Exhaust Gas Recirculation (EGR) System - Vehicles with 3.5L or 4.2L engine

EGR Valve



E30253

EGR Valve Tube



E30254

The EGR system comprises of an EGR valve and exhaust manifold to EGR valve tube. The EGR system allows a measured quantity of exhaust gas to be directed back to the intake manifold. The exhaust gas is introduced to the incoming charge air in the intake manifold, where it mixes with the air/fuel mixture and lowers the peak gas temperature, reducing nitrogen oxide (NOx) exhaust emissions. The

gas is drawn through the exhaust manifold to EGR valve tube from the exhaust to the inlet manifold through the EGR valve. The EGR valve is electrically operated and is controlled through an input from the engine control module (ECM).

On vehicles without a supercharger the EGR valve is mounted on the intake manifold. On vehicles with a supercharger the EGR valve is mounted on the throttle body elbow.

The ECM monitors the operation of the EGR system from inputs from the manifold absolute pressure (MAP) sensor and can detect high or low flow through the valve as a result of changes to the pressure readings.

High or low flow outside the expected range results in the setting of a diagnostic trouble code (DTC).

On vehicles without a supercharger the MAP sensor is mounted on the rear of intake manifold. On vehicles with a supercharger the MAP sensor is mounted on the rear of the throttle body elbow. For additional information, refer to Electronic Engine Controls (303-14B)

Secondary Air Injection (AIR) System

To assist in the reduction of exhaust emissions to meet European Union (EU) Stage 4 and Federal Petrol Emission standards, AIR is fitted to the vehicle.



IE62215

Item	Part Number	Description
1		AIR vacuum reservoir
2		AIR switching valve
3		Exhaust manifolds
4		AIR pump
5		AIR control valve

The AIR pump is used to provide a supply of air into the exhaust manifolds during the cold start period of the engine. The AIR cycle lasts for up to 65 seconds. The hot unburnt fuel particles leaving the combustion chamber mix with the air injected into the exhaust manifolds and immediately combust.

This subsequent combustion of the unburnt and partially burnt carbon monoxide (CO) and hydrocarbon (HC) particles help to reduce the emission of these pollutants from the exhaust system. The additional heat generated in the exhaust manifold also provides rapid heating of the exhaust system catalytic converters. The additional oxygen which is delivered to the catalytic converters also generates an exothermic reaction which causes the catalytic converters to reach their optimum operating temperature and 'light off' quickly.

The catalytic converters only start to provide effective treatment of emission pollutants when they reach an operating temperature of approximately 250°C (482°F) and need to be between temperatures of 400°C (752°F) and 800°C (1472°F) for optimum efficiency. Consequently, the heat produced by the AIR 'afterburning' reduces the time delay before the catalysts reach an efficient operating temperature.

The AIR system comprises the following components:

- AIR pump

- AIR switching valve

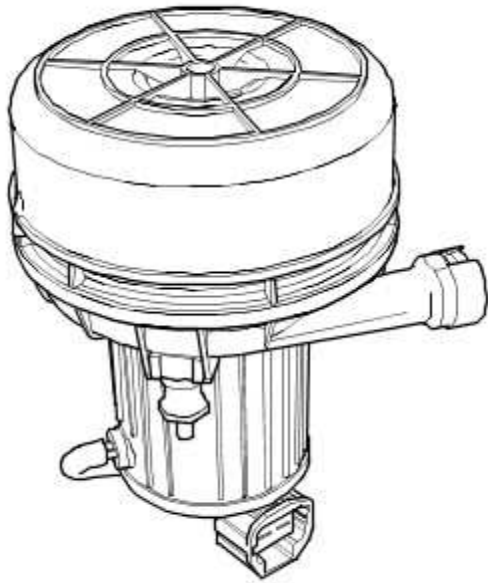
- AIR control valve

- AIR vacuum reservoir

- AIR pump relay

- AIR pressure sensor (North American specification vehicles only)

AIR Pump



E62274

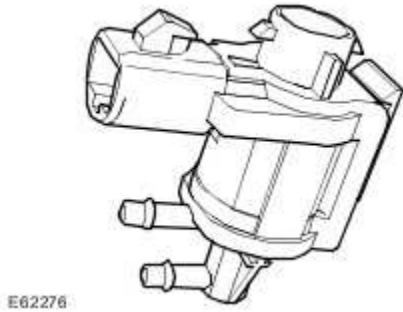
The AIR pump is located behind the right-hand side of the front bumper cover. The pump is fitted on rubber mountings to help prevent noise which is generated by AIR pump operation. The AIR pump is powered from the vehicle battery by a dedicated relay and supplies approximately 10 to 15 kg/hr (22 to 33 lb/hr) of air when the engine is at idle speed and the ambient temperature is below 20°C (68°F).

Air is drawn into the AIR pump through vents in its front cover and is then passed through a foam filter. The air is delivered to the exhaust manifold on each side of the engine through a combination of plastic pipes and stainless steel tubes.

One second after the AIR pump is energised, the ECM switches on the AIR switching valve, which opens to allow vacuum from the AIR vacuum reservoir to be applied to the vacuum operated AIR control valve. When the vacuum is applied to the AIR control valve, it opens to allow the air from the AIR pump through to the exhaust manifolds.

When the ECM switches off the AIR switching valve, the vacuum supply to the AIR control valve is cut-off and the valve closes to prevent further air being injected into the exhaust manifolds. With an approximate five second delay after as the AIR switching valve is closed, the ECM removes power from the AIR pump relay, and this in turn stops the AIR pump from operating.

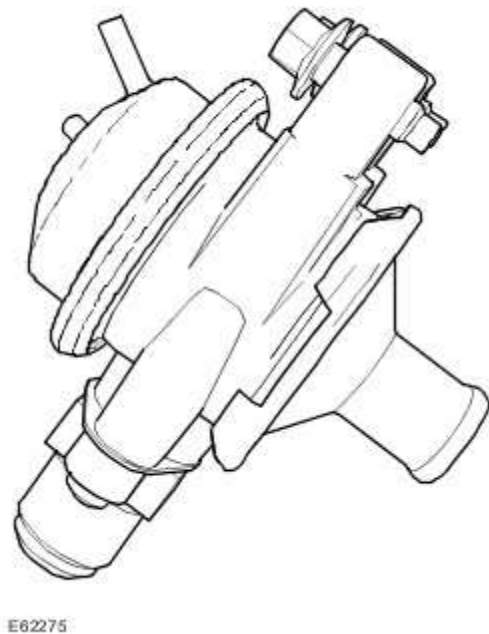
AIR Switching Valve



The ECM switches on the AIR switching valve with a one second delay after initiating AIR pump operation. When the AIR switching valve is open, a steady vacuum supply is allowed through to open the vacuum operated AIR control valve. When the ECM switches off the AIR switching valve, the valve closes and immediately shuts off the vacuum supply to the AIR control valve. The pump continues to operate for a further five seconds for system diagnostic purposes.

When the AIR switching valve is switched off, the vacuum supply line opens to atmosphere, and this causes the AIR switching valve to close automatically to prevent any further injection of air.

AIR Control Valve



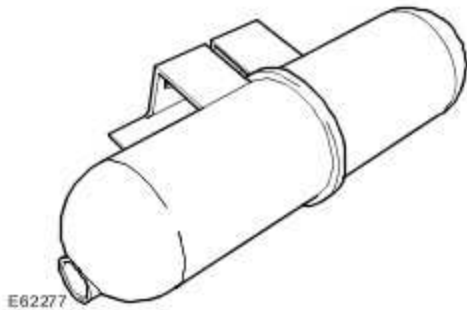
The injected air from the AIR pump is controlled by the AIR control valve. This allows the correct amount of air to be injected directly into the exhaust manifolds. The AIR control valve prevents exhaust gasses from blowing back into the AIR pump.

The AIR control valve is assisted in operation by a vacuum source from the AIR vacuum reservoir located in the right-hand side of the engine bay. This assistance allows the actuation of the AIR control valve independently from the intake manifold vacuum levels available.

When the pressure in the exhaust system is higher than in the AIR system, the AIR control valve closes the circuit, and this protects the AIR system from exhaust gasses blowing back into the AIR system.

Vacuum to the AIR switching valve is provided from the intake manifold vacuum by the AIR vacuum reservoir. A small bore vacuum hose provides the vacuum route between the AIR vacuum reservoir and AIR switching valve. A further small bore vacuum hose is used to connect the AIR switching valve to the AIR control valve.

AIR Vacuum Reservoir



The AIR vacuum reservoir is located on the right-hand side of the engine bay.

The AIR vacuum reservoir is included in the vacuum supply line between the intake manifold and the AIR switching valve.

The AIR vacuum reservoir contains a one-way valve to stop vacuum leaking back towards the intake manifold side. The AIR vacuum reservoir holds a constant vacuum so that the AIR control valve opens as soon as the AIR switching valve is switched on.

AIR Pump Relay

The AIR pump relay is located on the AIR pump mounting bracket. The ECM is used to control the operation of the AIR pump by the AIR pump relay.

The AIR system receives its voltage supply through the AIR pump relay. The ECM monitors the state of the relay for correct operation as part of its system diagnostic.

AIR Pressure Sensor - North American specification vehicles only

The AIR system is monitored by measuring the system pressure by using the AIR pressure sensor at several instances during its cycle of operation.

The AIR system pressure is measured before operation of the AIR pump. The AIR pump is then switched on and with a one second delay, the AIR switching valve is opened. After a stabilizing period, the system pressure is measured again, this time by taking the average of a one second duration of readings, and normalising for variations in battery voltage and atmospheric pressure. If the system pressure measured at this time has not risen enough with respect to the initial AIR

pressure reading then a failure will be flagged.

A second pressure measurement is made after the requirement for AIR into the exhaust system has expired, but continuing on from the same period of AIR pump operation, i.e. the pump is left running, against a closed AIR switching valve. Again this pressure measurement is the average of a one second duration of readings normalised for variations in battery voltage and atmospheric pressure. If the system pressure measured at this time has not risen enough or has risen too much with respect to the system pressure during normal operation of AIR then a failure will be flagged.

A final pressure reading is taken after the AIR system has been switched off to ensure the system shuts down.

Engine Emission Control - VIN Range: G00442->G45703

- 1 . Verify the customer concern by operating the system.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.
- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 4 . If the concern is not visually evident, refer to the Symptom Chart.

Diagnostic Trouble Code (DTC) P0400 indicates exhaust gas recirculation (EGR) system flow malfunction.

Possible Source(s):

Exhaust manifold to EGR valve pipe tube blocked.
Exhaust manifold to EGR valve pipe tube cracked.
EGR valve stuck closed.
EGR valve stuck open.
EGR valve loose.
Fuse 37 in the front power distribution box (FPDB).
Relay 5 in the FPDB
Electrical harness.
Electrical connector(s)

Action(s) to take:

GO to Pinpoint Test A.

Diagnostic Trouble Code (DTC) P0405 indicates exhaust gas recirculation (EGR) valve malfunction, short to battery/12volts (V).

Possible Source(s):

Electrical harness.
Electrical connector(s).
Engine control module (ECM).
EGR valve.

Action(s) to take:

GO to Pinpoint Test B.

Diagnostic Trouble Code (DTC) P0406 indicates exhaust gas recirculation (EGR) valve malfunction, short to ground/open circuit.

Possible Source(s):

Electrical harness.

Electrical connector(s).

ECM.

EGR valve.

Action(s) to take:

GO to Pinpoint Test C.

PINPOINT TEST G187746p1 : Diagnostic Trouble Code (DTC) P0400 indicates exhaust gas recirculation (EGR) system flow malfunction.

G187746t24 : CHECK EGR VALVE FOR CORRECT FITMENT TO INTAKE MANIFOLD

1. Check the EGR valve retaining bolts for correct torque.

Exhaust Gas Recirculation (EGR) Valve (17.45.01)

Was the EGR valve fitted correctly?

-> **Yes**

GO to Pinpoint Test G187746t2.

-> **No**

GO to Pinpoint Test G187746t1.

G187746t1 : CHECK EXHAUST GAS RECIRCULATION (EGR) VALVE TO MANIFOLD/INTAKE ELBOW GASKET FOR CORRECT SEAL

1. Visually inspect the gasket for external damage.

Is the gasket damaged?

-> **Yes**

INSTALL a new gasket, make sure valve is seated correctly and retaining bolts installed to the correct

torque.

Exhaust Gas Recirculation (EGR) Valve (17.45.01) CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

-> **No**

GO to Pinpoint Test G187746t2.

G187746t2 : CHECK FOR EXHAUST MANIFOLD TO EGR VALVE TUBE FOR DAMAGE or BLOCKAGES

1. Visually inspect the exhaust manifold to EGR valve tube.

Is the tube damaged or blocked?

-> **Yes**

If the tube is damaged INSTALL a new tube.

Exhaust Manifold to Exhaust Gas Recirculation (EGR) Valve Tube (17.45.11) CLEAR the DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes. If the tube is blocked, unblock the tube. CLEAR DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G187746t3.

G187746t3 : CHECK FOR POWER SUPPLY TO EGR VALVE

1. Disconnect EGR valve electrical connector PI 15 2. TURN ignition switch to the ON position 3. MEASURE the voltage at PI 15 pin 2 (GU)

Is the voltage less than 10 volts

-> **Yes**

GO to Pinpoint Test G187746t4.

-> **No**

GO to Pinpoint Test G187746t4.

G187746t4 : CHECK FUSE 37 IN THE FRONT POWER DISTRIBUTION BOX (FPDB)

1. Check the fuse.

Is the fuse ok?

-> **Yes**

GO to Pinpoint Test G187746t6.

-> **No**

GO to Pinpoint Test G187746t19.

G187746t5 : CHECK HARNESS BETWEEN FPDB AND EGR FOR SHORT TO GROUND

1. Disconnect the EGR valve electrical connector PI 15. 2. CHECK the resistance between PI 15 pin 2 (GU) and ground.

Is the resistance less than 10,000 Ohms?

-> **Yes**

REPAIR the circuit between the EGR valve and FPDB. INSTALL a new fuse. CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

-> **No**

INSTALL a new fuse. CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

G187746t6 : CHECK FOR BATTERY VOLTAGE AT FPDB

1. CHECK for voltage at FPDB electrical connector FH 32 pin 43 (GU).

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between FPDB electrical connector FH 32 pin 43 (GU) and FPDB relay 5.

-> **No**

REPAIR the circuit between FPDB electrical connector FH 32 pin 43 (GU) and EGR valve electrical connector PI 15 pin 2 (GU). CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

G187746t19 : CHECK FOR POWER SUPPLY TO EGR VALVE

1. Disconnect EGR valve electrical connector PI 15 2. MEASURE the voltage at PI 15 pin 5 (GU)

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between PI 15 pin 5 (GU) and splice PIS 15. CLEAR DTC. TEST the system for normal operation.

-> **No**

INSTALL a new EGR valve. CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

PINPOINT TEST G187746p2 : Diagnostic Trouble Code (DTC) P0405 indicates exhaust gas recirculation (EGR) valve malfunction, short to battery/12volts

G187746t7 : CHECK FOR A SHORT TO BATTERY VOLTAGE

1. Disconnect the EGR valve electrical connector PI 15. 2. TURN ignition switch to the ON position. 3. Measure the voltage at PI 15 pin 4 (YU).

Is the voltage more than 1 volt?

-> Yes

GO to Pinpoint Test G187746t8.

-> No

GO to Pinpoint Test G187746t9.

G187746t8 : CHECK FOR A SHORT TO BATTERY VOLTAGE IN ECM

1. Disconnect ECM electrical connector PI 1. 2. Measure the voltage at PI 15 pin 4 (YU).

Is the voltage more than 1 volt?

-> Yes

REPAIR circuit between the PI 1 pin 57 (YU) and the EGR valve electrical connector PI 15 pin 4 (YU).
CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

-> No

INSTALL a new ECM. <<303-14B>>CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

G187746t9 : CHECK FOR A SHORT TO BATTERY VOLTAGE

1. Measure the voltage at PI 15 pin 1 (YG).

Is the voltage more than 1 volt?

-> Yes

GO to Pinpoint Test G187746t10.

-> No

GO to Pinpoint Test G187746t11.

G187746t10 : CHECK FOR A SHORT TO BATTERY VOLTAGE IN ECM

1. Disconnect ECM electrical connector PI 1. 2. Measure the voltage at PI 15 pin 1 (YG).

Is the voltage more than 1 volt?

-> Yes

REPAIR circuit between the PI 1 pin 58 (YG) and the EGR valve electrical connector PI 15 pin 1 (YG).
CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

-> No

INSTALL a new ECM. <<303-14B>>CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

G187746t11 : CHECK FOR A SHORT TO BATTERY VOLTAGE

1. Measure the voltage at PI 15 pin 6 (YR).

Is the voltage more than 1 Volt?

-> Yes

GO to Pinpoint Test G187746t12.

-> No

GO to Pinpoint Test G187746t20.

G187746t12 : CHECK FOR A SHORT TO BATTERY VOLTAGE IN ECM

1. Disconnect ECM electrical connector PI 1. 2. Measure the voltage at PI 15 pin 6 (YR).

Is the voltage more than 1 volt?

-> Yes

REPAIR circuit between the PI 1 pin 59 (YR) and the EGR valve electrical connector PI 15 pin 6 (YR).
CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

-> No

INSTALL a new ECM. <<303-14B>>CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

G187746t20 : CHECK FOR A SHORT TO BATTERY VOLTAGE

1. Measure the voltage at PI 15 pin 3 (YU).

Is the voltage more than 1 Volt?

-> Yes

GO to Pinpoint Test G187746t21.

-> No

INSTALL a new EGR valve. CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

G187746t21 : CHECK FOR A SHORT TO BATTERY VOLTAGE IN ECM

1. Disconnect ECM electrical connector PI 1. 2. Measure the voltage at PI 15 pin 3 (YU).

Is the voltage more than 1 volt?

-> Yes

REPAIR circuit between the PI 1 pin 60 (YU) and the EGR valve electrical connector PI 15 pin 3 (YU). CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

-> No

INSTALL a new ECM. <<303-14B>>CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

PINPOINT TEST G187746p3 : Diagnostic Trouble Code (DTC) P0406 indicates exhaust gas recirculation (EGR) valve malfunction, short to ground/open circuit.

G187746t13 : CHECK FOR A SHORT TO GROUND

1. Disconnect the EGR valve electrical connector PI 15. 2. Disconnect the engine control module (ECM) electrical connector PI 1. 3. Measure the resistance between the EGR valve electrical connector PI 15 pin 4 (YU) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the circuit between EGR valve electrical connector PI 15 pin 4 (YU) and ECM electrical connector PI 1 pin 57 (YU). CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

-> No

GO to Pinpoint Test G187746t14.

G187746t14 : CHECK FOR AN OPEN CIRCUIT

1. Measure the resistance between the EGR valve electrical connector PI 15 pin 4 (YU) and ECM electrical connector PI 1 pin 57 (YU).

Is the resistance more than 5.0 ohms?

-> Yes

REPAIR the circuit between EGR valve electrical connector PI 15 pin 4 (YU) and ECM electrical connector PI 1 pin 57 (YU). CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

-> No

GO to Pinpoint Test G187746t15.

G187746t15 : CHECK FOR A SHORT TO GROUND

1. Measure the resistance between the EGR valve electrical connector PI 15 pin 1 (YG) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the circuit between EGR valve electrical connector PI 15 pin 1 (YG) and ECM electrical connector PI 1 pin 58 (YG). CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

-> No

GO to Pinpoint Test G187746t16.

G187746t16 : CHECK FOR AN OPEN CIRCUIT

1. Measure the resistance between the EGR valve electrical connector PI 15 pin 1 (YG) and ECM electrical connector PI 1 pin 58 (YG).

Is the resistance more than 5.0 Ohms?

-> Yes

REPAIR the circuit between EGR valve electrical connector PI 15 pin 1 (YG) and ECM electrical connector PI 1 pin 58 (YG). CLEAR DTC. To validate fix drive vehicle between 30 mph (48 kph) and 40 mph (64 kph). Allow vehicle to idle for 2 minutes.

-> No

GO to Pinpoint Test G187746t17.

G187746t17 : CHECK FOR A SHORT TO GROUND

1. Measure the resistance between the EGR valve electrical connector PI 15 pin 6 (YR) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the circuit between EGR valve electrical connector PI 15 pin 6 (YR) and ECM electrical connector PI 1 pin 59 (YR). CLEAR DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G187746t18.

G187746t18 : CHECK FOR AN OPEN CIRCUIT

1. Measure the resistance between the EGR valve electrical connector PI 15 pin 6 (YR) and ECM electrical connector PI 1 pin 59 (YR).

Is the resistance more than 5.0 Ohms?

-> Yes

REPAIR the circuit between EGR valve electrical connector PI 15 pin 6 (YR) and ECM electrical connector PI 1 pin 59 (YR). CLEAR DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G187746t22.

G187746t22 : CHECK FOR A SHORT TO GROUND

1. Measure the resistance between the EGR valve electrical connector PI 15 pin 3 (YU) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the circuit between EGR valve electrical connector PI 15 pin 3 (YU) and ECM electrical connector PI 1 pin 60 (YU). CLEAR DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G187746t23.

G187746t23 : CHECK FOR AN OPEN CIRCUIT

1. Measure the resistance between the EGR valve electrical connector PI 15 pin 3 (YU) and ECM electrical connector PI 1 pin 60 (YU).

Is the resistance more than 5.0 Ohms?

-> Yes

REPAIR the circuit between EGR valve electrical connector PI 15 pin 3 (YU) and ECM electrical connector PI 1 pin 60 (YU). CLEAR DTC. TEST the system for normal operation.

-> No

INSTALL a new EGR valve. CLEAR DTC. TEST the system for normal operation. If DTC is repeated
INSTALL a new ECM. CLEAR DTC. TEST the system for normal operation.

Engine Emission Control - VIN Range: G45704->G99999

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit, and the introduction of secondary air injection.

For additional information on the operation of the emission control systems.

Engine Emission Control - VIN Range: G45704->G99999

Inspection and verification

1 . Verify the customer concern.

2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Engine breather hoses Cyclone separator Exhaust gas recirculation (EGR) pipes (check for cracks) EGR valve	Fuses Wiring harness Loose or corroded electrical connectors Sensor(s) Stepper motor(s) Secondary air injection pump Secondary air injection valve Engine control module (ECM)

3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC Index.

Symptom Chart

Symptom (general)	Symptom (specific)	Possible source	Action
-------------------	--------------------	-----------------	--------

Non-Start	Engine cranks, but does not fire	Engine breather system disconnected/restricted	Check the engine breather system hoses, separator, etc. Rectify as necessary.
Difficult to start	Difficult to start cold	Exhaust gas recirculation (EGR) valve stuck open	Check the EGR valve, Exhaust Gas Recirculation (EGR) Valve (17.45.01) Check the pipework.
Engine stalls	Engine stalls soon after start	Breather system disconnected/restricted	Check the engine breather system hoses, separator, etc. Rectify as necessary.
	Engine stops/stalls	EGR valve stuck open	Check the EGR valve. Exhaust Gas Recirculation (EGR) Valve (17.45.01)
Rough running	Poor idle quality	EGR valve stuck open	Check the EGR valve. Exhaust Gas Recirculation (EGR) Valve (17.45.01)
Poor driveability	Engine hesitates/poor acceleration	EGR valve stuck open	Check the EGR valve. Exhaust Gas Recirculation (EGR) Valve (17.45.01)
	Poor throttle response	Breather system disconnected/restricted	Check the engine breather system hoses, separator, etc. Rectify as necessary.
Excessive:	Fuel consumption Black smoke Emissions	EGR valve stuck open EGR system not operating Crankcase ventilation system restricted	Check the EGR valve. Exhaust Gas Recirculation (EGR) Valve (17.45.01) For EGR valve circuit tests. GO to Pinpoint Test G528708p1. Check the engine breather system hoses, separator, etc. Rectify as necessary.
Noisy	Loud 'ticking' noise with engine running	EGR pipes cracked	Inspect the EGR pipes, paying particular attention to the ribbed sections. Replace as necessary.
Oil leakage	Engine oil leaks	Crankcase ventilation system restricted	Check the engine breather system hoses, separator, etc.

			Rectify as necessary.
--	--	--	-----------------------

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of DTCs.

Electronic Engine Controls - VIN Range: G45704->G99999 or

Electronic Engine Controls - VIN Range: G45704->G99999

DTC	Description	Possible causes	Action
P040100	EGR flow insufficient	EGR valve incorrectly fitted or loose EGR valve stuck closed, blocked EGR pipe blocked EGR valve mechanical failure	Check the fitment of the EGR valve. Exhaust Gas Recirculation (EGR) Valve (17.45.01) Check the EGR pipework.
P041300	Secondary air injection valve circuit	Secondary air valve control circuit: short circuit to power	For secondary air injection valve circuit tests, GO to Pinpoint Test G528708p4.
P041400	Secondary air injection valve circuit	Secondary air valve control circuit: short circuit to ground Secondary air valve control circuit: high resistance	For secondary air injection valve circuit tests, GO to Pinpoint Test G528708p4.
P048900	Exhaust gas recirculation (EGR) control circuit low	EGR valve power supply circuit: short circuit to ground EGR valve power supply circuit: high resistance	For EGR stepper circuit tests, GO to Pinpoint Test G528708p1.

P049000	Exhaust gas recirculation (EGR) control circuit high	EGR valve to ECM drive circuit: short circuit to power	For EGR stepper circuit tests, GO to Pinpoint Test G528708p1.
P243100	Secondary air injection system air flow/pressure sensor circuit range/performance	Secondary air injection pump/valve/pipework leaks Secondary air injection pump Secondary air injection valve	Check the secondary air injection system pipework, etc. For pump tests. GO to Pinpoint Test G528708p2. For valve tests. GO to Pinpoint Test G528708p4.
P243200	Secondary air injection system air flow/pressure sensor circuit low	Secondary air injection manifold pressure (MAP) sensor circuit: short circuit to ground Secondary air injection manifold pressure (MAP) sensor circuit: high resistance	For secondary air injection MAP sensor tests, GO to Pinpoint Test G528708p3.
P243300	Secondary air injection system air flow/pressure sensor circuit high	Secondary air injection manifold pressure (MAP) sensor circuit: short circuit to power	For secondary air injection MAP sensor tests, GO to Pinpoint Test G528708p3.
P244400	Secondary air injection system pump stuck ON	Secondary air injection pump control circuit: short circuit to ground	For secondary air injection pump circuit tests, GO to Pinpoint Test G528708p2.
P244500	Secondary air injection system pump stuck OFF	Secondary air injection pump control circuit: short circuit to power	For secondary air injection pump circuit tests, GO to Pinpoint Test G528708p2.

Pinpoint tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

PINPOINT TEST G528708p1 : CHECK THE EGR STEPPER SUPPLY AND CONTROL CIRCUITS

G528708t1 : CHECK THE EGR STEPPER SUPPLY VOLTAGE CIRCUITS

1. Key off. 2. Disconnect the EGR stepper electrical connector, PI15. 3. Key on, ignition off.

Make sure the EMS relay is energized. 4. Measure the voltage between:

EGR stepper connector, PI15	Battery
Pin 02	Negative terminal
Pin 05	

Is the voltage less than 10 volts?

-> Yes

REPAIR the relevant EGR stepper supply voltage circuit. This circuit includes the front power distribution box (fuse 14) and the EMS control relay. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t2.

G528708t2 : CHECK THE EGR STEPPER CONTROL CIRCUITS FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

EGR stepper connector, PI15	Battery
Pin 04	Negative terminal
Pin 01	
Pin 06	
Pin 03	

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t3.

G528708t3 : CHECK THE EGR STEPPER CONTROL CIRCUITS FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

EGR stepper connector, PI15	Battery
Pin 04	Positive terminal
Pin 01	
Pin 06	
Pin 03	

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t4.

G528708t4 : CHECK THE EGR STEPPER CONTROL CIRCUITS FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, EC300. 3. Measure the resistance between:

EGR stepper connector, PI15	ECM connector, EC300
Pin 04	Pin 53
Pin 01	Pin 52
Pin 06	Pin 51
Pin 03	Pin 50

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new EGR valve.

Exhaust Gas Recirculation (EGR) Valve (17.45.01) CLEAR the DTC and test the system for normal operation. Refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G528708p2 : CHECK THE SECONDARY AIR INJECTION PUMP CIRCUITS

G528708t5 : CHECK THE SECONDARY AIR INJECTION PUMP RELAY SUPPLY VOLTAGES

1. Key off. 2. Remove the secondary air injection pump relay. 3. Measure the voltage between:

Secondary air injection relay base	Battery
Pin 01	Negative terminal

Pin 03	
--------	--

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the relay base and battery. This circuit includes in-line (fuse 2) and the mega fuses. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t10.

G528708t10 : CHECK THE SECONDARY AIR INJECTION RELAY TO PUMP SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the secondary air injection pump electrical connector, EC93. 2. Measure the resistance between:

Secondary air injection relay base	Battery
Pin 05	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t11.

G528708t11 : CHECK THE SECONDARY AIR INJECTION RELAY TO PUMP SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Secondary air injection relay base	Battery
Pin 05	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t6.

G528708t6 : CHECK THE SECONDARY AIR INJECTION PUMP SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Secondary air injection relay base	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t7.

G528708t7 : CHECK THE SECONDARY AIR INJECTION PUMP SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Secondary air injection relay base	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G528708t12.

G528708t12 : CHECK THE SECONDARY AIR INJECTION RELAY TO PUMP SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the secondary air pump connector, EC93. 2. Measure the resistance between:

Secondary air injection relay base	Secondary air pump connector, EC93
Pin 05	Pin 02

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G528708t13.

G528708t13 : CHECK THE SECONDARY AIR INJECTION PUMP GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Secondary air pump connector, EC93	Battery
Pin 01	Negative terminal

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G528708t8.

G528708t8 : CHECK THE SECONDARY AIR INJECTION PUMP SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

Secondary air injection relay base	ECM connector, EC300
Pin 02	Pin 50

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new secondary air injection pump relay. CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G528708p3 : (V8 N/A FEDERAL SPECIFICATION ONLY) CHECK THE SECONDARY AIR INJECTION MAP SENSOR CIRCUITS

G528708t9 : CHECK THE SECONDARY AIR INJECTION MAP SENSOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Disconnect the secondary air injection MAP sensor electrical connector, EC120. 3. Measure the resistance between:

Secondary air injection MAP sensor connector, EC120	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t14.

G528708t14 : CHECK THE SECONDARY AIR INJECTION MAP SENSOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Secondary air injection MAP sensor connector, EC120	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t15.

G528708t15 : CHECK THE SECONDARY AIR INJECTION MAP SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Secondary air injection MAP sensor connector, EC120	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t16.

G528708t16 : CHECK THE SECONDARY AIR INJECTION MAP SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Secondary air injection MAP sensor connector, EC120	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t17.

G528708t17 : CHECK THE SECONDARY AIR INJECTION MAP SENSOR SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

Secondary air injection MAP sensor connector, EC120	ECM connector, EC300
Pin 01	Pin 19

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t18.

G528708t18 : CHECK THE SECONDARY AIR INJECTION MAP SENSOR SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Secondary air injection MAP sensor connector, EC120	ECM connector, EC300
Pin 02	Pin 13

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t19.

G528708t19 : CHECK THE SECONDARY AIR INJECTION MAP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Secondary air injection MAP sensor connector, EC120	ECM connector, EC300
Pin 03	Pin 07

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new secondary air injection MAP sensor. CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G528708p4 : CHECK THE SECONDARY AIR INJECTION VALVE CIRCUITS

G528708t20 : CHECK THE SECONDARY AIR INJECTION VALVE SUPPLY VOLTAGE

1. Key off. 2. Disconnect the secondary air injection valve electrical connector, PI90. 3. Key on, engine off. 4. Measure the voltage between:

Secondary air injection valve connector, PI90	Battery
Pin 02	Negative terminal

Is the voltage less than 10 volts?

-> Yes

REPAIR the supply circuit between the secondary air injection valve and battery. This circuit includes fuse 27 of the front power distribution box and the mega fuse. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t21.

G528708t21 : CHECK THE SECONDARY AIR INJECTION VALVE CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Secondary air injection valve connector, PI90	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G528708t22.

G528708t22 : CHECK THE SECONDARY AIR INJECTION VALVE CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Secondary air injection valve connector, PI90	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G528708t23.

G528708t23 : CHECK THE SECONDARY AIR INJECTION VALVE CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

Secondary air injection valve connector, PI90	ECM connector, EC300
Pin 01	Pin 55

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new secondary air injection valve.

Secondary Air Injection (AIR) Control Valve - 3.0L NA V6 - AJ27

Secondary Air Injection (AIR) Control Valve - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8

Secondary Air Injection (AIR) Control Valve - 4.2L SC V8 - AJV8 CLEAR the DTC and test the system for normal operation.

Exhaust Gas Recirculation (EGR) Valve (17.45.01)

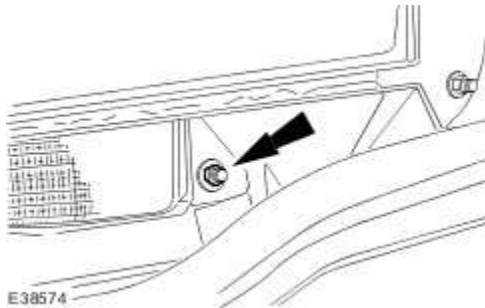
Removal

Left-hand drive vehicles with Supercharger

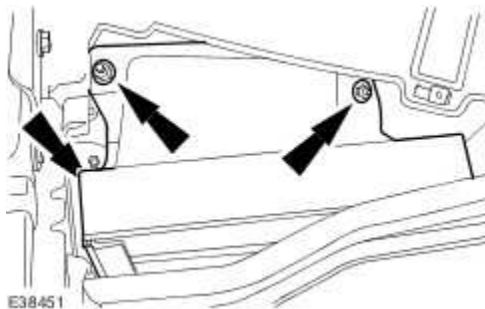
- 1 . Remove the cabin air filter.

For additional information, refer to Cabin Air Filter (76.10.09)

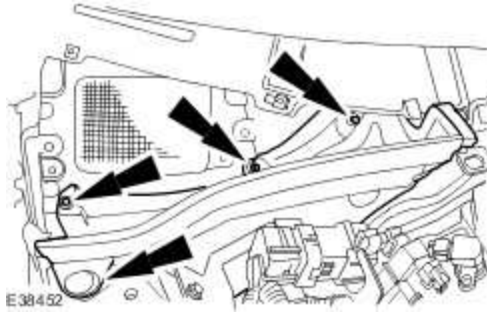
- 2 . Remove the cabin air filter housing retaining nut.



- 3 . Remove the cabin air filter housing.



- 4 . Remove the engine compartment panel.



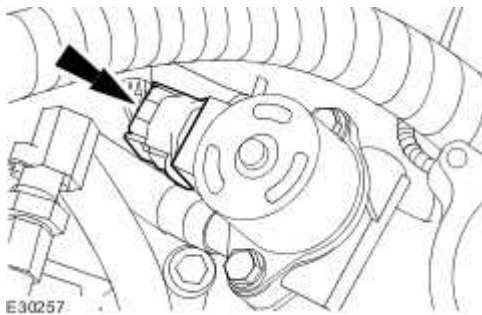
Vehicles with supercharger

5 Remove the throttle body.

. For additional information, refer to Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G00442->G45703 (19.70.04)

For additional information, refer to Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)

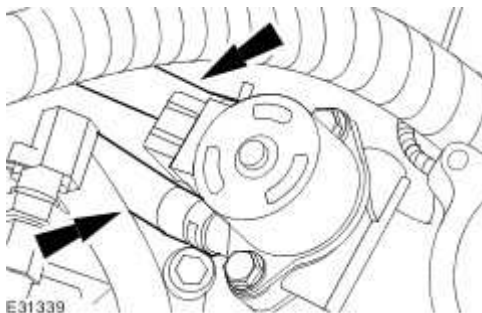
6 . Disconnect the exhaust gas recirculation (EGR) valve electrical connector.



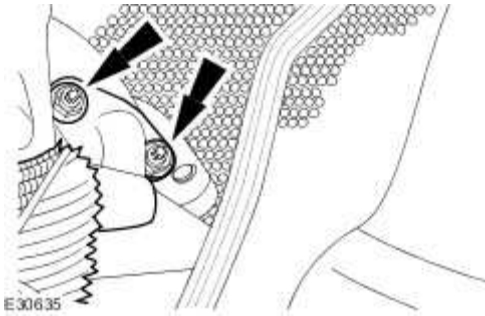
7 . **NOTE:**

Cap the exposed ports.

Disconnect the coolant hoses.

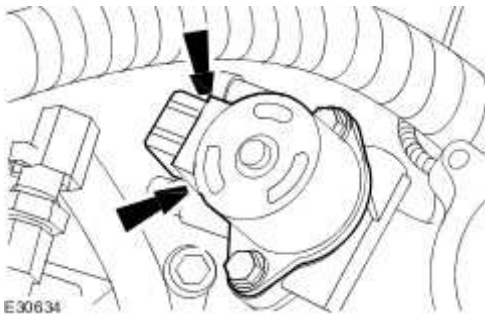


8 . Remove the exhaust manifold to EGR valve tube retaining nuts.



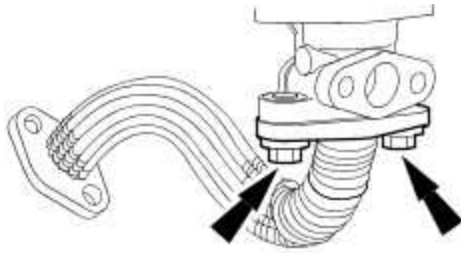
9 . Remove the EGR valve and the exhaust manifold to EGR valve tube.

- ▶ Remove the retaining bolts.
- ▶ Remove and discard the exhaust manifold to EGR valve tube gasket.
- ▶ Remove and discard the EGR valve to air intake elbow gasket.



10 Remove the EGR valve.

- ▶ Remove and discard the EGR valve to exhaust manifold to EGR valve tube gasket.



E30261

Vehicles without supercharger

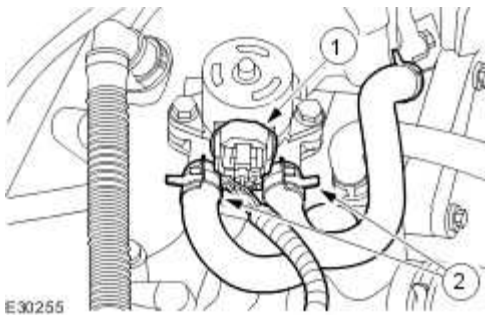
11 . NOTE:

Cap the exposed ports.

Disconnect the EGR valve coolant hoses.

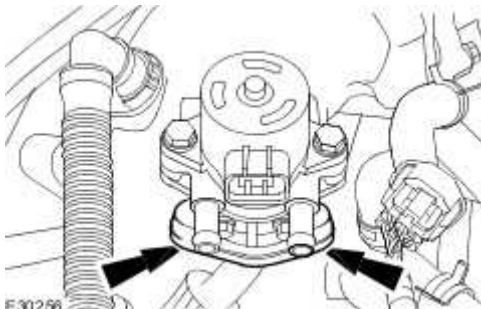
1) Disconnect the EGR valve electrical connector.

2) Disconnect the EGR valve coolant hoses.



E30255

12 . Remove the retaining bolts.

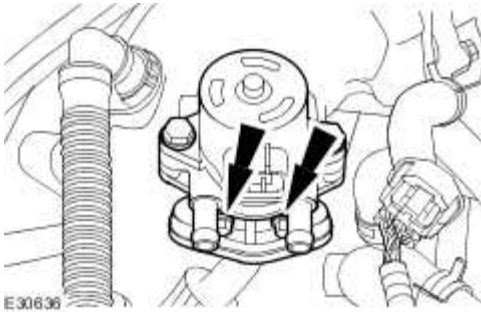


E30266

13 Remove the EGR valve.

▶ Remove and discard the EGR valve to exhaust manifold to EGR valve tube gasket.

▶ Remove and discard the EGR valve to intake manifold gasket.



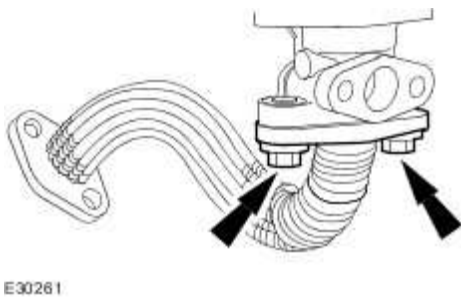
Installation

Vehicles with supercharger

1 . Install the EGR valve.

▶ Install a new EGR valve to exhaust manifold to EGR valve tube gasket.

▶ Tighten to 21 Nm.

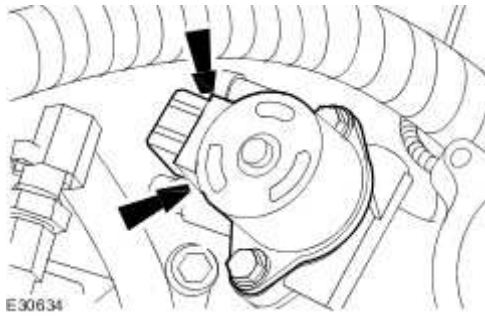


2 . Install the EGR valve and the exhaust manifold to EGR valve tube.

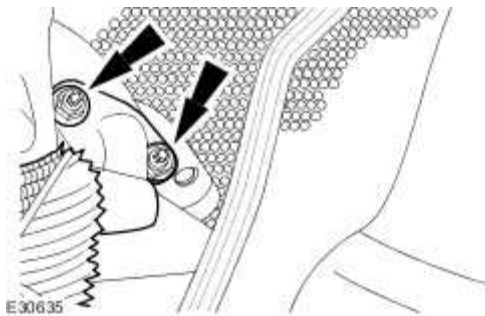
▶ Install a new exhaust manifold to EGR valve tube gasket.

▶ Install a new EGR valve to air intake elbow gasket.

► Tighten to 10 Nm.



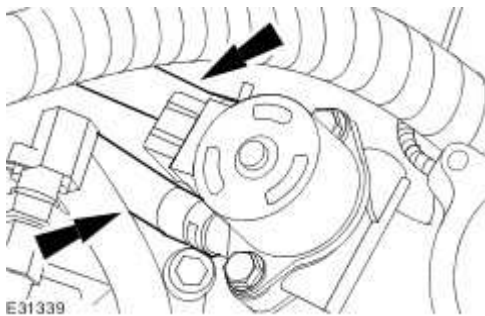
3 . Tighten to 21 Nm.



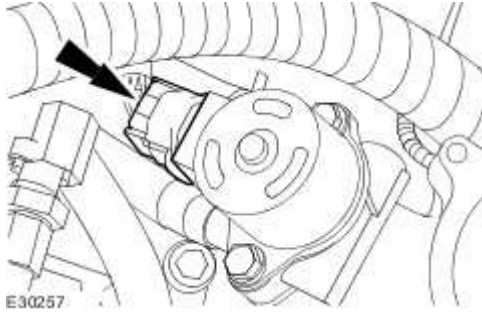
4 . **NOTE:**

Un-cap the exposed ports.

Connect the coolant hoses.



5 . Connect the EGR valve electrical connector.



6 Install the throttle body.

- For additional information, refer to Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G00442->G45703 (19.70.04)

For additional information, refer to Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)

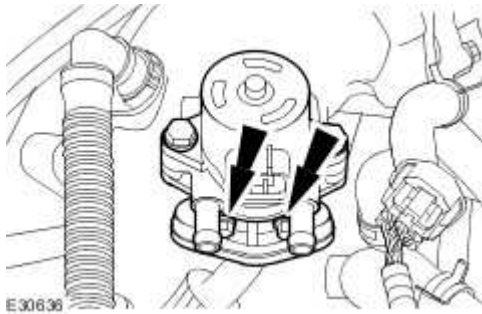
Vehicles without supercharger

7 . Install the EGR valve.

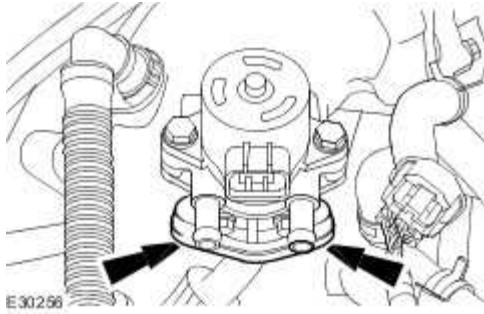
▶ Install a new EGR valve to exhaust manifold to EGR valve tube gasket.

▶ Install a new EGR valve to intake manifold gasket.

▶ Tighten to 10 Nm.



8 . Tighten to 21 Nm.

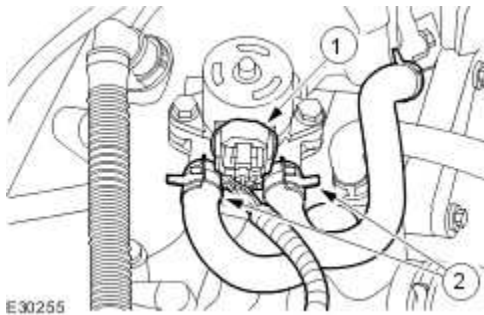


9 . NOTE:

Un-cap the exposed ports.

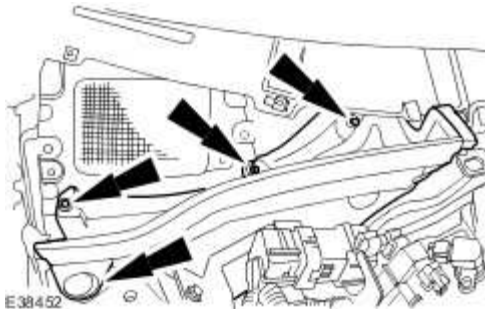
Connect the EGR valve electrical connector.

- 1) Connect the EGR valve coolant hoses.
- 2) Connect the EGR valve electrical connector.

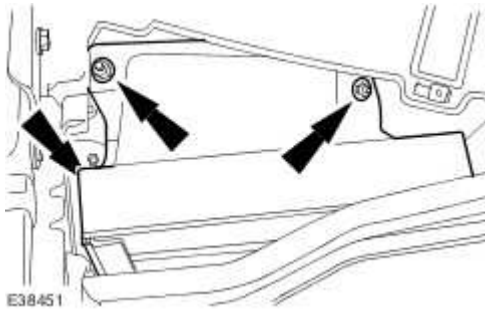


Left-hand drive vehicles with Supercharger

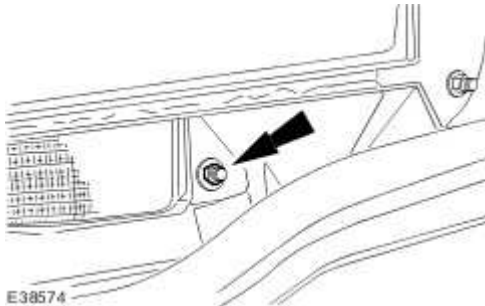
10 . Install the engine compartment panel.



- 11 . Install the cabin air filter housing.



- 12 . Install the cabin air filter housing retaining nut.



- 13 . Install the cabin air filter.

For additional information, refer to Cabin Air Filter (76.10.09)

All vehicles

- 14 . Check and top up the coolant expansion tank.

- 15 **NOTE:**

For NAS vehicles only.

If required, carry out a long drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Long Drive Cycle Self-Test

Exhaust Manifold to Exhaust Gas Recirculation (EGR) Valve Tube (17.45.11)


Removal

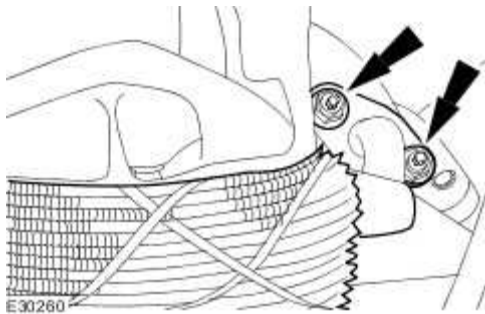
Vehicles with supercharger

- 1 . Remove the exhaust gas recirculation (EGR) valve.
 - . For additional information, refer to Exhaust Manifold to Exhaust Gas Recirculation (EGR) Valve Tube (17.45.11)

Vehicles without supercharger

- 2 . Remove the intake manifold.
 - For additional information, refer to Intake Manifold - VIN Range: G00442->G45703 (30.15.01)
 - For additional information, refer to Intake Manifold - VIN Range: G45704->G99999 (30.15.01)
- 3 . Remove the exhaust manifold to exhaust gas recirculation (EGR) valve tube.

 Remove and discard the gasket.



Installation

Vehicles with supercharger

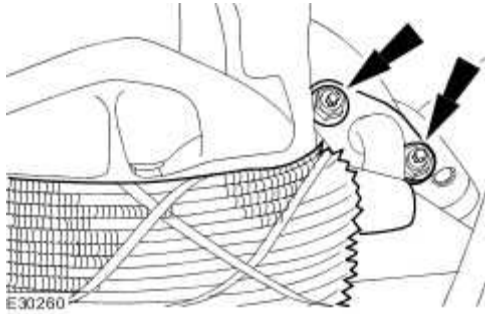
- 1 . Install the EGR valve.
 - For additional information, refer to Exhaust Gas Recirculation (EGR) Valve (17.45.01)

Vehicles without supercharger

2 . Install the exhaust manifold to exhaust gas recirculation (EGR) valve tube.

▶ Install a new gasket.

▶ Tighten to 21 Nm.



3 . Install the intake manifold.

For additional information, refer to Intake Manifold - VIN Range: G00442->G45703 (30.15.01)

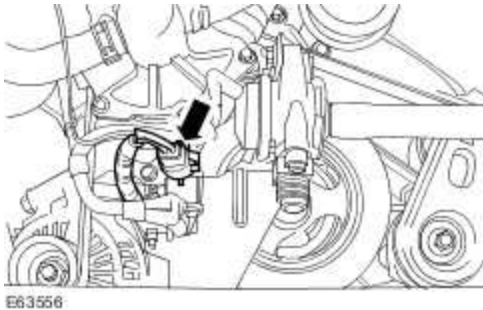
For additional information, refer to Intake Manifold - VIN Range: G45704->G999999 (30.15.01)

Secondary Air Injection (AIR) Control Valve - 3.0L NA V6 - AJ27

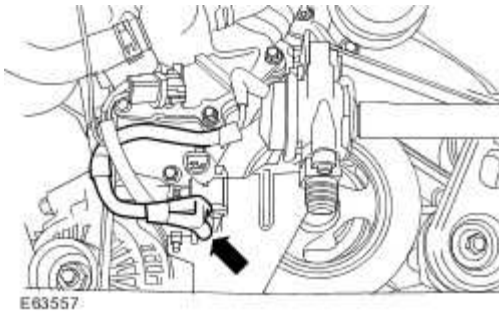
Removal

- 1 Remove the secondary air injection (AIR) control valve to exhaust manifold right-hand tube.
For additional information, refer to Secondary Air Injection (AIR) Control Valve to Exhaust Manifold Tube RH - 3.0L NA V6 - AJ27

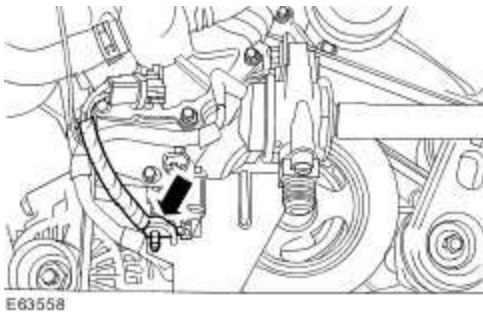
- 2 . Disconnect the AIR switching valve electrical connector.



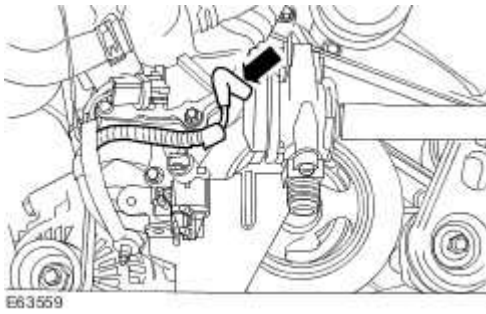
- 3 . Disconnect the AIR switching valve vacuum hoses.



- 4 . Detach the AIR wiring harness.



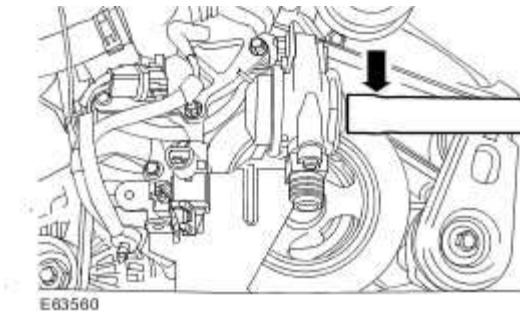
- 5 . Disconnect the AIR control valve vacuum hose.



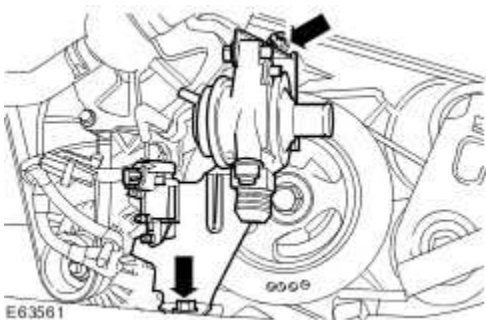
- 6 . **NOTE:**

Note the position of the timing marks on the AIR control valve and the AIR supply hose.

Disconnect the AIR supply hose.



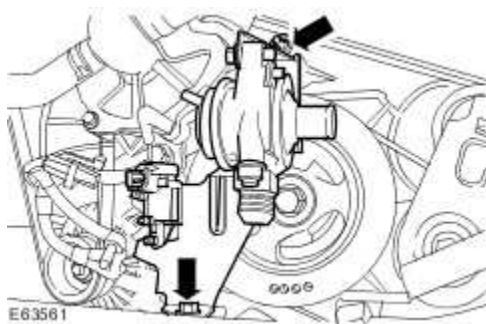
- 7 . Remove the AIR control valve and bracket assembly.



Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 8 Nm.



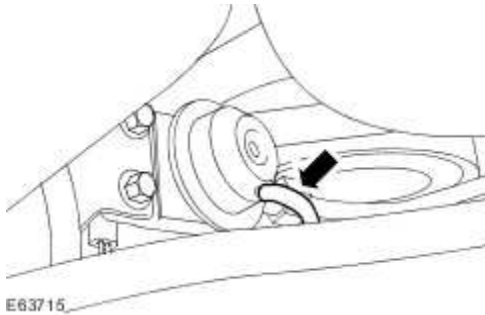
Secondary Air Injection (AIR) Control Valve - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8

Removal

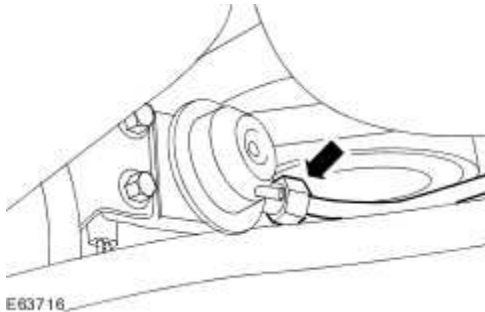
- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect

- 2 . Remove the air cleaner.
For additional information, refer to Air Cleaner (19.10.05)

- 3 . Disconnect the secondary air injection (AIR) control valve vacuum hose.

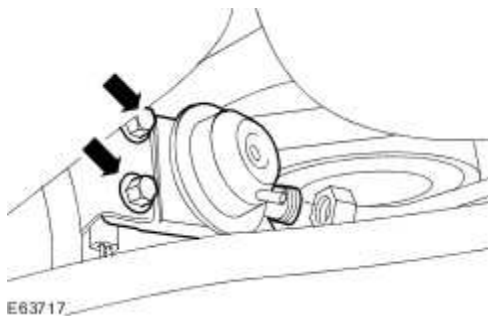


- 4 . Disconnect the AIR control valve to exhaust manifold tube.



- 5 . Reposition the AIR control valve downwards.

▶ Remove the AIR control valve retaining bolts.

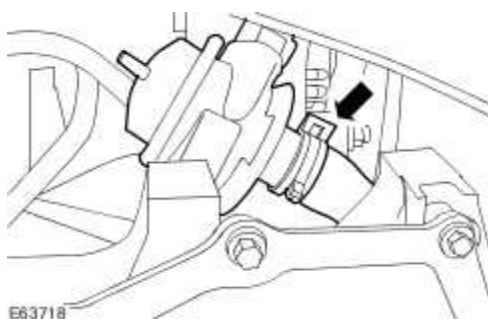


6 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

7 . Remove the AIR control valve.

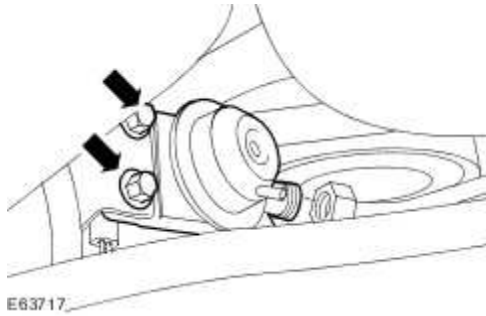
▶ Disconnect the AIR control valve supply hose.



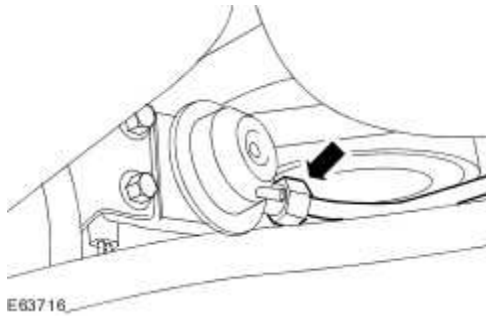
Installation

1 . To install, reverse the removal procedure.

▶ Tighten to 25 Nm.



2 . Tighten to 35 Nm.



3 **NOTE:**

For NAS vehicles only.

If required, carry out a short drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Short Drive Cycle Self-Test

Secondary Air Injection (AIR) Control Valve - 4.2L SC V8 - AJV8

Removal

- 1 . Disconnect the battery ground cable.

For additional information, refer to

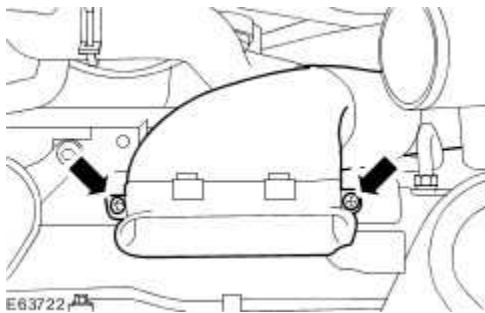
- 2 . Remove the radiator grille opening panel.

For additional information, refer to

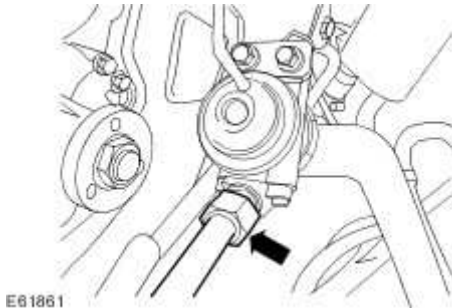
- 3 . Remove the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

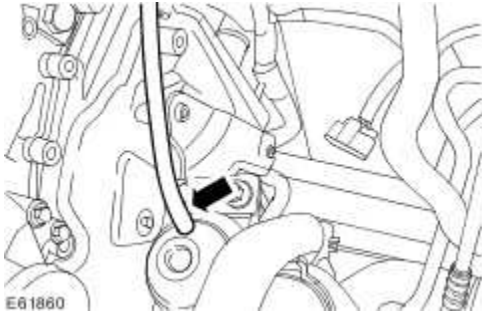
- 4 . Remove the air cleaner intake duct.



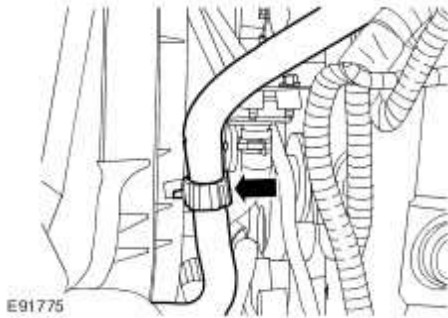
- 5 . Disconnect the secondary air injection (AIR) control valve to exhaust manifold tube.



- 6 . Disconnect the AIR control valve vacuum hose.



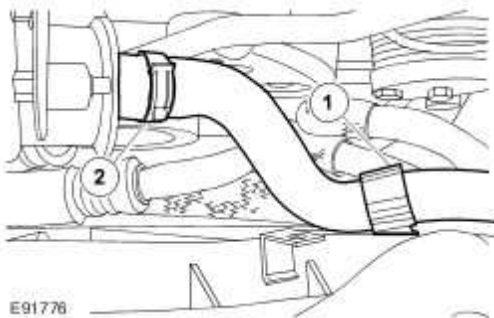
7 . Release the hose from the cooling fan motor and shroud.



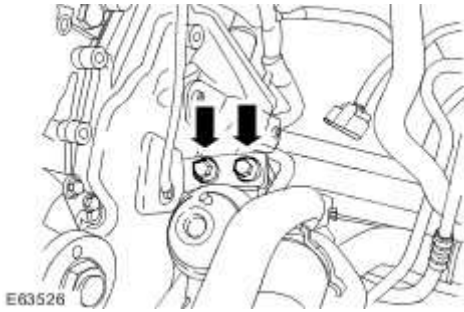
8 . Disconnect the AIR control valve air supply hose.

1) Release the hose from the cooling fan motor and shroud.

2) Disconnect the AIR control valve air supply hose.



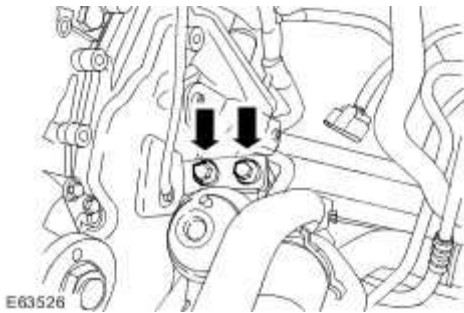
9 . Remove the AIR control valve.



Installation

- 1 . Install the AIR control valve.

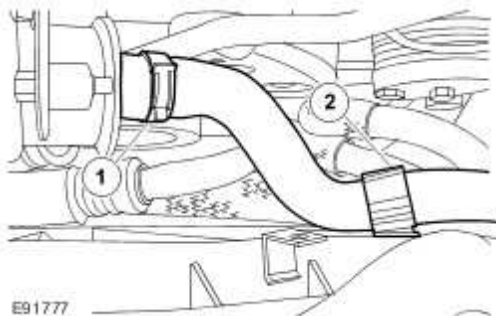
► Tighten to 25 Nm.



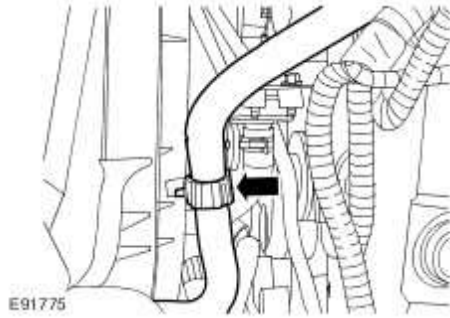
- 2 . Connect the AIR control valve air supply hose.

1) Connect the AIR control valve air supply hose.

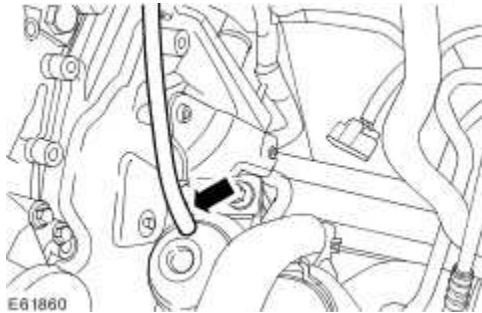
2) Secure the hose to the cooling fan motor and shroud.



3 . Secure the hose to the cooling fan motor and shroud.

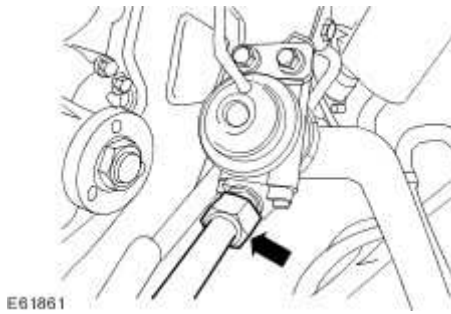


4 . Connect the AIR control valve vacuum hose.

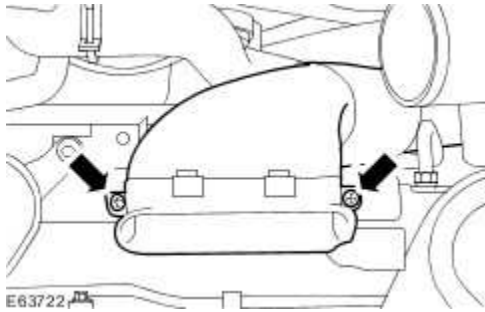


5 . Connect the AIR control valve to exhaust manifold tube.

► Tighten to 35 Nm.



6 . Install the air cleaner intake duct.



- 7 . Install the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

- 8 . Install the radiator grille opening panel.

For additional information, refer to

- 9 . Connect the battery ground cable.

For additional information, refer to

- 10 **NOTE:**

.

For NAS vehicles only.

If required, carry out a short drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Short Drive Cycle Self-Test

Secondary Air Injection (AIR) Control Valve to Exhaust Manifold Tube LH - 3.0L NA V6 - AJ27

Removal

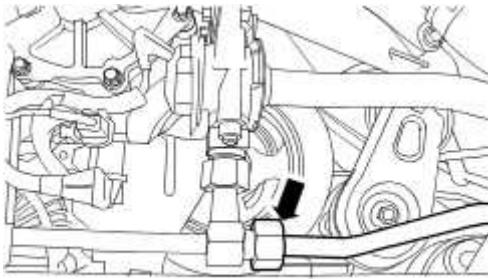
- 1 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

2 NOTE:

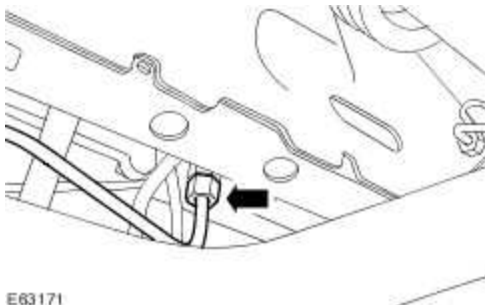
Note the position of the timing mark on the secondary air injection (AIR) control valve to exhaust manifold left-hand tube. The timing mark indicates the correct end of the AIR control valve to exhaust manifold left-hand tube that should be connected to the AIR control valve to exhaust manifold right-hand tube.

Disconnect the secondary air injection (AIR) control valve to exhaust manifold left-hand tube.



E63553

- 3 Remove the AIR control valve to exhaust manifold left-hand tube from the left-hand exhaust manifold.

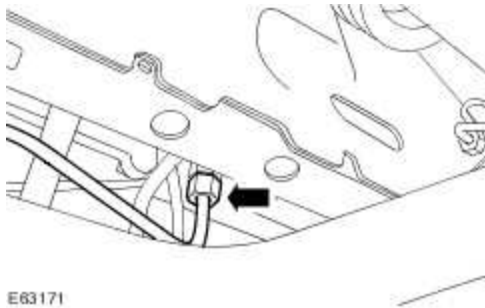


E63171

Installation

- 1 . To install, reverse the removal procedure.

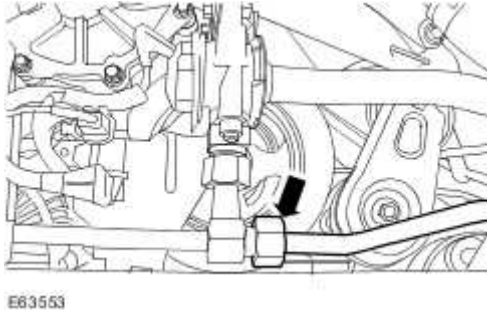
▶ Tighten to 35 Nm.



2 NOTE:

Make sure that the timing mark on the AIR control valve to exhaust manifold left-hand tube is correctly aligned.

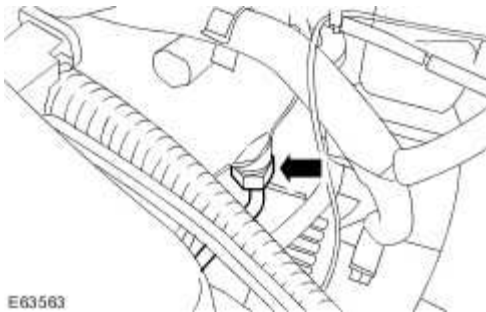
Tighten to 35 Nm.



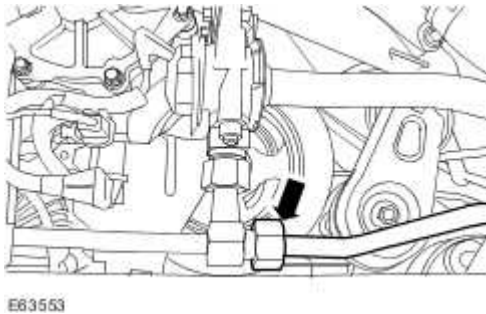
Secondary Air Injection (AIR) Control Valve to Exhaust Manifold Tube RH - 3.0L NA V6 - AJ27

Removal

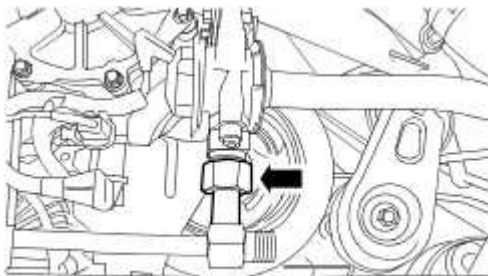
- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)
- 3 . Disconnect the secondary air injection (AIR) control valve to exhaust manifold right-hand tube from the right-hand exhaust manifold.



- 4 . Disconnect the AIR control valve to exhaust manifold left-hand tube.

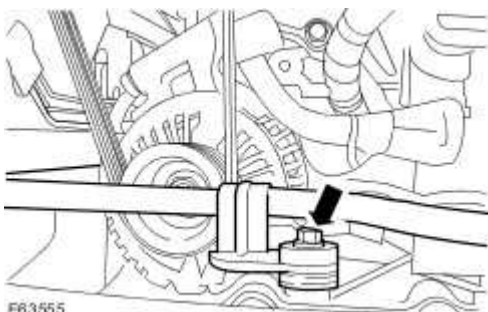


- 5 . Disconnect the AIR control valve to exhaust manifold right-hand tube.



E63554

6 . Remove the AIR control valve to exhaust manifold right-hand tube.

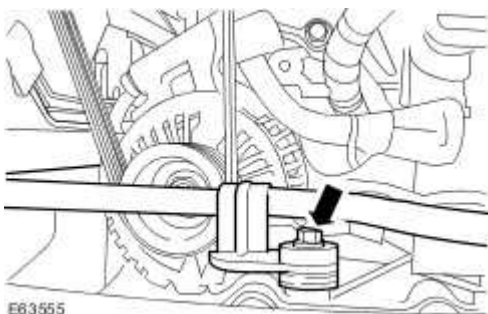


E63555

Installation

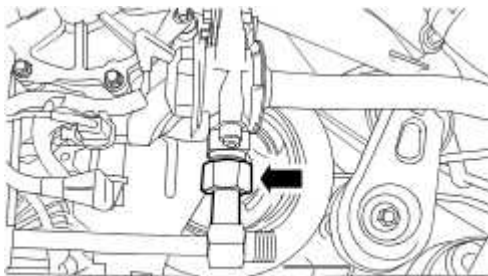
1 . To install, reverse the removal procedure.

► Tighten to 8 Nm.



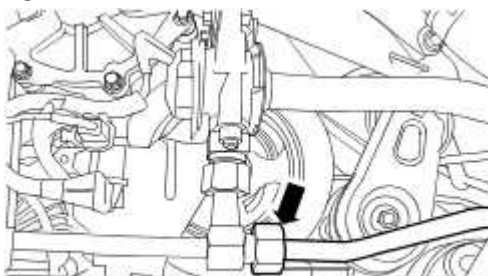
E63555

2 . Tighten to 35 Nm.



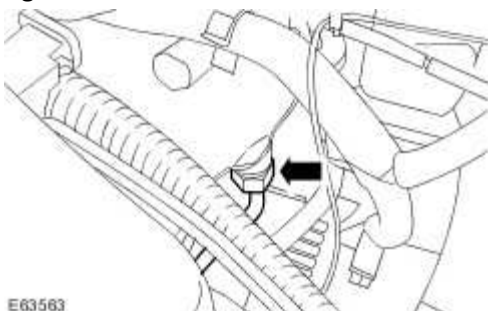
E63554

3 . Tighten to 35 Nm.



E63553

4 . Tighten to 35 Nm.




E63563

Secondary Air Injection (AIR) Control Valve to Exhaust Manifold Tube - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, 4.2L

Removal

Right-hand drive vehicles

- 1 . Center the steering wheel.

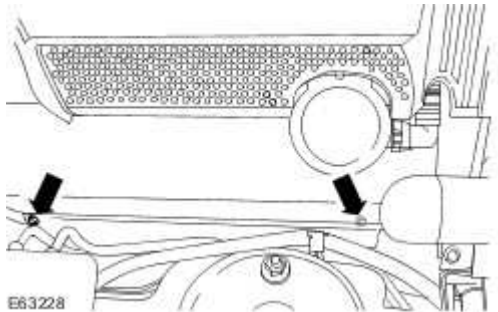
 Lock in position, remove the ignition key.

All vehicles

- 2 . Remove the cooling fan motor and shroud.

For additional information, refer to Cooling Fan Motor and Shroud (26.25.25)

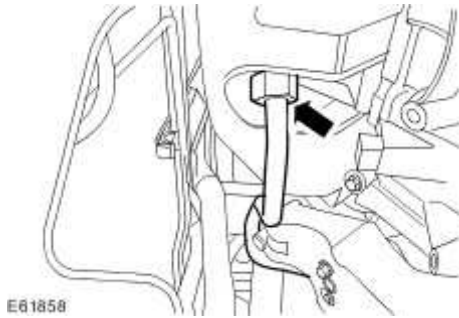
- 3 . Remove the right-hand exhaust manifold heat shield upper retaining bolts.



- 4 . Remove the air deflector.

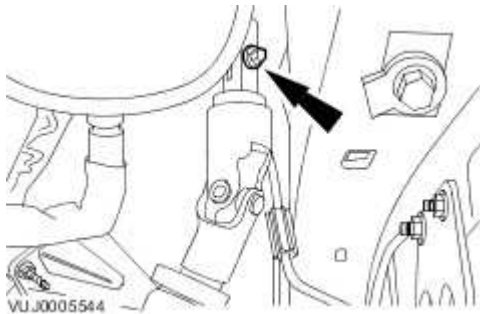
For additional information, refer to Air Deflector (76.11.41)

- 5 . Disconnect the secondary air injection (AIR) control valve to exhaust manifold tube from the left-hand exhaust manifold.



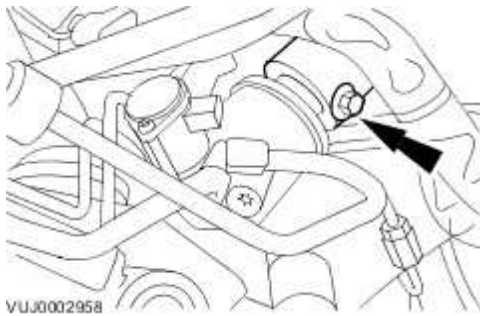
Right-hand drive vehicles

- 6 . Remove the steering gear coupling upper pinch bolt



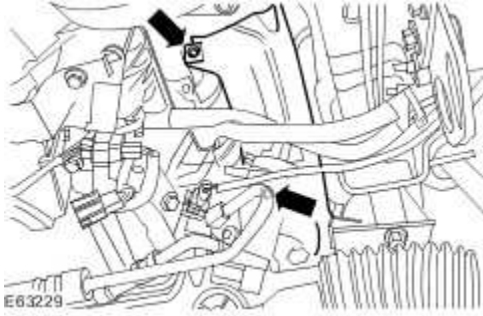
- 7 . Remove the steering gear coupling.

- ▶ Remove the steering gear coupling lower pinch bolt.

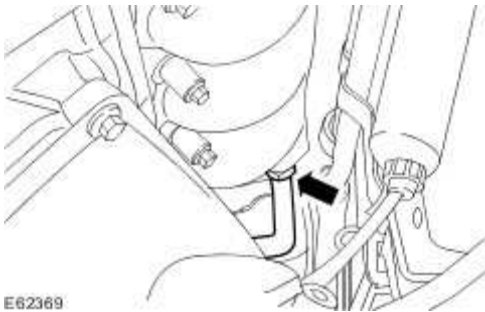


All vehicles

- 8 . Remove the right-hand heated oxygen sensor (HO2S).
For additional information, refer to Heated Oxygen Sensor (HO2S)
- 9 . Remove the right-hand exhaust manifold heat shield.

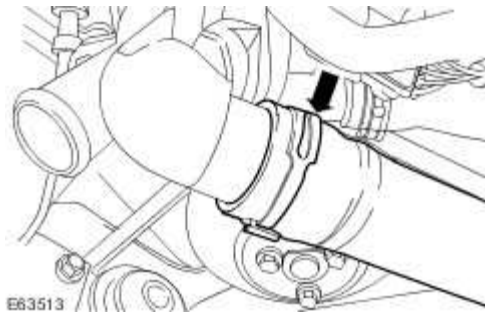


- 10 . Disconnect the AIR control valve to exhaust manifold tube from the right-hand exhaust manifold.



- 11 . Lower the vehicle.

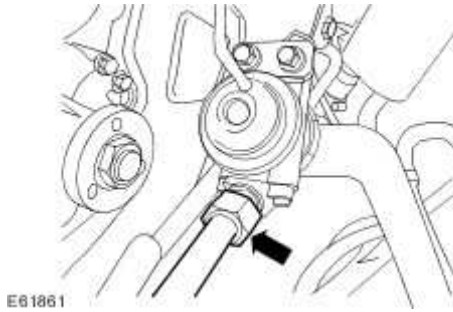
- 12 . Disconnect the coolant hose.



- 13 . **NOTE:**

Vehicles with supercharger shown, vehicles without supercharger similar.

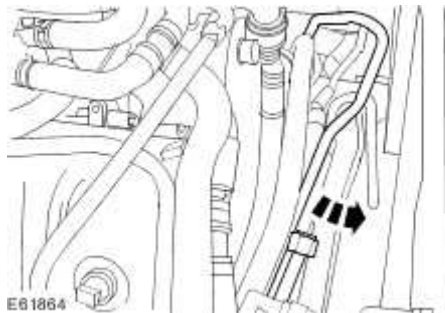
Disconnect the AIR control valve to exhaust manifold tube.



14 . NOTE:

Vehicles with supercharger shown, vehicles without supercharger similar.

Remove the AIR control valve to exhaust manifold tube.



Installation

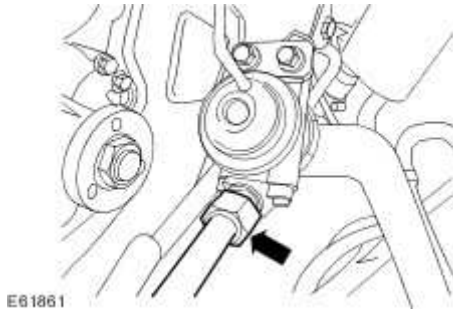
All vehicles

1 . NOTE:

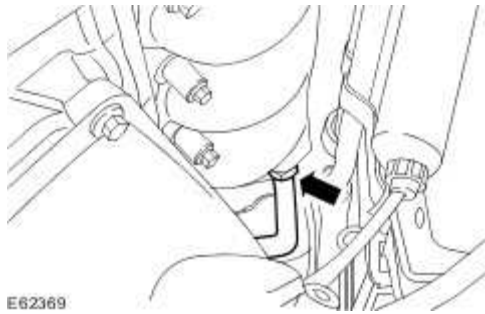
Vehicles with supercharger shown, vehicles without supercharger similar.

To install, reverse the removal procedure.

▶ Tighten to 35 Nm.



2 . Tighten to 35 Nm.

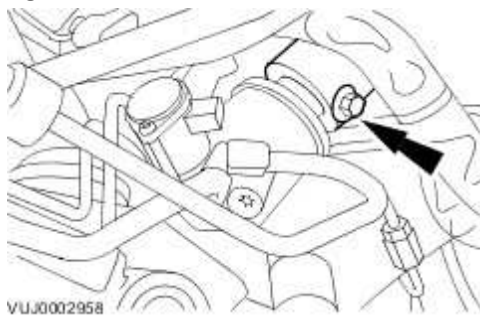


3 . Tighten to 3 Nm.

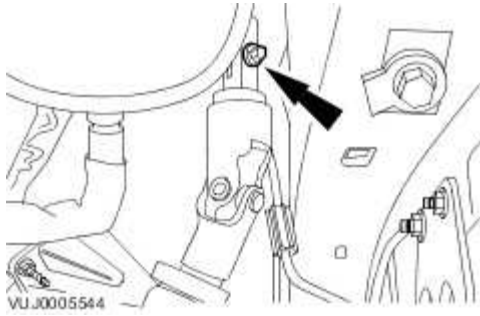


Right-hand drive vehicles

4 . Tighten to 35 Nm.

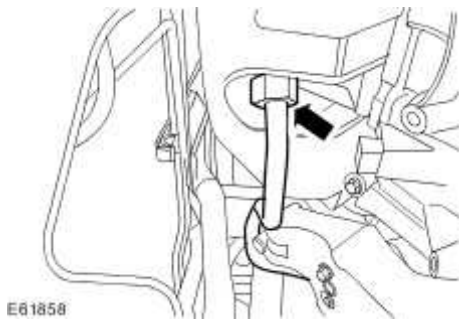


5 . Tighten to 35 Nm.

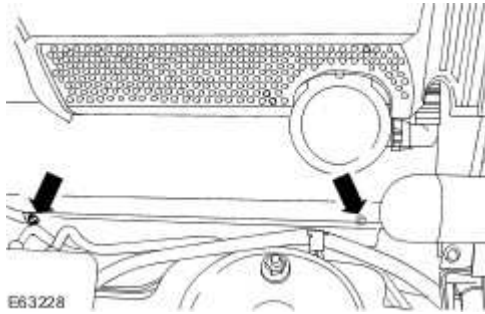


All vehicles

6 . Tighten to 35 Nm.



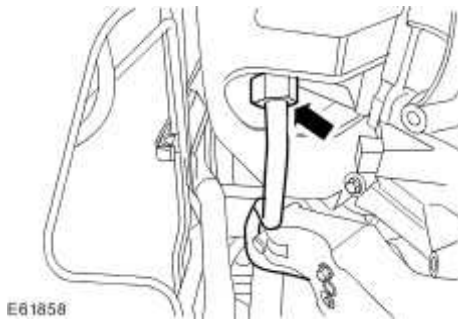
7 . Tighten to 3 Nm.



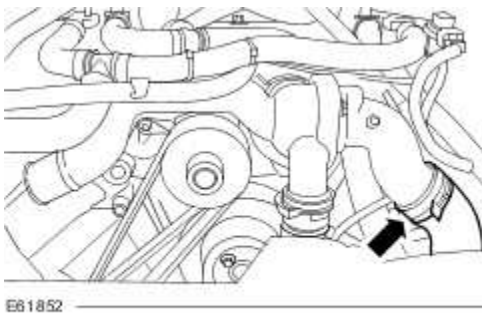
Secondary Air Injection (AIR) Control Valve to Exhaust Manifold Tube - 4.2L SC V8 - AJV8, 4.2L

Removal

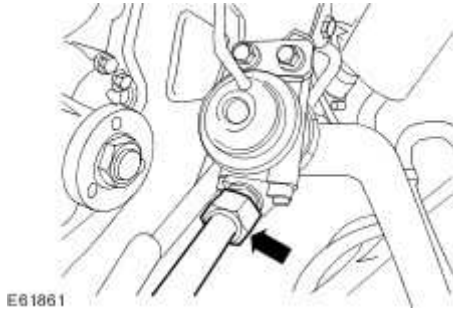
- 1 . Remove the cooling fan motor and shroud.
For additional information, refer to Cooling Fan Motor and Shroud (26.25.25)
- 2 . Raise the vehicle.
- 3 . Disconnect the secondary air injection (AIR) control valve to exhaust manifold tube from the left-hand exhaust manifold.



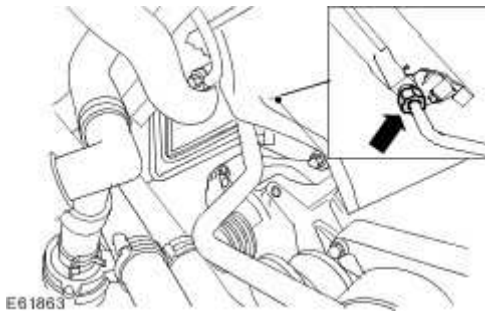
- 4 . Lower the vehicle.
- 5 . Disconnect the coolant hose.



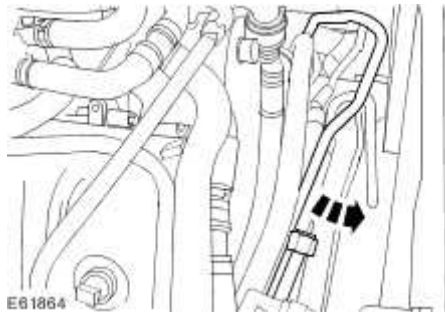
6 . Disconnect the AIR control valve to exhaust manifold tube.



7 Disconnect the AIR control valve to exhaust manifold tube from the right-hand exhaust manifold.



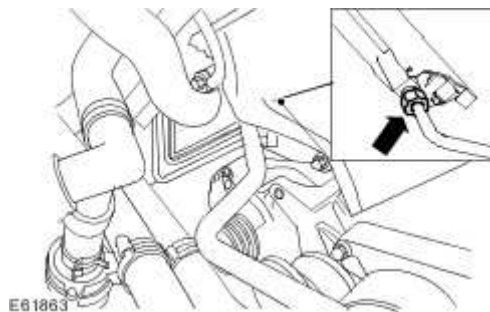
8 . Remove the AIR control valve to exhaust manifold tube.



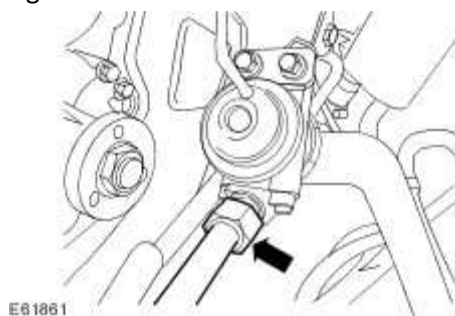
Installation

1 . To install, reverse the removal procedure.

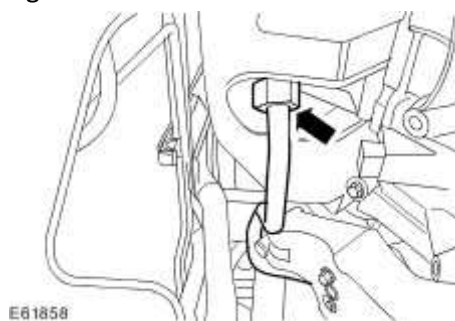
► Tighten to 35 Nm.



2 . Tighten to 35 Nm.



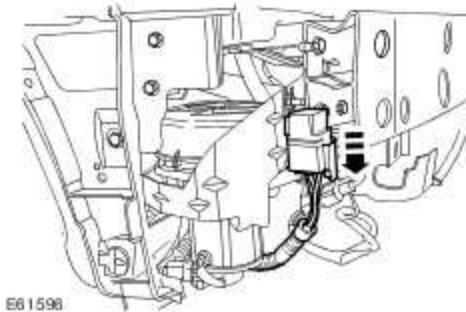
3 . Tighten to 35 Nm.



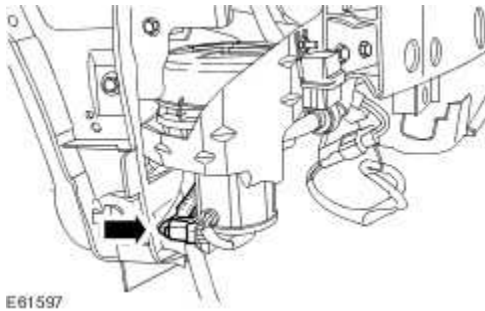
Secondary Air Injection (AIR) Pump

Removal

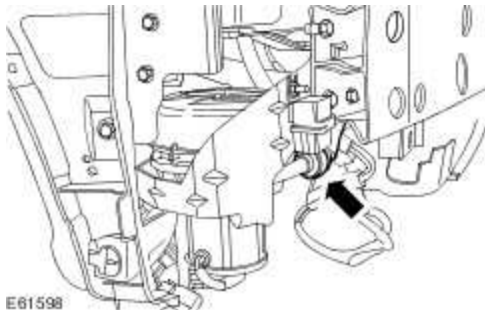
- 1 Remove the front bumper cover.
 - For additional information, refer to Front Bumper Cover - VIN Range: G00442->H18679 (76.22.78)
- 2 . Disconnect the secondary air pump relay electrical connector.



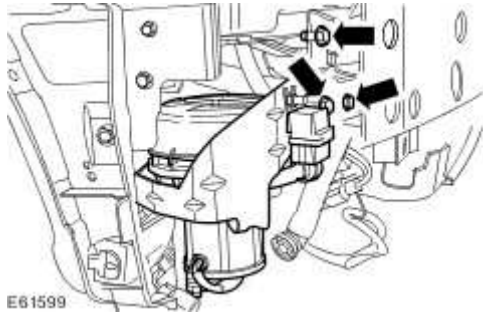
- 3 . Disconnect the secondary air pump electrical connector.



- 4 . Disconnect the secondary air pump hose.



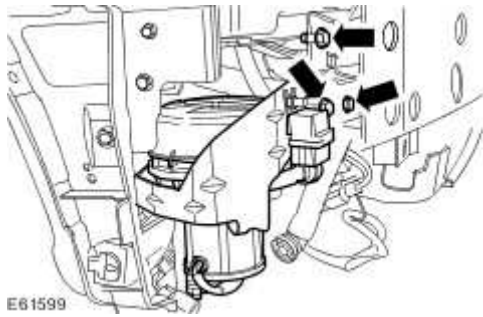
- 5 . Remove the secondary air pump.



Installation

- 1 . To install, reverse the removal procedure.

▶ Tighten to 20 Nm.



2 NOTE:

For NAS vehicles only.

If required, carry out a short drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Short Drive Cycle Self-Test

303-08B : Engine Emission Control – 2.7L V6 – TdV6

Specifications

Specifications

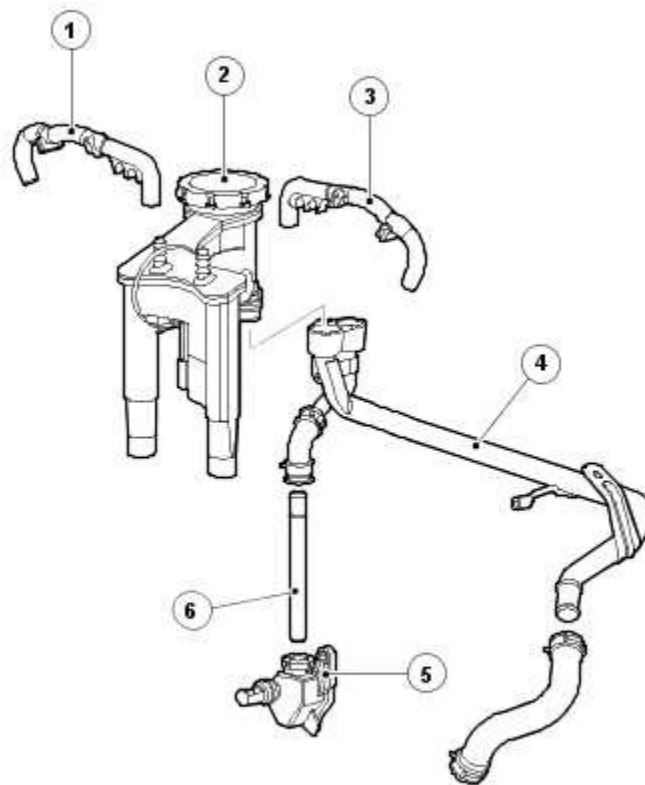
Torque Specifications

Description	Nm	lb-ft	lb-in
Exhaust gas recirculation (EGR) valve to cylinder head retaining bolts	10	–	89
EGR valve to EGR cooler retaining bolts	10	–	89
EGR valve tube to exhaust manifold retaining bolts	10	–	89
EGR valve cooler mounting bracket retaining bolt	10	–	89
EGR valve outlet tube to EGR valve retaining bolts	10	–	89
EGR valve outlet tube to timing cover retaining bolt	5	–	44
Fuel filter mounting bracket retaining 10 mm bolt	25	18	–
Fuel filter mounting bracket retaining 6 mm bolt	10	–	89

Engine Emission Control

Crankcase Ventilation

The crankcase ventilation system on the 2.7L Diesel ensures that all gases emitted from the crankcase during engine running are separated from any oil particles.



E66813

Item	Part Number	Description
1		Left-hand breather tube
2		Crankcase vent oil seperator
3		Right-hand breather tube

4		Crankcase oil return tube
5		Crankcase oil return valve
6		Oil return tube

Crankcase ventilation is by a cyclone separator. The oil separator is constructed from a plastic composite material. The oil separator is located between the 'V' at the back of the engine block by means of three seals. The oil separator contains a diaphragm and spring which opens under intake vacuum.

The ventilation systems first chamber is a horizontal void cavity fed by eight points. Once primary separation is complete, the partially cleaned vapor is sucked through a cyclone where the process further reduces the oil content. Prior to the vapor entering the air supply at the compressor, a diaphragm pressure balance valve operates to minimize the crankcase pressure variations caused by engine air demand and service condition.

Due to the shape and design of the cyclone unit, the oil and vapor are separated more effectively. Vapor is directed into the inlet system and the heavier oil drains back into the engine.

Exhaust Emission Control

The exhaust of a diesel engine contains the following pollutants:

Carbon Monoxide (CO)

Hydrocarbons (HC)

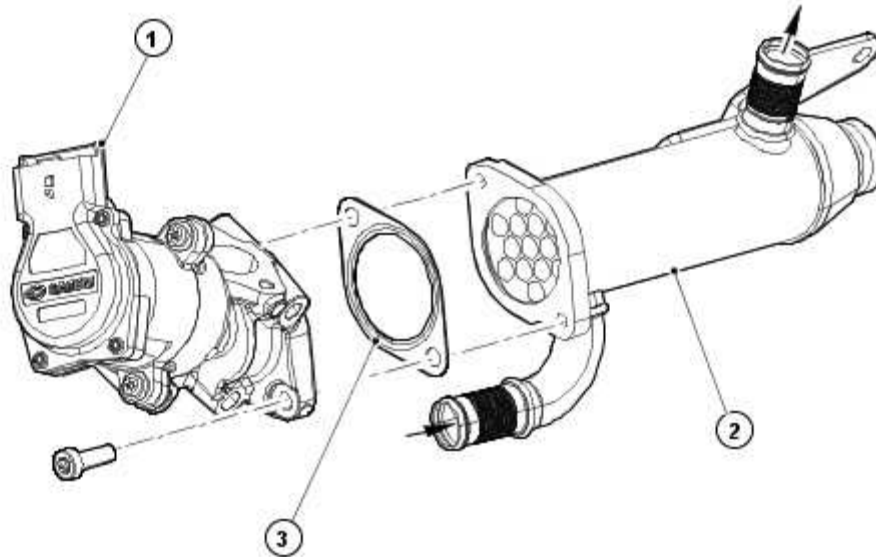
Particulates

Oxides of Nitrogen (NOx)

These pollutants are primarily produced as a result of incomplete combustion of the fuel.

The particulates in the exhaust gases consist of pure carbon and various compounds such as metal oxide and sulphur.

Exhaust Gas Re-Circulation



E52628

Item	Part Number	Description
1		Exhaust gas recirculation (EGR) valve
2		EGR cooler
3		Gasket

The exhaust gas re-circulation (EGR) system is fitted to the engine in order to reduce the amount of nitrogen oxide (NO_x). This is done by reducing the temperature of the combustion process by introducing some waste exhaust gases into the inlet manifold. The effect of this is that there is a depletion of oxygen which reduces the temperature of the combustion process and in turn reduces the amount of NO_x produced.

The engine control module (ECM) will determine the amount of EGR operation depending on the engine rpm, intake air temperature, coolant temperature and fuel flow rate. The amount of exhaust gas being recirculated is measured by a combination of position sensing of the valves and a mass air flow (MAF) sensor.

The EGR valves are operated through their full range at each engine start-up. This is to clear any carbon deposits that may have built up whilst the engine was running.

The EGR system is continually monitored for faults. Depending on how the system fails, the ECM will dictate whether the malfunction indication light (MIL) is on or off. In the event of a failure of the EGR system, the ECM will use substitute values and the EGR function will become inoperative.

The EGR cooler is connected to the vehicle cooling system via hoses and is there to cool the exhaust gases being recirculated.

The EGR valve and cooler are supplied as separate components. The EGR valve itself should not be disassembled.

Engine Emission Control

Principle of operation

Exhaust gas recirculation (EGR)

The EGR system recycles exhaust gases back through the combustion process to reduce NOx emissions.

By introducing this gas into the air intake, oxygen content and combustion temperatures are reduced, which reduces the NOx emissions.

High EGR flow is necessary during cruising and mid-range acceleration, when combustion temperatures are typically very high, while lower EGR flow is needed during low speed and light load conditions.

No EGR flow should occur during conditions when it could adversely affect engine operating efficiency or vehicle driveability, such as engine warm-up, idle, etc.

The EGR function of the 2.7 L engine is managed by the engine control module (ECM), which controls the operation of stepper motors, allowing precise control of the EGR valve actuators.

The ECM determines the optimum EGR flow using inputs from sensors in the engine management system, including the mass air flow meters, coolant temperature sensor, and intake air temperature sensor.

Positive crankcase ventilation

The crankcase ventilation system uses the depression created in the air intake to draw vapors from the crankcase through the engine where they are burnt with the fuel/air charge.

By doing this, any build-up of pressure inside the crankcase is avoided, reducing blow-by and potential oil leakage problems, while still reducing emissions into the atmosphere.

The 2.7 L engine crankcase ventilation is through a cyclone separator mounted in the engine 'V'.

The separator consists of a diaphragm and spring inside the casing which respond to crankcase pressure variations and separate the oil from the vapor, allowing the oil back into the engine while the vapor is directed to the intake system.

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

Inspection and verification

1 . Verify the customer concern.

2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Engine breather hoses Cyclone separator EGR Pipes (check for cracks)	Electrical connections to the stepper motor(s) Stepper motor(s) Harnesses Mass air flow (MAF) sensors Manifold absolute pressure (MAP) sensor Intake air temperature (IAT) sensor Intake air shutoff throttle Engine control module (ECM)

3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC index, or the symptom chart if no DTCs are set.

Symptom chart

Symptom	Possible source	Action
Difficult to start	EGR valve stuck open	Inspect the system (see visual inspection). Check for DTCs.
Poor idle quality	EGR valve stuck open	Inspect the system (see visual inspection). Check for DTCs.
Lack of power when accelerating	EGR valve stuck open	Inspect the system (see visual inspection). Check for DTCs.
Engine stops/stalls	EGR valve stuck	Inspect the system (see visual inspection). Check for

	open	DTCs.
Excessive fuel consumption	EGR valve stuck open	Inspect the system (see visual inspection). Check for DTCs.
Excessive black smoke	EGR valve stuck open	Inspect the system (see visual inspection). Check for DTCs.
Excessive emissions	EGR system not operating	Inspect the system (see visual inspection). Check for DTCs.
Loud 'ticking' noise with engine running	EGR pipes cracked	Closely inspect the pipes for cracks (particularly at the corrugated sections).
Excessive blow-by	Crankcase ventilation system restricted	Inspect the hoses. Check each hose for restriction/blockage by gently blowing through. Check for blockage of the separator.
Engine oil leaks	Crankcase ventilation system restricted	Inspect the hoses. Check each hose for restriction/blockage by gently blowing through. Check for blockage of the separator.

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of powertrain DTCs,
Electronic Engine Controls

DTC	Condition	Possible source	Action
P040100	Exhaust gas recirculation (EGR) insufficient flow detected	EGR valve incorrectly fitted or loose EGR pipe blocked	Check pipework for restriction. Check the mechanical function of the throttle valve. For EGR actuator and circuit tests, GO to Pinpoint Test G552800p2.

		<p>EGR valve stuck closed, blocked</p> <p>EGR valve failure</p> <p>MAF sensor fault</p>	<p>and GO to Pinpoint Test G552800p4.</p> <p>For MAF sensor circuit tests, Electronic Engine Controls</p>
P040200	Exhaust gas recirculation (EGR) excessive flow detected	<p>EGR valve incorrectly fitted or loose</p> <p>EGR pipe blocked</p> <p>EGR valve stuck closed, blocked</p> <p>EGR valve failure</p> <p>MAF sensor fault</p>	<p>Check pipework for restriction. Check the mechanical function of the throttle valve. For EGR actuator and circuit tests, GO to Pinpoint Test G552800p2. and GO to Pinpoint Test G552800p4.</p> <p>For MAF sensor circuit tests, Electronic Engine Controls</p>
P040300	Exhaust gas recirculation (EGR) valve H-bridges (right hand bank)	<p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>EGR valve failure</p> <p>ECM failure</p>	<p>For EGR actuator and circuit tests, GO to Pinpoint Test G552800p2.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P040400	Exhaust gas recirculation (EGR) control circuit range/performance (right hand bank)	<p>IAT sensor fault</p> <p>MAP sensor fault</p> <p>MAF sensor fault</p> <p>EGR valve stuck closed, blocked</p> <p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to</p>	<p>For IAT, MAP and MAF sensor circuit tests, Electronic Engine Controls For right hand bank EGR valve and circuit tests, GO to Pinpoint Test G552800p2.</p>

		power EGR valve failure	
P040500	Exhaust gas recirculation (EGR) valve circuit low (right hand bank)	EGR valve circuit(s): high resistance EGR valve circuit(s): short circuit to ground EGR valve failure	For EGR sensor and circuit tests, GO to Pinpoint Test G552800p2.
P040600	Exhaust gas recirculation (EGR) valve circuit high (right hand bank)	EGR valve circuit(s): short circuit to power EGR valve failure	For EGR sensor and circuit tests, GO to Pinpoint Test G552800p2.
P040700	Exhaust gas recirculation (EGR) - intake air shutoff throttle circuit low	Intake air shutoff throttle circuit(s): high resistance Intake air shutoff throttle circuit(s): short circuit to ground Intake air shutoff throttle failure	For intake air shutoff throttle and circuit tests, GO to Pinpoint Test G552800p1.
P040800	Exhaust gas recirculation (EGR) - intake air shutoff throttle circuit high	Intake air shutoff throttle circuit(s): short circuit to power Intake air shutoff throttle failure	For intake air shutoff throttle and circuit tests, GO to Pinpoint Test G552800p1.
P048700	Exhaust gas recirculation (EGR) valve H-bridges (left hand bank)	EGR valve circuit(s): high resistance EGR valve circuit(s): short circuit to ground EGR valve circuit(s): short circuit to power EGR valve failure	For EGR sensor and circuit tests, GO to Pinpoint Test G552800p4. Refer to the warranty policy and procedure manual if an ECM is suspect.

		ECM failure	
P133400	Exhaust gas recirculation (EGR) - intake air shutoff throttle minimum/maximum stop performance	<p>EGR valve stuck/sticking</p> <p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>Intake air shut off throttle stuck/sticking</p> <p>Intake air shut off throttle circuit(s): high resistance</p> <p>Intake air shut off throttle circuit(s): short circuit to ground</p> <p>Intake air shut off throttle circuit(s): short circuit to power</p> <p>Intake air shut off throttle failure</p> <p>ECM failure</p>	<p>For intake air shutoff throttle and circuit tests, GO to Pinpoint Test G552800p1.</p> <p>For EGR actuator and circuit tests, GO to Pinpoint Test G552800p2. and GO to Pinpoint Test G552800p4.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P140A00	Exhaust gas recirculation (EGR) valve circuit low (left hand bank)	<p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve failure</p>	<p>For EGR actuator and circuit tests, GO to Pinpoint Test G552800p4.</p>
P140B00	Exhaust gas recirculation (EGR) valve circuit high (left hand	EGR valve circuit(s): short circuit to	For EGR actuator and circuit tests, GO to Pinpoint Test

	bank)	power EGR valve failure	G552800p4.
P140C00	Exhaust gas recirculation (EGR) - intake air shutoff throttle H bridges	Intake air shutoff throttle circuit(s): high resistance Intake air shutoff throttle circuit(s): short circuit to ground Intake air shutoff throttle circuit(s): short circuit to power Intake air shutoff throttle failure ECM failure	For intake air shutoff throttle and circuit tests, GO to Pinpoint Test G552800p1. Refer to the warranty policy and procedure manual if an ECM is suspect.
P140D00	Exhaust gas recirculation (EGR) control circuit range/performance (left hand bank)	IAT sensor fault MAP sensor fault MAF sensor fault EGR valve stuck closed, blocked EGR valve circuit(s): high resistance EGR valve circuit(s): short circuit to ground EGR valve circuit(s): short circuit to power EGR valve failure	For IAT, MAP and MAF sensor circuit tests, Electronic Engine Controls For EGR actuator and circuit tests, GO to Pinpoint Test G552800p4.
P140E00	Exhaust gas recirculation (EGR) valve circuit adaption (left hand bank)	EGR valve circuit(s): high resistance EGR valve circuit(s): short circuit to	For EGR actuator and circuit tests, GO to Pinpoint Test G552800p4. Refer to the warranty policy and procedure manual if an ECM is

		<p>ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>EGR valve failure</p> <p>ECM failure</p>	suspect.
P141A00	Exhaust gas recirculation (EGR) valve circuit intermittent/erratic (right hand bank)	<p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>EGR valve failure</p> <p>ECM failure</p>	<p>For EGR actuator and circuit tests, GO to Pinpoint Test G552800p2.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P141B00	Exhaust gas recirculation (EGR) - intake air shutoff throttle circuit intermittent/erratic	<p>Intake air shutoff throttle circuit(s): high resistance</p> <p>Intake air shutoff throttle circuit(s): short circuit to ground</p> <p>Intake air shutoff throttle circuit(s): short circuit to power</p> <p>Intake air shutoff throttle failure</p> <p>ECM failure</p>	<p>For intake air shutoff throttle and circuit tests, GO to Pinpoint Test G552800p1.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P141C00	Exhaust gas recirculation (EGR) valve circuit intermittent/erratic (left hand bank)	<p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p>	<p>For EGR actuator and circuit tests, GO to Pinpoint Test G552800p4.</p> <p>Refer to the warranty policy and procedure manual if an ECM is</p>

		<p>EGR valve circuit(s): short circuit to power</p> <p>EGR valve failure</p> <p>ECM failure</p>	suspect.
P141D00	Exhaust gas recirculation (EGR) valve circuit adaption (right hand bank)	<p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>EGR valve failure</p> <p>ECM failure</p>	<p>For EGR actuator and circuit tests, GO to Pinpoint Test G552800p2.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P214100	Exhaust gas recirculation (EGR) - intake air shutoff throttle control deviation below minimum threshold	<p>EGR valve stuck/sticking</p> <p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>Intake air shutoff throttle stuck/sticking</p> <p>Intake air shutoff throttle circuit(s): high resistance</p> <p>Intake air shutoff throttle circuit(s): short circuit to ground</p>	<p>For intake air shutoff throttle and circuit tests, GO to Pinpoint Test G552800p1.</p> <p>For EGR actuator and circuit tests, GO to Pinpoint Test G552800p2.</p> <p>and GO to Pinpoint Test G552800p4.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>

		<p>Intake air shutoff throttle circuit(s): short circuit to power</p> <p>Intake air shutoff throttle failure</p> <p>ECM failure</p>	
P214200	Exhaust gas recirculation (EGR) - intake air shutoff throttle control deviation above maximum threshold	<p>EGR valve stuck/sticking</p> <p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>Intake air shutoff throttle stuck/sticking</p> <p>Intake air shutoff throttle circuit(s): high resistance</p> <p>Intake air shutoff throttle circuit(s): short circuit to ground</p> <p>Intake air shutoff throttle circuit(s): short circuit to power</p> <p>Intake air shutoff throttle failure</p> <p>ECM failure</p>	<p>For intake air shutoff throttle and circuit tests, GO to Pinpoint Test G552800p1.</p> <p>For EGR actuator and circuit tests, GO to Pinpoint Test G552800p2. and GO to Pinpoint Test G552800p4.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>

Pinpoint Tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

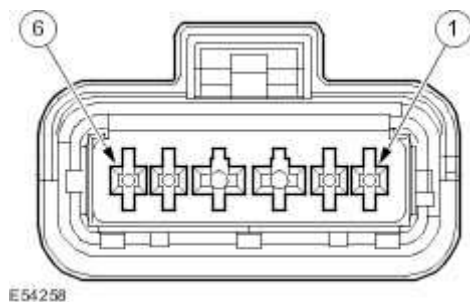
NOTE:

If DTCs are recorded and a fault is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

PINPOINT TEST G552800p1 : INTAKE AIR SHUTOFF THROTTLE ACTUATOR

G552800t1 : CHECK THE INTAKE AIR SHUTOFF THROTTLE SENSOR RETURN CIRCUIT

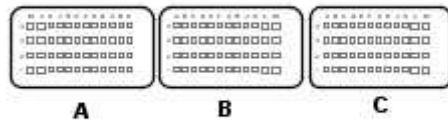
1.



Circuit	Pin
---------	-----

Signal from ECM	02
Ground from ECM	01
Power from ECM	06

2.



E54251

Circuit	Pin
Intake air throttle - signal	E1
Intake air throttle - ground	F2
Intake air throttle - power	F1

3. Key off. 4. Disconnect the intake air throttle connector, C39. 5. Key on, engine off. 6. Measure the resistance between:

C39, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552800t2.

-> No

GO to Pinpoint Test G552800t14.

G552800t2 : CHECK THE POWER SUPPLY TO THE INTAKE AIR SHUTOFF THROTTLE

1. Measure the voltage between:

C39, harness side	Battery
Pin 06	Negative terminal

Is the voltage between 4.8 and 5.2 volts?

-> **Yes**

GO to Pinpoint Test G552800t3.

-> **No**

GO to Pinpoint Test G552800t11.

G552800t3 : CHECK THE INTAKE AIR SHUTOFF THROTTLE SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C39, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552800t4.

-> **No**

GO to Pinpoint Test G552800t7.

G552800t4 : CHECK THE INTAKE AIR SHUTOFF THROTTLE SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C39, harness side	Battery
--------------------------	----------------

Pin 02	Positive terminal
--------	-------------------

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t5.

-> No

GO to Pinpoint Test G552800t9.

G552800t5 : CHECK THE INTAKE AIR SHUTOFF THROTTLE SIGNAL CIRCUIT FOR SHORT CIRCUIT TO SENSOR POWER

1. Measure the resistance between:

C39, harness side	C39, harness side
Pin 02	Pin 06

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t6.

-> No

GO to Pinpoint Test G552800t10.

G552800t6 : CHECK THE INTAKE AIR SHUTOFF THROTTLE SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C39, harness side	C100, harness side
Pin 02	Pin E1

Is the resistance less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Intake air shutoff throttle connector - ECM connector - Intake air shutoff throttle - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t7 : CHECK THE SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

C39, harness side	C39, harness side
Pin 02	Pin 01

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552800t8.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t8 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C39, harness side	C39, harness side
Pin 02	Pin 01

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following

component(s): - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t9 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C39, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t10 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C39, harness side	C39, harness side
Pin 02	Pin 06

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t11 : CHECK THE SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C39, harness side	Battery
Pin 06	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552800t12.

-> **No**

GO to Pinpoint Test G552800t17.

G552800t12 : CHECK THE SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C39, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552800t13.

-> **No**

GO to Pinpoint Test G552800t19.

G552800t13 : CHECK THE INTAKE AIR SHUTOFF THROTTLE SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C39, harness side	C100, harness side
Pin 06	Pin F1

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

-> No

REPAIR the high resistance. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t14 : CHECK THE INTAKE AIR SHUTOFF THROTTLE RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C39, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t15.

-> No

GO to Pinpoint Test G552800t20.

G552800t15 : CHECK THE SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C39, harness side	C39, harness side
Pin 06	Pin 01

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t16.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t16 : CHECK THE INTAKE AIR SHUTOFF THROTTLE RETURN CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

C39, harness side	C100, harness side
Pin 01	Pin F2

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

-> No

REPAIR the high resistance. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t17 : CHECK THE SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C39, harness side	C39, harness side
Pin 06	Pin 01

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552800t18.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t18 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

C39, harness side	Battery
Pin 06	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t19 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C39, harness side	Battery
Pin 06	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t20 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C39, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

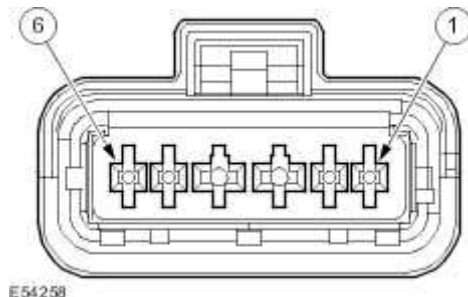
-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552800p2 : RIGHT HAND BANK EGR ACTUATOR

G552800t55 : CHECK THE RIGHT HAND BANK EGR ACTUATOR RETURN CIRCUIT

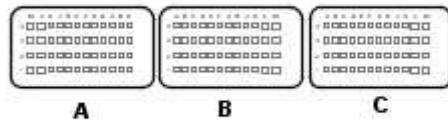
1.



Circuit	Pin
----------------	------------

Signal from ECM	02
Ground from ECM	04
Power from ECM	03

2.



E54251

Circuit	Pin
EGR actuator - signal	A3
EGR actuator - ground	H2
EGR actuator - power	H1

3. Key off. 4. Disconnect the EGR actuator connector, C70. 5. Key on, engine off. 6. Measure the resistance between:

C70, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552800t51.

-> No

GO to Pinpoint Test G552800t54.

G552800t51 : CHECK THE POWER SUPPLY TO THE EGR ACTUATOR

1. Measure the voltage between:

C70, harness side	Battery
Pin 03	Negative terminal

Is the voltage between 4.8 and 5.2 volts?

-> **Yes**

GO to Pinpoint Test G552800t21.

-> **No**

GO to Pinpoint Test G552800t50.

G552800t21 : CHECK THE EGR ACTUATOR SIGNAL CIRCUIT FOR A SHORT CIRCUIT TO GROUND

1. Key off. 2. Disconnect the EGR actuator connector, C70. 3. Key on, engine off. 4. Measure the resistance between:

C70, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552800t22.

-> **No**

GO to Pinpoint Test G552800t24.

G552800t22 : CHECK THE EGR ACTUATOR SIGNAL CIRCUIT FOR A SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C70, harness side	Battery
--------------------------	----------------

Pin 02	Positive terminal
--------	-------------------

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t23.

-> No

GO to Pinpoint Test G552800t25.

G552800t23 : CHECK THE EGR ACTUATOR SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C70, harness side	C101, harness side
Pin 02	Pin A3

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ETV connector - ECM connector - ETV - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t24 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C70, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t25 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C70, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t50 : CHECK THE SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C70, harness side	Battery
Pin 03	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552800t52.

-> **No**

GO to Pinpoint Test G552800t61.

G552800t52 : CHECK THE SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C70, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552800t53.

-> **No**

GO to Pinpoint Test G552800t62.

G552800t53 : CHECK THE SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C70, harness side	C101, harness side
Pin 03	Pin H1

Is the resistance less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t61 : CHECK THE SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C70, harness side	C70, harness side
Pin 04	Pin 03

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t60.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t60 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

C70, harness side	Battery
Pin 03	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t62 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C70, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t54 : CHECK THE EGR ACTUATOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C70, harness side	Battery
Pin 04	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t56.

-> No

GO to Pinpoint Test G552800t58.

G552800t56 : CHECK THE SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C70, harness side	C70, harness side
Pin 04	Pin 03

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t59.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t59 : CHECK THE EGR ACTUATOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

C70, harness side	C101, harness side
Pin 04	Pin H2

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t58 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C70, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

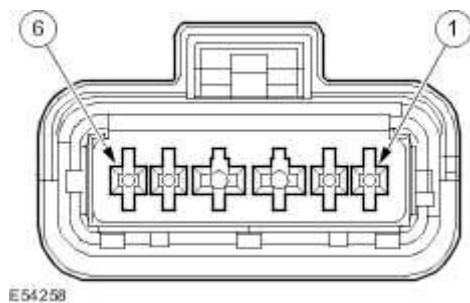
-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552800p4 : LEFT HAND BANK EGR ACTUATOR

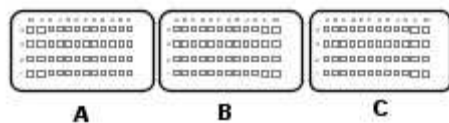
G552800t26 : CHECK THE LEFT HAND BANK EGR ACTUATOR RETURN CIRCUIT

1.



Circuit	Pin
Signal from ECM	02
Ground from ECM	04
Power from ECM	03

2.



Circuit	Pin
---------	-----

EGR actuator - signal	A2
EGR actuator - ground	K1
EGR actuator - power	J1

3. Key off. 4. Disconnect the EGR actuator connector, C71. 5. Key on, engine off. 6. Measure the resistance between:

C71, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552800t27.

-> No

GO to Pinpoint Test G552800t39.

G552800t27 : CHECK THE POWER SUPPLY TO THE EGR ACTUATOR

1. Measure the voltage between:

C70, harness side	Battery
Pin 03	Negative terminal

Is the voltage between 4.8 and 5.2 volts?

-> Yes

GO to Pinpoint Test G552800t28.

-> No

GO to Pinpoint Test G552800t33.

G552800t28 : CHECK THE EGR ACTUATOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Disconnect the EGR actuator connector, C71. 3. Key on, engine off. 4. Measure the resistance between:

C71, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t29.

-> No

GO to Pinpoint Test G552800t31.

G552800t29 : CHECK THE EGR ACTUATOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C71, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t30.

-> No

GO to Pinpoint Test G552800t32.

G552800t30 : CHECK THE EGR ACTUATOR SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C71, harness side	C101, harness side
Pin 02	Pin A2

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ETV connector - ECM connector - ETV - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t31 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C71, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t32 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C71, harness side	Battery
--------------------------	----------------

Pin 02	Positive terminal
--------	-------------------

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t33 : CHECK THE SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C71, harness side	Battery
Pin 03	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t34.

-> No

GO to Pinpoint Test G552800t36.

G552800t34 : CHECK THE SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C71, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552800t35.

-> **No**

GO to Pinpoint Test G552800t38.

G552800t35 : CHECK THE SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C71, harness side	C101, harness side
Pin 03	Pin J1

Is the resistance less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t36 : CHECK THE SUPPLY AND SIGNAL CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C71, harness side	C71, harness side
Pin 04	Pin 03

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552800t37.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t37 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

C71, harness side	Battery
Pin 03	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t38 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C71, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t39 : CHECK THE EGR ACTUATOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C71, harness side	Battery
Pin 04	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t40.

-> No

GO to Pinpoint Test G552800t42.

G552800t40 : CHECK THE SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C71, harness side	C71, harness side
Pin 04	Pin 03

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552800t41.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t41 : CHECK THE EGR ACTUATOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

C71, harness side	C101, harness side
Pin 04	Pin K1

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

-> No

REPAIR the high resistance. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552800t42 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C71, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

Crankcase Vent Oil Separator

Removal

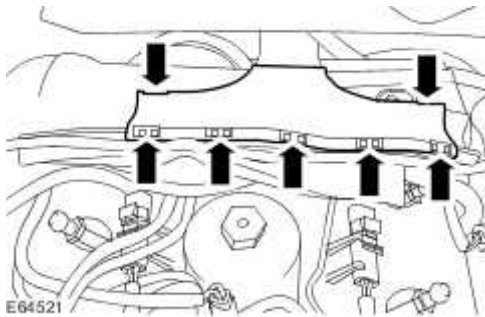
Right-hand drive vehicles

- 1 . Remove the secondary bulkhead center panel.
For additional information, refer to Secondary Bulkhead Center Panel

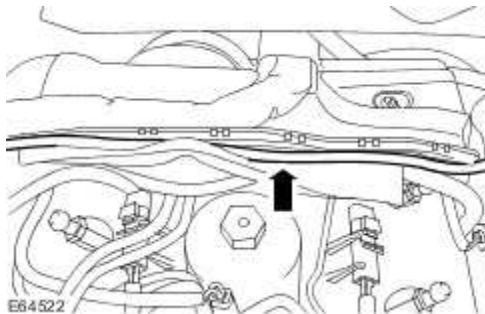
Left-hand drive vehicles

- 2 . Remove the cowl vent screen.
For additional information, refer to Cowl Vent Screen (76.10.01)

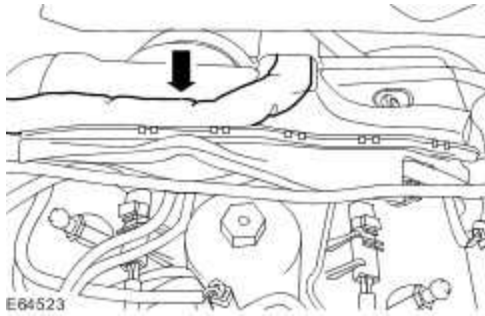
- 3 . Remove the engine harness cover.



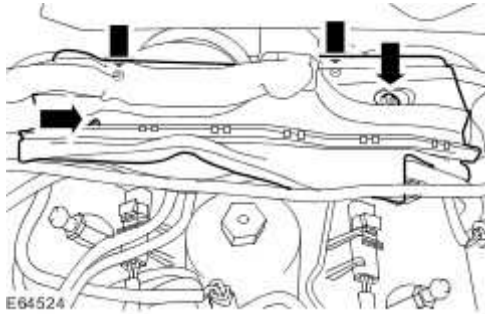
- 4 . Detach the brake booster vacuum pipe.



- 5 . Reposition the engine harness from the casing.

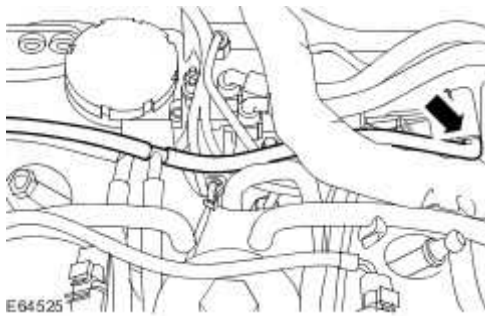


6 . Remove the engine harness casing.

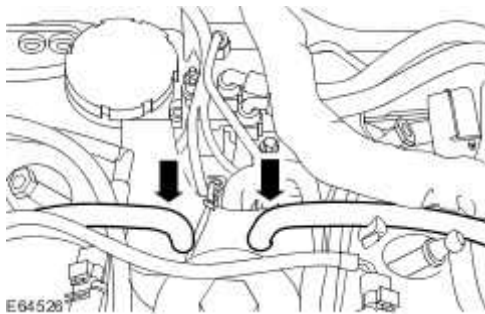


All vehicles

7 . Disconnect the left-hand port deactivation vacuum hose.



8 . Detach the crankcase vent oil separator breather hoses.



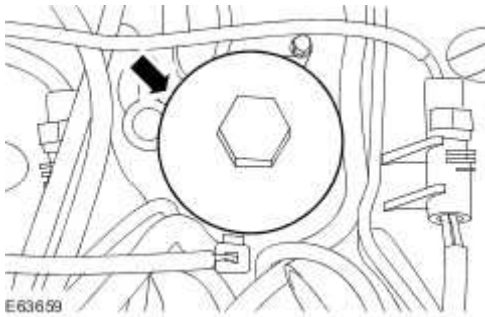
Left-hand drive vehicles

9 NOTE:

Remove and discard the O-ring seal.

Remove the oil filter element housing.

- ▶ Rotate the oil filter element housing five complete turns counter-clockwise.
- ▶ Allow the engine oil to drain from the oil filter element housing for two minutes.
- ▶ Remove the oil filter element housing.

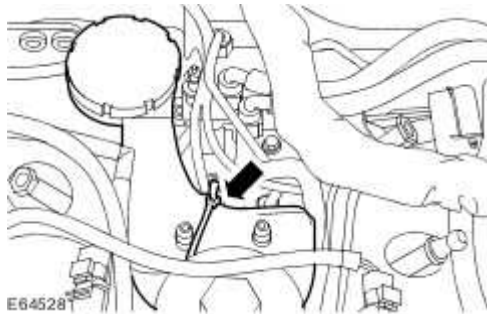


All vehicles

10 . NOTE:


Remove and discard the seals.

Remove the crankcase vent oil separator.




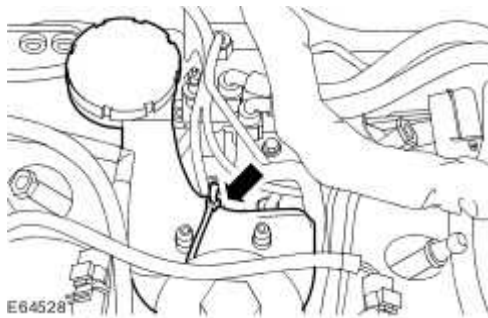
Installation

All vehicles

- 1  **CAUTION:** Make sure the crankcase vent oil separator is correctly located on the alignment dowel before fully seating. Failure to follow this instruction may result in damage to the component.

Install the crankcase vent oil separator.

 Install new seals.




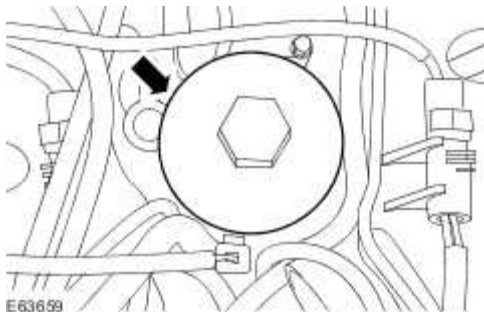
Left-hand drive vehicles

2 . NOTE:

Install a new O-ring seal.

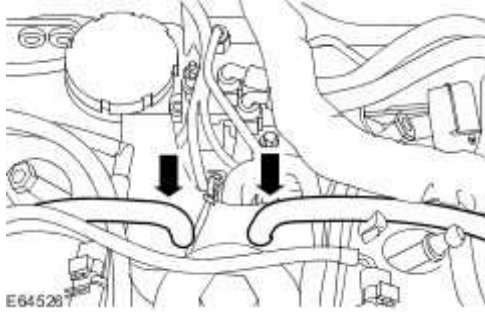
Install the oil filter element housing.

 Tighten to 25 Nm.

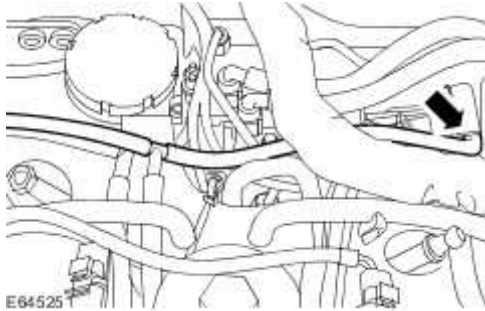


All vehicles

- 3 . Attach the crankcase vent oil separator breather hoses.




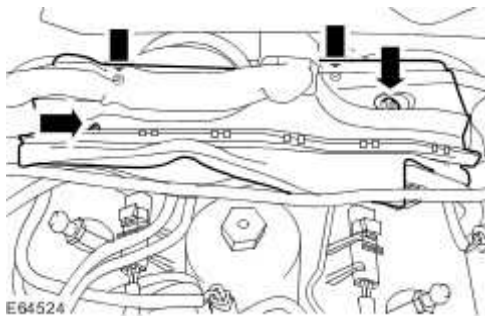
- 4 . Connect the left-hand port deactivation vacuum hose.



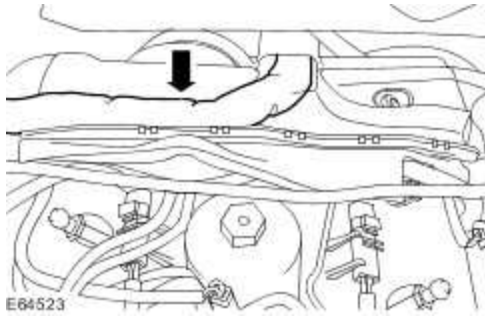
Left-hand drive vehicles

- 5 . Install the engine harness casing.

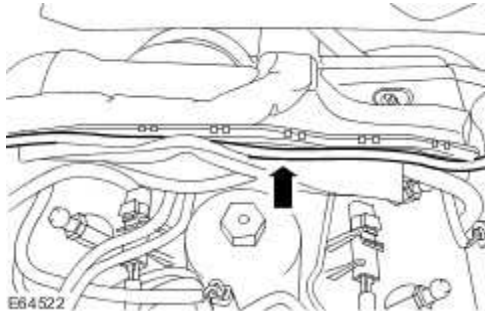
 Tighten to 4 Nm.



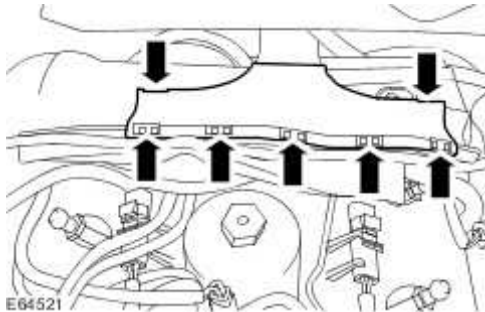
- 6 . Reposition the engine harness into the casing.



- 7 . Attach the brake booster vacuum pipe.



- 8 . Install the engine harness cover.



- 9 . Install the cowl vent screen.

For additional information, refer to Cowl Vent Screen (76.10.01)

Right-hand drive vehicles

- 10 . Install the secondary bulkhead center panel.

For additional information, refer to Secondary Bulkhead Center Panel

Exhaust Gas Recirculation (EGR) Valve LH

Removal

1



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



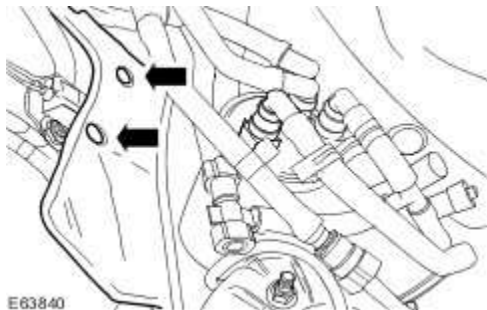
CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or lines. Failure to follow this procedure may result in damage to the vehicle.

Drain the cooling system.

For additional information, refer to Cooling System Draining, Filling and Bleeding

- 2 Remove the exhaust gas recirculation (EGR) valve outlet tube.
 - . For additional information, refer to Exhaust Gas Recirculation (EGR) Valve Outlet Tube (17.45.11)

- 3 . Remove the injector sound proofing.



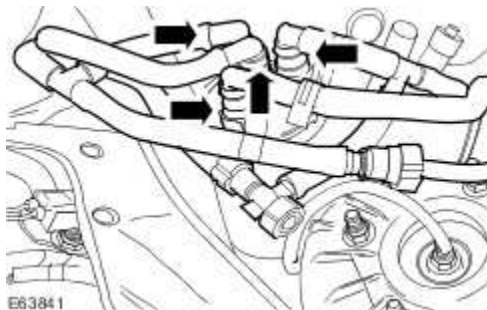
4 . Disconnect the EGR valve electrical connector.



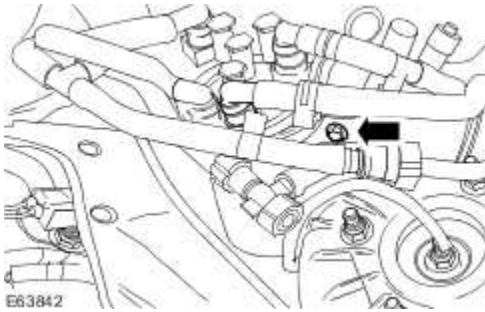
5 . **NOTE:**

Fit suitable blanking caps to fuel filter unions, fuel supply lines and fuel return lines.

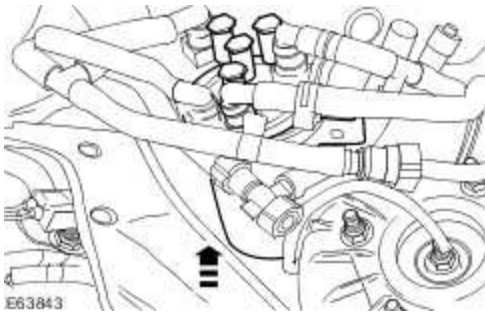
Detach the fuel filter supply and return lines.



6 . Loosen the fuel filter securing bolt.

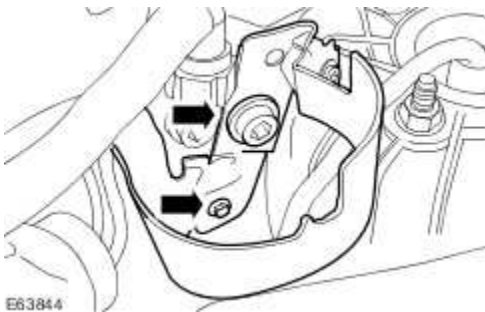


7 . Remove the fuel filter from the retaining bracket.



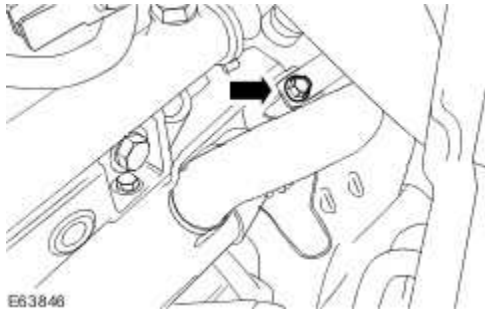
8 . Remove the fuel filter retaining bracket.

► Remove the retaining bolts.

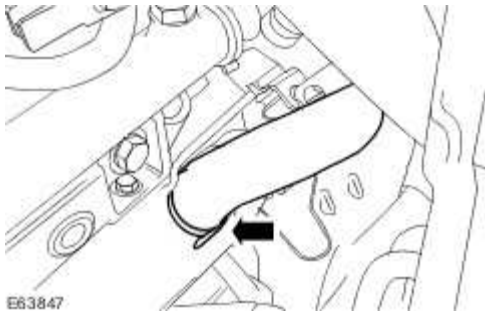


9 . Detach the EGR valve coolant outlet hose.

► Remove the retaining bolt.



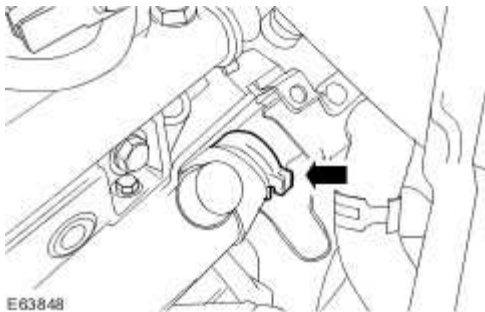
10 . Disconnect the EGR valve coolant outlet hose.



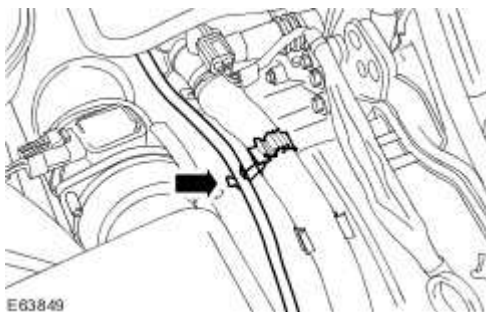
11 . **NOTE:**

Discard the EGR valve inlet tube securing clip.

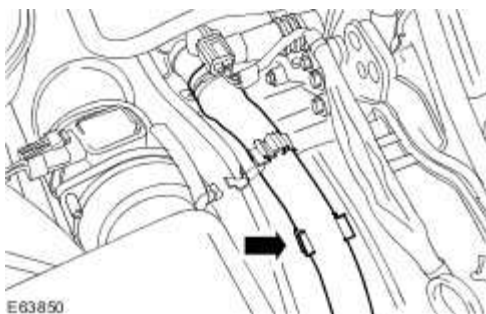
Remove the EGR valve inlet tube securing clip.



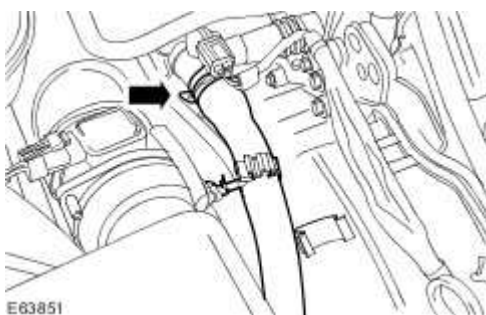
12 . Detach the vent hose.



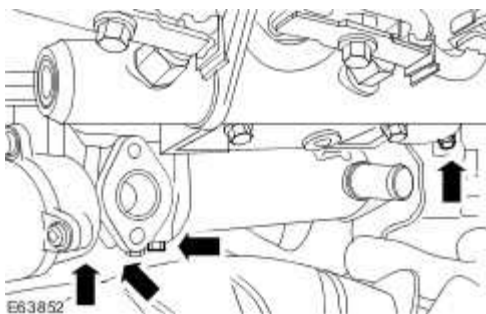
13 . Detach the coolant inlet hose from the timing cover.



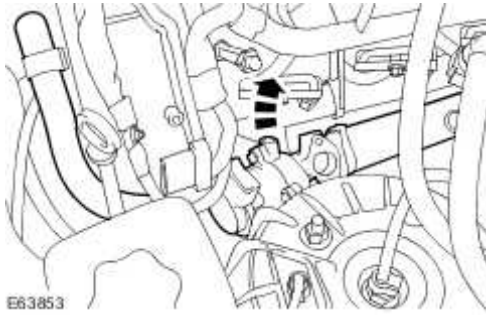
14 . Disconnect the coolant inlet hose.



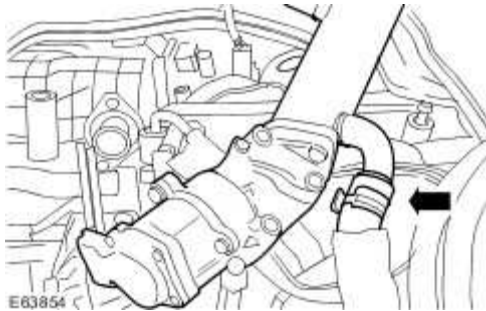
15 . Remove the EGR valve and cooler assembly securing bolts.



16 . Reposition the EGR valve and cooler assembly.

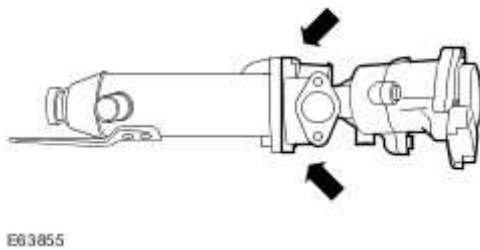


17 . Remove the EGR valve and cooler assembly.



18 . Remove the EGR valve.

▶ Remove and discard the gasket.



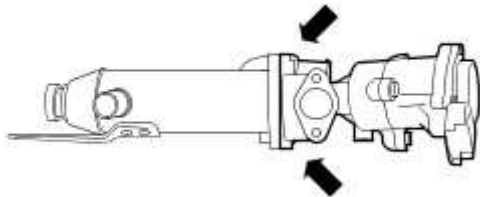
Installation

1 . **NOTE:**

Install a new gasket.

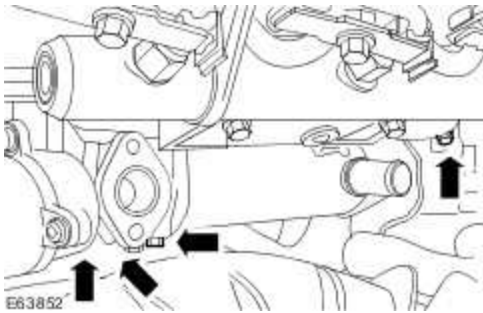
To install, reverse the removal procedure.

▶ Tighten to 10 Nm.



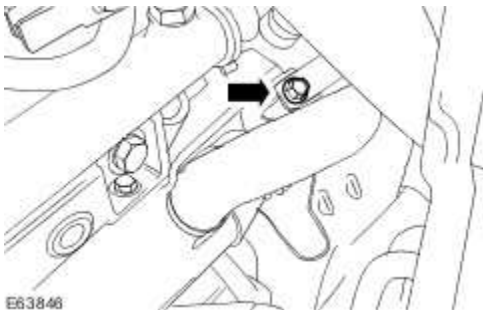
E63855

2 . Tighten to 10 Nm.



E63852

3 . Tighten to 10 Nm.

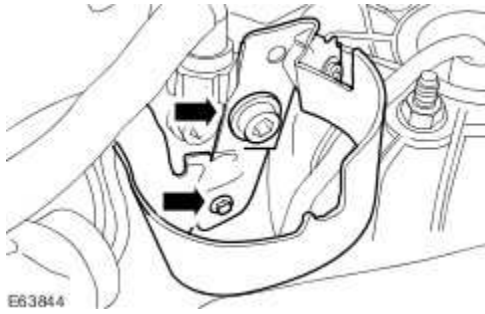


E63848

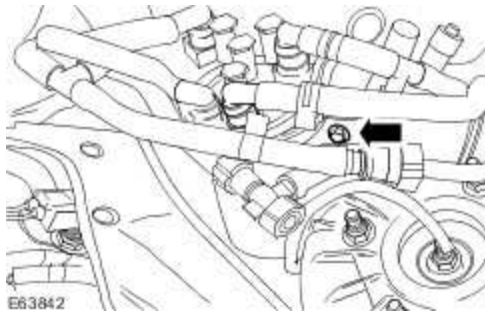
4 . Tighten the fuel filter retaining bracket.

▶ Tighten 10 mm (0.394 inch's) bolt to 25 Nm.

▶ Tighten 6 mm (0.236 inch's) bolt to 10 Nm.



5 . Tighten to 7 Nm.



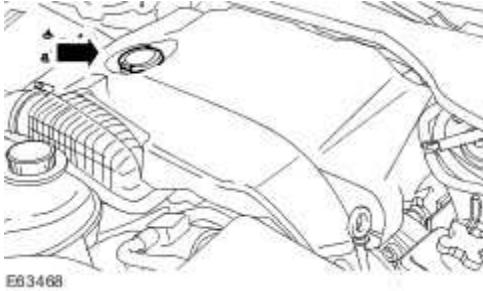
6 . Fill and bleed the cooling system.

For additional information, refer to Cooling System Draining, Filling and Bleeding

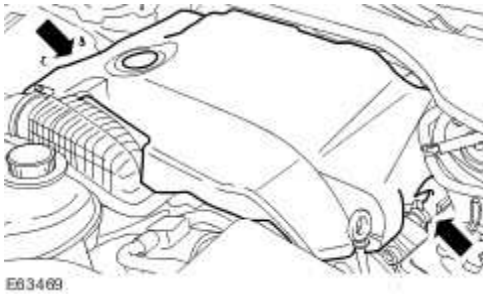
Exhaust Gas Recirculation (EGR) Valve Outlet Tube (17.45.11)

Removal

- 1 . Remove the oil filler cap.



- 2 . Remove the engine cover.



- 3 . Install the engine oil filler cap to prevent foreign material entering the valve cover.

- 4 . **NOTE:**

Right-hand shown, left-hand similar.

Detach the exhaust gas recirculation (EGR) valve outlet tube.



5 . **NOTE:**

Right-hand shown, left-hand similar.

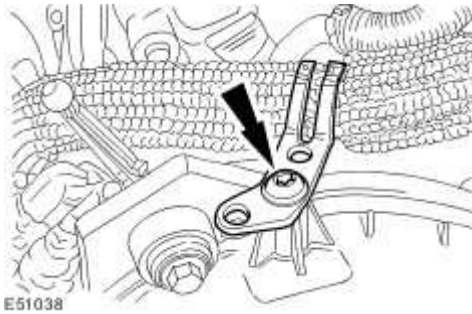
Detach the wiring harness.



6 . **NOTE:**

Right-hand shown, left-hand similar.

Detach the EGR valve outlet tube.

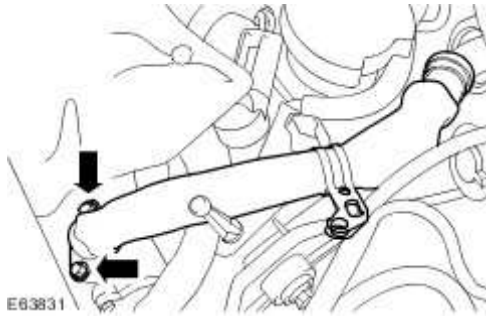


7 . **NOTE:**

Right-hand shown, left-hand similar.

Remove the EGR valve outlet tube.

▶ Discard the gasket.



Installation

1 . NOTE:

Right-hand shown, left-hand similar.

Loosely install the EGR valve outlet tube.

- ▶ Install a new retaining clip.
- ▶ Do not fully close the retaining clip at this stage.

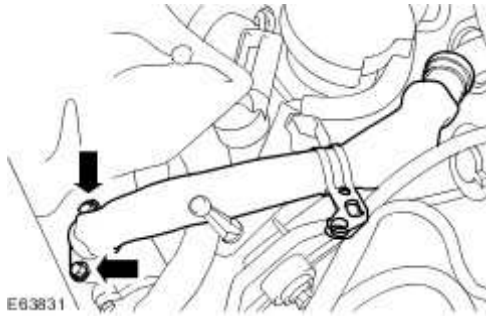


2 . NOTE:

Right-hand shown, left-hand similar.

Install the EGR valve outlet tube retaining bolts.

- ▶ Install a new gasket
- ▶ Do not fully tighten the retaining bolts at this stage.

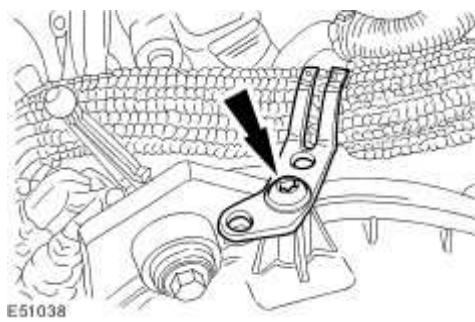


3 . NOTE:

Right-hand shown, left-hand similar.

Attach the EGR valve outlet tube.

▶ Do not fully tighten the retaining bolt at this stage.



4 . NOTE:

Right-hand shown, left-hand similar.

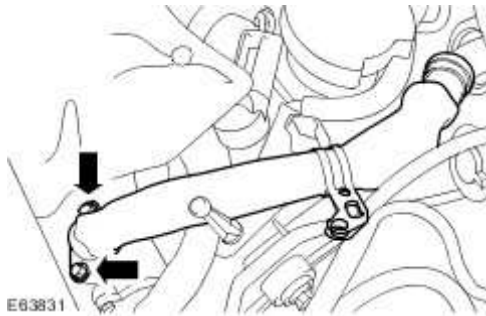
Fully close the EGR valve outlet tube retaining clip.



5 . **NOTE:**

Right-hand shown, left-hand similar.

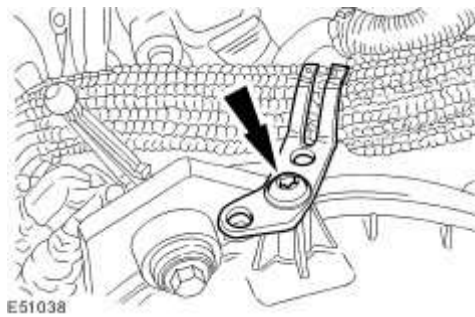
Tighten to 10 Nm.



6 . **NOTE:**

Right-hand shown, left-hand similar.

Tighten to 5 Nm.

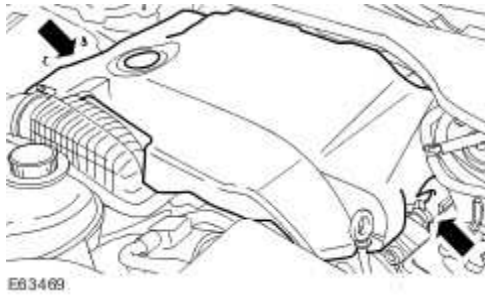


7 . Attach the wiring harness.

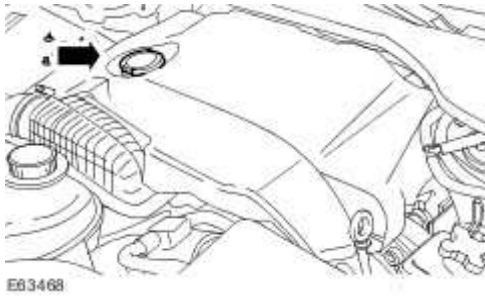


8 . Remove the engine oil filler cap.

9 . Install the engine cover.



10 . Install the oil filler cap.



Exhaust Gas Recirculation (EGR) Valve RH

Removal

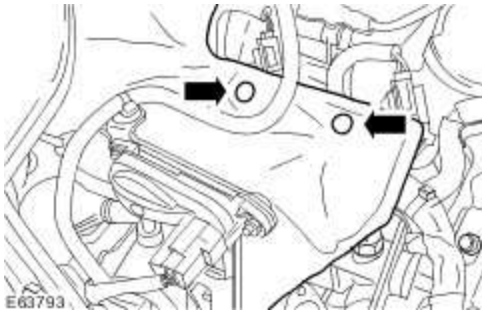
- 1 . Drain the cooling system.

For additional information, refer to Cooling System Draining, Filling and Bleeding

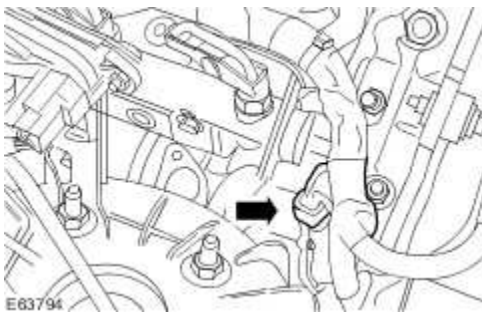
- 2 Remove the exhaust gas recirculation (EGR) valve outlet tube.

. For additional information, refer to Exhaust Gas Recirculation (EGR) Valve Outlet Tube (17.45.11)

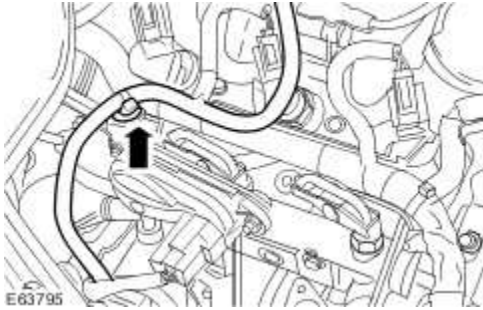
- 3 . Remove the injector sound proofing.



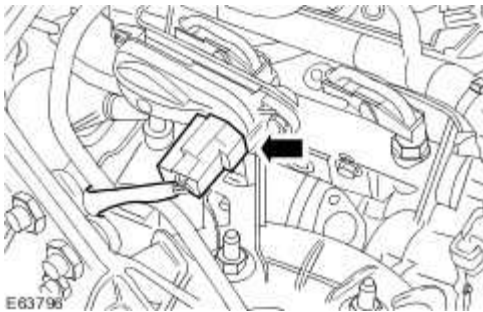
- 4 . Disconnect the EGR valve electrical connector.



- 5 . Detach the wiring harness.

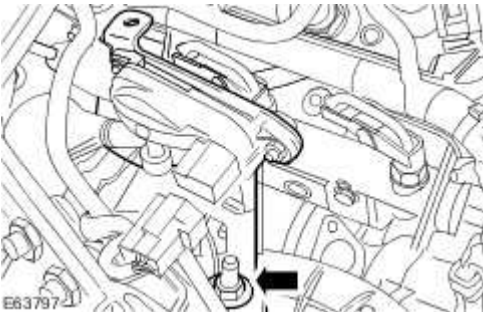



6 . Disconnect the diesel particulate filter differential pressure sensor electrical connector.



7 Detach the diesel particulate filter differential pressure sensor and glow plug module securing bracket.

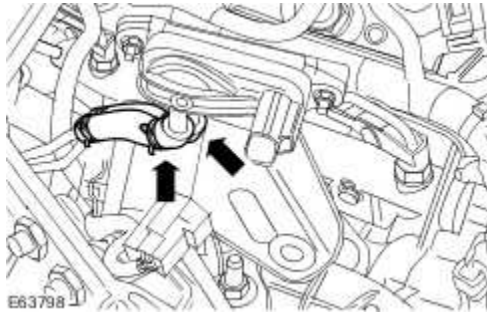
▶ Remove the retaining nut.



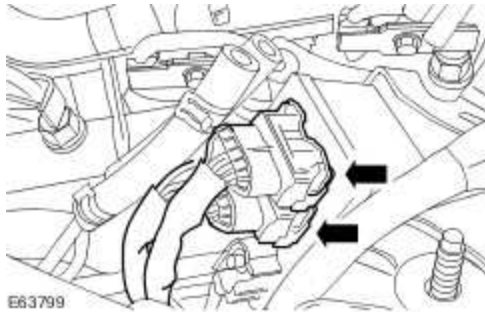
8  **CAUTION:** Make a note of the connection orientation of the high and low pressure hoses to the sensor ports. Make sure the hoses are located to the correct sensor port when installed. Failure to follow these instructions may result in damage to the vehicle.

Detach the diesel particulate filter differential pressure sensor high pressure and low pressure

hoses.

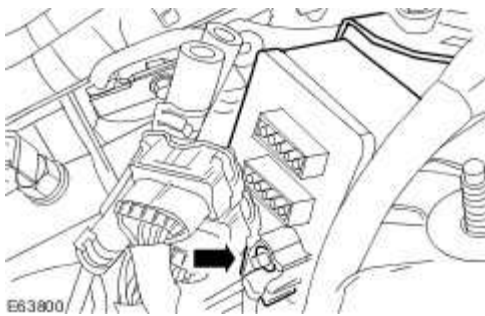


9 . Disconnect the glow plug module electrical connectors.



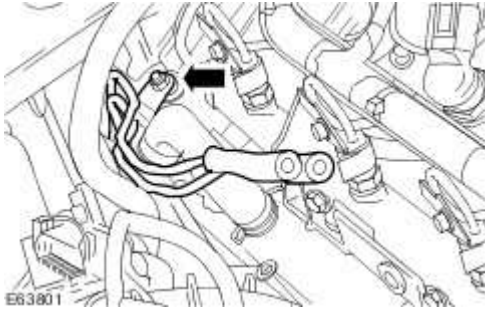
10 Remove the diesel particulate filter differential pressure sensor and glow plug module
· securing bracket.

► Remove the glow plug module positive cable retaining nut.

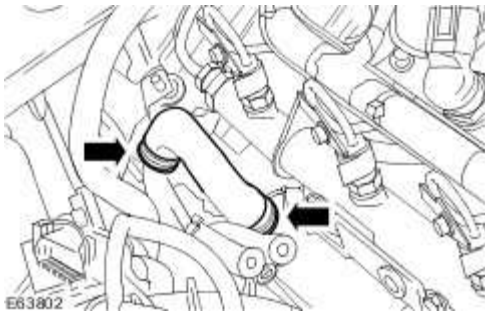


11 . Detach the diesel particulate filter differential pressure sensor high and low pressure pipes.

► Remove the retaining nut.



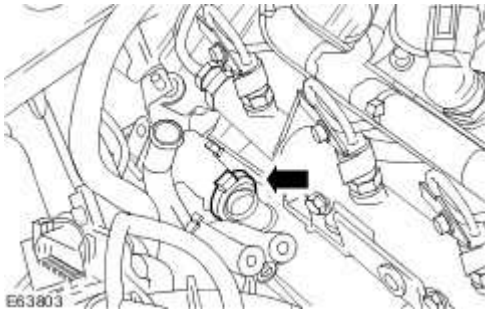
12 . Remove the EGR valve coolant outlet hose.



13 . **NOTE:**

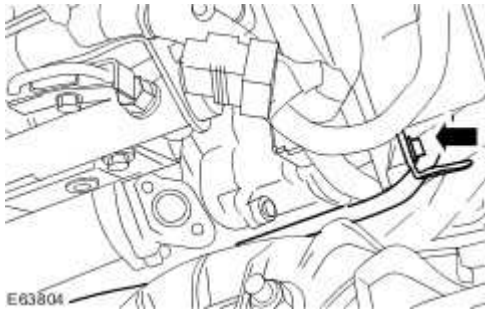
Discard the EGR valve inlet tube securing clip.

Remove the EGR valve inlet tube securing clip.

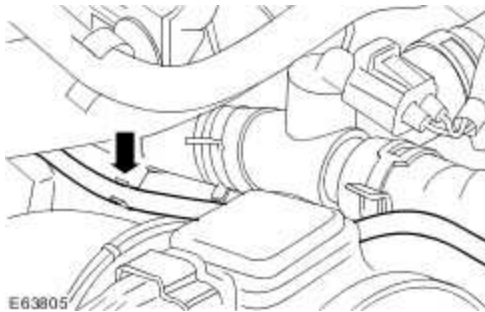


14 . Detach the EGR cooler outlet pipe from the timing cover.

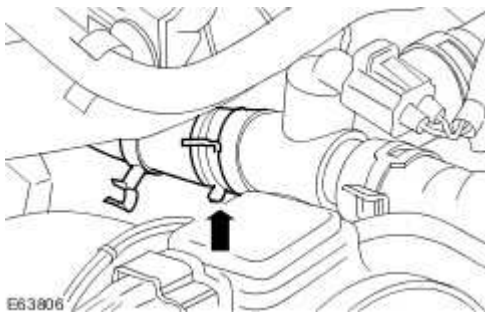
► Loosen the timing belt cover securing bolt.



15 . Detach the vent hose.



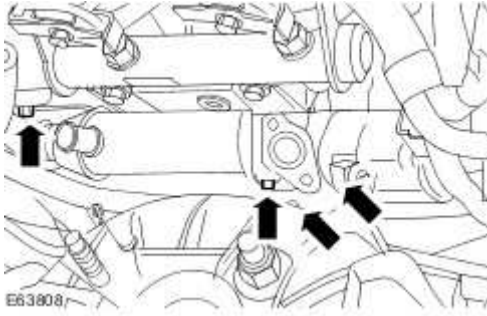
16 . Disconnect the coolant inlet hose.



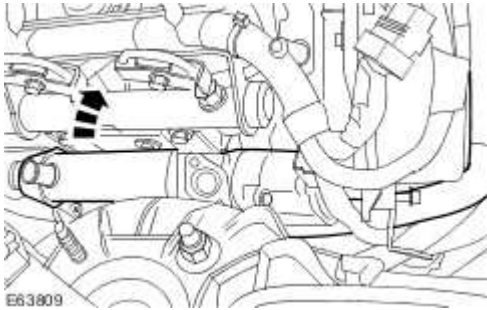
17 . Detach the coolant inlet hose from the timing cover.



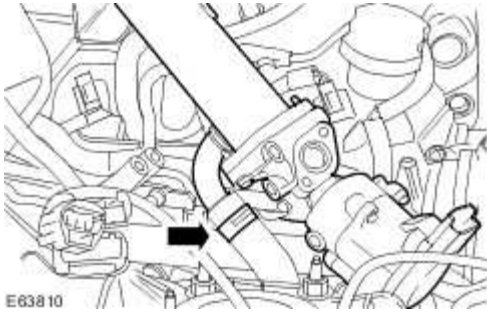
18 . Remove the EGR valve and cooler assembly securing bolts.



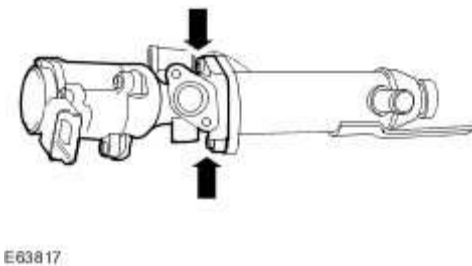
19 . Reposition the EGR valve and cooler assembly.



20 . Remove the EGR valve and cooler assembly.



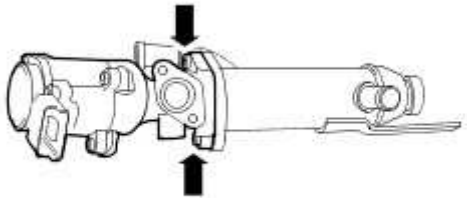
21 . Remove the EGR valve.



Installation

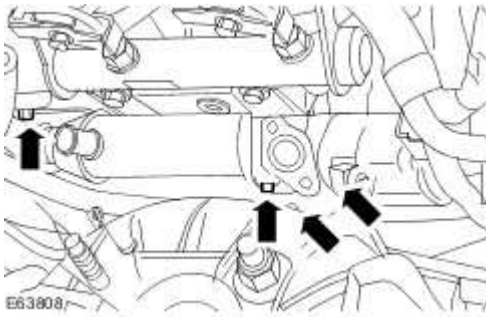
1 . To install, reverse the removal procedure.

▶ Tighten to 10 Nm.



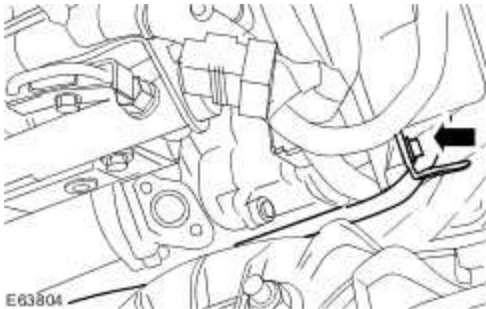
E63817

2 . Tighten to 10 Nm.



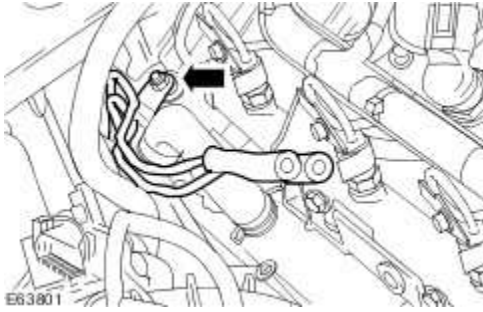
E63808

3 . Tighten to 10 Nm.

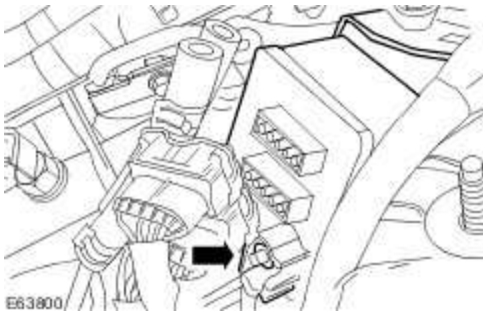


E63804

4 . Tighten to 10 Nm.



5 . Tighten to 5 Nm.

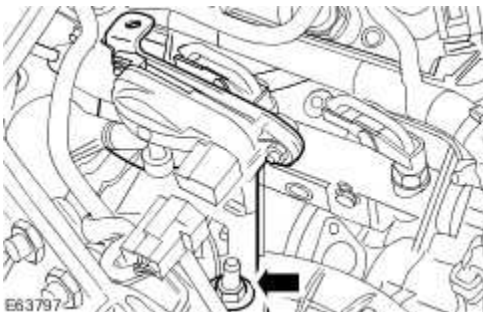


6



- **CAUTION:** Make sure the high and low pressure hoses are fully installed and the retaining clips are positioned in their original position.

Tighten to 25 Nm.



7 . Fill and bleed the cooling system.

For additional information, refer to Cooling System Draining, Filling and Bleeding

303-12A : Intake Air Distribution and Filtering – 3.0L NA V6 - AJ27

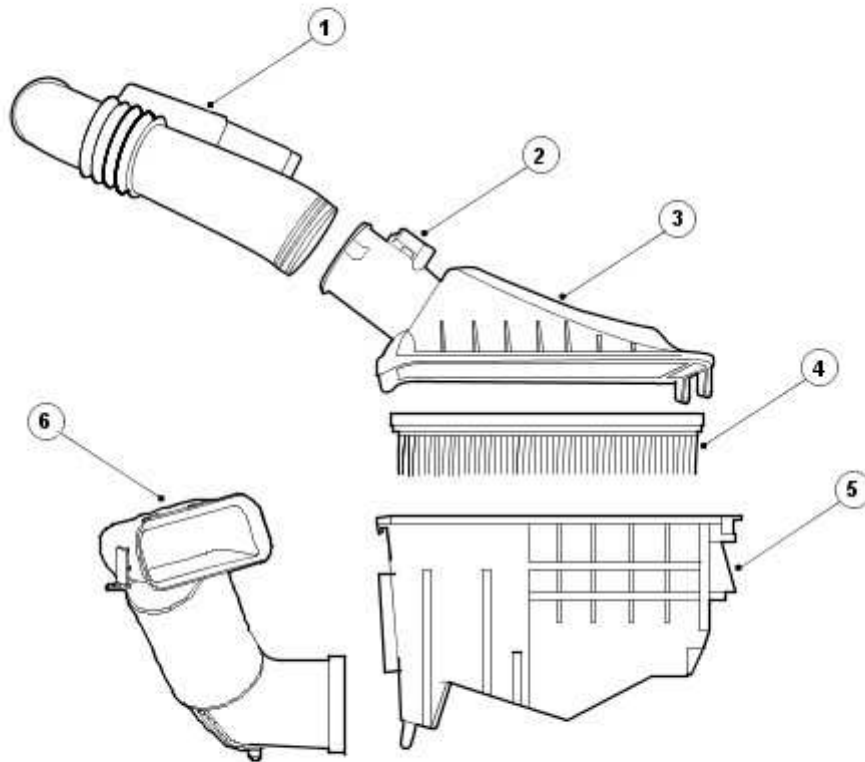
Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Air cleaner	8	—	71

Intake Air Distribution and Filtering



E31808

Item	Part Number	Description
1	—	Air cleaner outlet pipe
2	—	Mass air flow (MAF) sensor
3	—	Air cleaner cover
4	—	Air cleaner element
5	—	Air cleaner
6	—	Air cleaner intake pipe

Intake Air Distribution and Filtering - VIN Range: G00442->G45703

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical damage.

Visual Inspection Chart

Mechanical
Air cleaner intake pipe
Air cleaner outlet pipe
Air cleaner element

- 1 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 2 . If the cause is not visually evident, verify the symptom and refer to the Jaguar Approved Diagnostic System.

Intake Air Distribution and Filtering - VIN Range: G45704->G99999

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of damage.

Mechanical	Electrical
Hoses and ducts (damage/connections)	Mass air flow (MAF) sensor
Air cleaner element (contaminated/blocked)	Manifold absolute pressure (MAP) sensor
Restricted air intake	Throttle body
Seals and gaskets	Harness (security/damage)
	Connections (security/damage)
	Intake manifold tuning (IMT) valves

3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC index chart.

Symptom chart

Symptom	Possible cause	Action
Vehicle does not start/hard starting/poor performance	Restricted/blocked air intake Restricted/blocked air cleaner element	Clear the restriction, Air Cleaner (19.10.05) Replace the air cleaner element as necessary, Air Cleaner Element (19.10.08)
Excessive intake noise	Intake pipe disconnected/damaged after the air cleaner Air cleaner assembly incorrectly assembled/damaged	Check the intake system and hoses for correct installation/damage, Air Cleaner (19.10.05)

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of DTCs,
Electronic Engine Controls - VIN Range: G45704->G99999

DTC	Description	Possible causes	Action
P010100	Mass or volume air flow A circuit range/performance	Blocked air cleaner Air intake leak Engine breather leak Mass air flow (MAF) sensor to ECM sensing circuit: high resistance, intermittent short circuit to ground MAF sensor supply circuit: high resistance Throttle adaption fault (check throttle position voltage at Ignition ON)	Check the air cleaner and intake ducts, etc, check the engine breather system. Engine Emission Control - VIN Range: G45704->G99999 For MAF and throttle tests. Electronic Engine Controls - VIN Range: G45704->G99999
P010600	Manifold absolute pressure (MAP)/BARO sensor range/performance	Intake manifold air leak (loose or missing component) MAP sensor to ECM circuit(s) fault Throttle adaption fault (check throttle position voltage at Ignition ON) MAP sensor failure	Check the air intake manifold and intake system. For MAF, MAP and throttle tests. Electronic Engine Controls - VIN Range: G45704->G99999
P017100	System too lean (right hand	Air intake leak between MAF sensor and	Check the air intake system for leaks, etc. Check the fuel

	bank)	<p>cylinder head</p> <p>Fuel filter/system restriction</p> <p>Fuel injector restriction</p> <p>MAF sensor fault (low intake air flow)</p> <p>Exhaust leak (before catalyst)</p>	<p>filter and lines.</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For injector tests.</p> <p>Fuel Charging and Controls - VIN Range: G45704->G99999 For MAF sensor tests.</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 For exhaust system tests.</p>
P017200	System too rich (right hand bank)	<p>Restricted air cleaner</p> <p>Leaking fuel injector(s)</p> <p>Oil contaminated with fuel (too many cold starts with vehicle subsequently not getting hot enough for long enough)</p> <p>MAF sensor fault (high intake air flow)</p>	<p>Check the air cleaner and intake system. For fuel injector information, Fuel Injectors (18.10.02)</p> <p>Check the oil condition, if contamination is present, renew the engine oil and filter. For MAF sensor circuit tests.</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999</p>
P017400	System too lean (left hand bank)	<p>Air intake leak between MAF sensor and cylinder head</p> <p>Fuel filter/system restriction</p> <p>Fuel injector restriction</p> <p>MAF sensor fault (low intake air flow)</p> <p>Exhaust leak (before catalyst)</p>	<p>Check the intake system.</p> <p>Check the fuel pressure, check the fuel lines.</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For fuel injector information.</p> <p>Fuel Injectors (18.10.02) For MAF sensor circuit tests.</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 Check the exhaust</p>

			system (before catalyst) for condition and security.
P017500	System too rich (left hand bank)	<p>Restricted air cleaner</p> <p>Leaking fuel injector(s)</p> <p>Oil contaminated with fuel (too many cold starts with vehicle subsequently not getting hot enough for long enough)</p> <p>MAF sensor fault (high intake air flow)</p>	<p>Check the air cleaner and intake system. For fuel injector information. Fuel Injectors (18.10.02)</p> <p>Check the oil condition, if contamination is present, renew the engine oil and filter. For MAF sensor circuit tests.</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999</p>
P050600	Idle air control system RPM lower than expected	<p>Air intake restriction</p> <p>Accessory drive overload (defective/seized component)</p>	<p>Check the air cleaner and intake system. Check the accessory drive belt and components.</p> <p>Accessory Drive Belt - 3.0L NA V6 - AJ27, VIN Range: G00442->G45703 (12.10.40)</p>
P050624	Idle control system RPM lower than expected cold start emission strategy ISC system lower than expected	<p>Air intake restriction</p> <p>Accessory drive overload (defective/seized component)</p>	<p>Check the air cleaner and intake system. Check the accessory drive belt and components.</p> <p>Accessory Drive Belt - 3.0L NA V6 - AJ27, VIN Range: G00442->G45703 (12.10.40)</p>
P050700	Idle air control system RPM higher than expected	<p>Intake air leak between MAF sensor and throttle</p> <p>Intake air leak between throttle and engine</p> <p>Engine crankcase breather leak</p>	<p>Check the intake system.</p> <p>Check the engine breather system,</p> <p>Engine Emission Control - VIN Range: G45704->G99999</p>
P050723	Idle control system RPM higher than expected cold start emission strategy ISC	<p>Intake air leak between MAF sensor and throttle</p>	<p>Check the intake system.</p> <p>Check the engine breather system,</p>

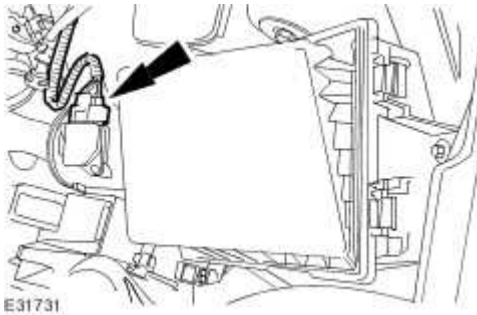
	system higher than expected	Intake air leak between throttle and engine Engine crankcase breather leak	Engine Emission Control - VIN Range: G45704->G99999
P066100	Intake manifold tuning (IMT) valve control circuit low - right hand	IMT circuit(s): short circuit to ground IMT circuit(s): high resistance	Electronic Engine Controls - VIN Range: G45704->G99999
P066200	Intake manifold tuning (IMT) valve control circuit high - right hand	IMT circuit(s): short circuit to power	Electronic Engine Controls - VIN Range: G45704->G99999
P066400	Intake manifold tuning (IMT) valve control circuit low - left hand	IMT circuit(s): short circuit to ground IMT circuit(s): high resistance	Electronic Engine Controls - VIN Range: G45704->G99999
P066500	Intake manifold tuning (IMT) valve control circuit high - left hand	IMT circuit(s): short circuit to power	Electronic Engine Controls - VIN Range: G45704->G99999

1 . Confirm the DTC and follow the action instruction from the index.

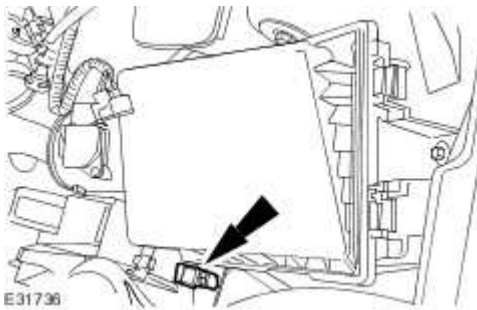
Air Cleaner (19.10.05)

Removal

- 1 . Remove the radiator grill opening panel. <<501-02>>
- 2 . Remove the air cleaner outlet pipe.
For additional information, refer to
- 3 . Disconnect the mass air flow (MAF) sensor electrical connector.



- 4 . Disconnect the extra air flap actuator electrical connector.



- 5 . Remove the air cleaner retaining bolt.



6 . Remove the air cleaner.



Installation

1 NOTE:

When installing the air cleaner, make sure the locating pegs fit securely in the grommets located in the inner wing.

To install, reverse the removal procedure.

► Tighten to 8Nm.



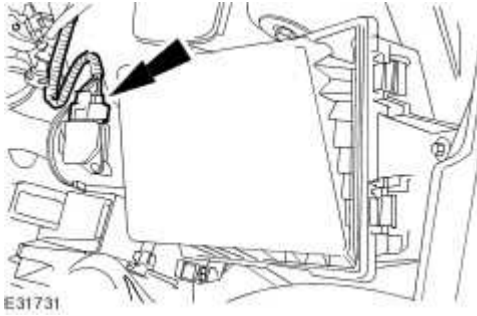
Air Cleaner Element (19.10.08)

Removal

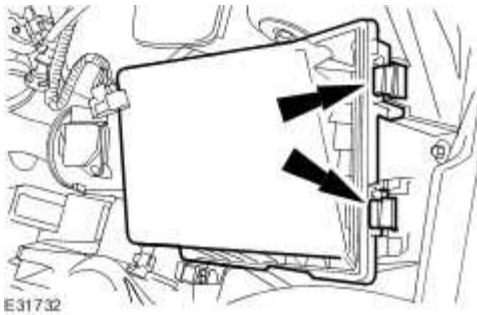
- 1 . Remove the air cleaner outlet pipe.

For additional information, refer to

- 2 . Disconnect the mass air flow sensor (MAF) electrical connector.



- 3 . Remove the air cleaner cover.



- 4 . Remove the air cleaner element.



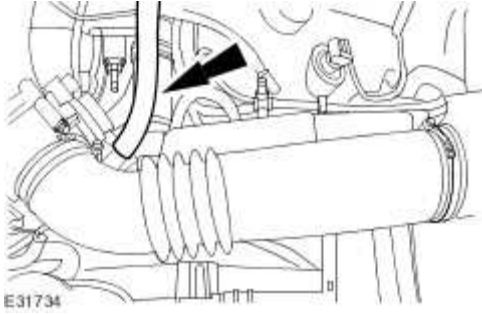
Installation

- 1 . To install, reverse the removal procedure.

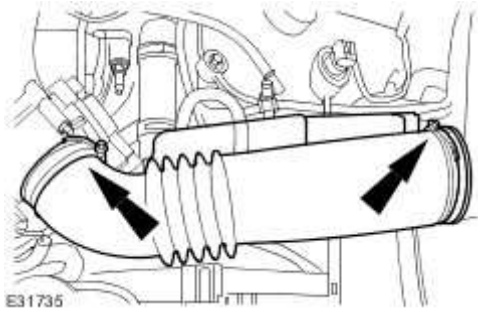
Air Cleaner Outlet Pipe (19.10.31)

Removal

- 1 . Disconnect the engine breather hose.



- 2 . Remove the air cleaner outlet pipe.



Installation

- 1 . To install, reverse the removal procedure.

303-12B : Intake Air Distribution and Filtering – 4.2L NA V8 – AJV8/4.2L SC V8 – AJV8/3.5L NA V8 – AJV8

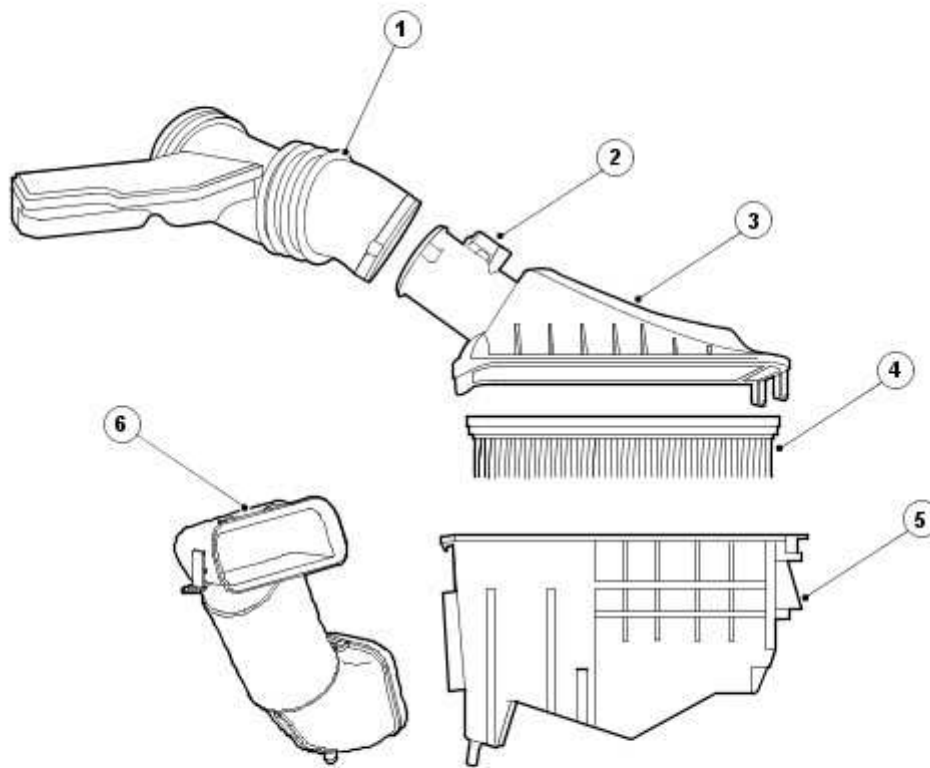
Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Air cleaner retaining bolt	8	-	71
Supercharger outlet pipe retaining nuts	9	-	80
Supercharger outlet pipe retaining bolts	9	-	80
Supercharger retaining bolts	24	18	-
Air intake elbow retaining bolts	24	18	-
Air intake elbow lower bracket retaining bolts	20	15	-
Exhaust gas recirculation (EGR) valve retaining bolts	10	7	-
Exhaust manifold to EGR valve tube retaining bolts	21	15	-
Exhaust manifold to EGR valve tube retaining nuts	21	15	-
Thermostat housing retaining bolts	10	7	-
Throttle body intake hose retaining clip	5	-	45

Intake Air Distribution and Filtering

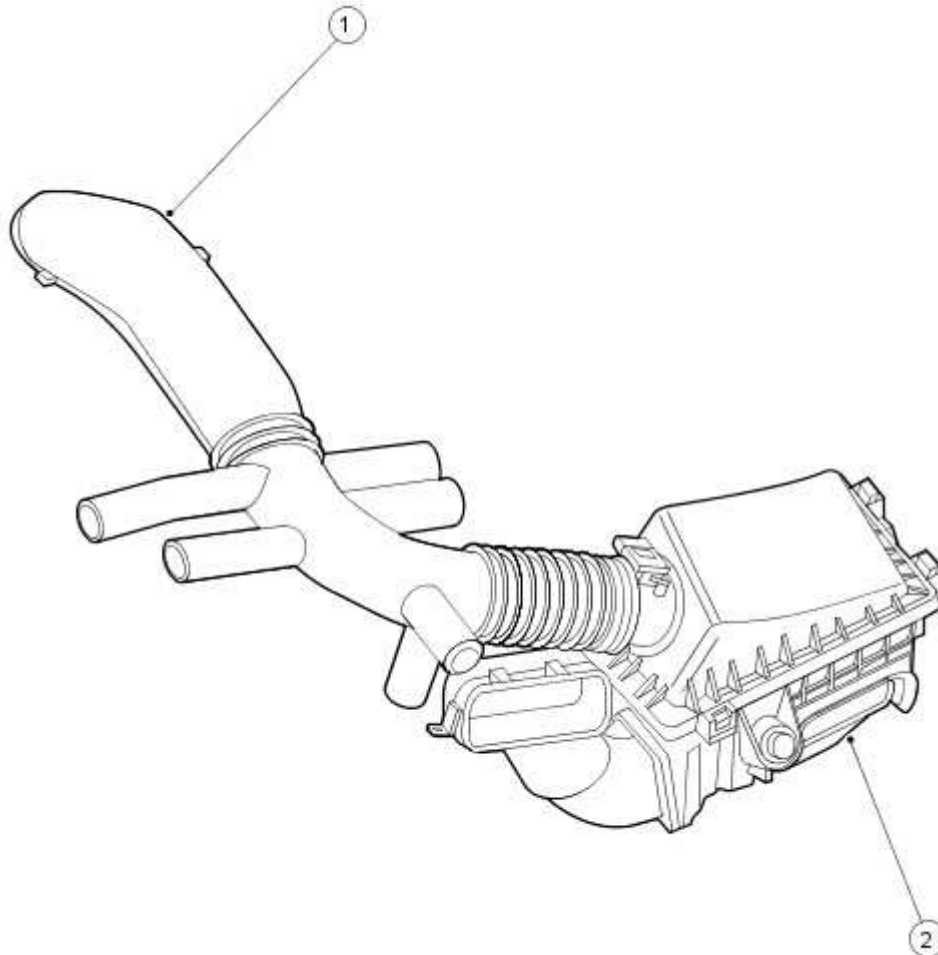


E36581

Item	Part Number	Description
1	—	Air cleaner outlet pipe
2	—	Mass air flow (MAF) sensor
3	—	Air cleaner cover
4	—	Air cleaner element
5	—	Air cleaner

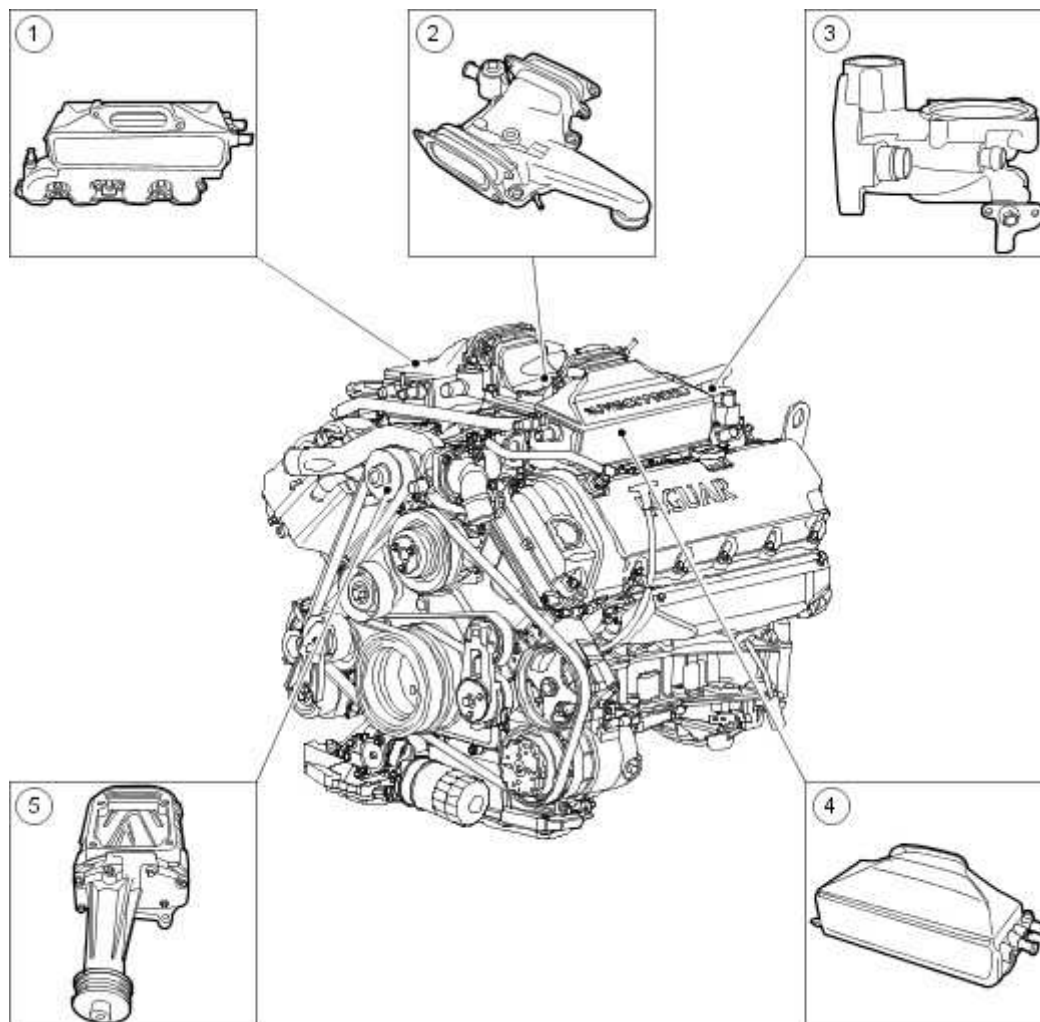
6	—	Air cleaner intake pipe
---	---	-------------------------

Vehicles with supercharger



E30249

Item	Part Number	Description
1	—	Throttle body intake pipe
2	—	Additional air inlet actuator



E30233

Item	Part Number	Description
1	—	Charge air cooler
2	—	Supercharger outlet pipe
3	—	Throttle body elbow
4	—	Charge air cooler
5	—	Supercharger

Intake air distribution and filtering for vehicles with supercharger

Air is supplied to the supercharger via the air cleaner, air cleaner outlet pipe, throttle body intake pipe, throttle body and throttle body elbow. The supercharger delivers pressurized air to two separate charge air cooler units, each unit being mounted on the cylinder bank it supplies.

Pressurized cooled air is fed from the charge air coolers directly into each inlet port. The air cleaner outlet pipe differs from the normally aspirated by having tuned resonators to reduce inlet noise levels. An intake air temperature sensor is fitted at the outlet of the bank 1 charge air cooler. The sensor provides an input to the engine control module (ECM). <<303-14B>> The intake elbow directs the metered airflow from the throttle body outlet (underside of the throttle body) into the intake of the supercharger. The supercharger by-pass valve assembly is part of the intake elbow. The butterfly valve inside the assembly is opened by a diaphragm actuator operated by vacuum feed from the elbow. At closed or partially open throttle positions, the butterfly valve opens, allowing the airflow from the two charge air cooler inlets to be directed back to the supercharger inlet. This action inhibits the supercharging effect and reduces engine torque. Progressive opening of the throttle causes the by-pass valve to gradually close.

Supercharger

The supercharger is attached to the three mounting bosses between the two cylinder heads. The supercharger has a filled for life internal lubrication system. The supercharger is positively aligned with the drive belt by a doweled mounting bracket.

Charge Air Cooler

Each cylinder bank is fitted with a charge air cooler which supplies pressurized air to the four cylinders. The inlet ports to the two charge air coolers are connected to the supercharger via the supercharger outlet pipe consisting of adjustable metal ducts with bonded rubber seals. The charge air coolers are water cooled via a radiator and water pump. <<303-03B>>

Intake Air Distribution and Filtering - VIN Range: G00442->G45703

Inspection and Verification

- 1 . Verify the customer concern by operating the system.
- 2 . Visually inspect for obvious signs of mechanical damage.

Visual Inspection Chart

Mechanical
Air cleaner intake pipe
Air cleaner outlet pipe
Air cleaner element
Throttle body intake pipe
Throttle body gasket
Throttle body
Supercharger outlet pipe to charge air cooler duct(s)
Supercharger outlet pipe gasket
Supercharger outlet pipe
Air intake elbow
Air intake elbow gasket
Air intake elbow retaining bolt seal(s)
Supercharger
Charge air cooler gasket(s)
Charge air cooler(s)

- 1 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

2 . If the cause is not visually evident, verify the symptom and refer to the Jaguar Approved Diagnostic System.

Intake Air Distribution and Filtering - VIN Range: G45704->G99999

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit, plus the addition of secondary air injection and changes to evaporative emissions and exhaust gas recirculation to comply with stage four emissions requirements.

For more information on these systems,

Evaporative Emissions - VIN Range: G00442->G45703

Engine Emission Control

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of damage.

Mechanical	Electrical
Hoses and ducts (damage/connections)	
Air cleaner element (contaminated/blocked)	
Restricted air intake	Mass air flow (MAF) sensor
Supercharger	Manifold absolute pressure (MAP) sensor
Supercharger drive belt	Throttle body
Charge air coolers (damage/connection)	Harness (security/damage)
Supercharger outlet pipes and gaskets	Connections (security/damage)
Supercharger air intake elbow/hoses	
Seals and gaskets	

3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the diagnostic trouble code (DTC) index.

Symptom chart (vehicles without supercharger)

Symptom	Possible cause	Action
Vehicle does not start/hard starting/poor performance	Restricted/blocked air intake Restricted/blocked air cleaner element	Clear the restriction, Air Cleaner (19.10.05) Replace the air cleaner element as necessary, Air Cleaner Element (19.10.08)
Excessive intake noise	Intake pipe disconnected/damaged after the air cleaner Air cleaner assembly incorrectly assembled/damaged	Check the intake system and hoses for correct installation/damage, Air Cleaner (19.10.05)

Symptom	Possible cause	Action
Lack of boost	Supercharger drive belt broken/slipping Supercharger fault supercharger air intake elbow fault Major air leakage (after the supercharger)	Check the supercharger and drive belt (see visual inspection). For supercharger air intake elbow tests, GO to Pinpoint Test G532443p1. Check the charge air coolers and pipework (see visual inspection).
Noise	Supercharger drive belt slipping Supercharger fault Major air leakage (after the supercharger)	Check the supercharger and drive belt (see visual inspection). Remove the supercharger drive belt and recheck for noise. Turn the supercharger by hand and check for excessive resistance. Check the supercharger pulley for excessive play. Check the charge air coolers and pipework (see visual inspection).

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of DTCs.

Electronic Engine Controls - VIN Range: G45704->G99999

DTC	Description	Possible causes	Action
P010100	MAF circuit range/performance	Blocked air cleaner Air intake leak Engine breather leak MAF sensor to ECM sensing circuit: high resistance, intermittent short circuit to ground MAF sensor supply circuit: high resistance	Clear the restriction, Air Cleaner (19.10.05) Replace the air cleaner element as necessary, Air Cleaner Element (19.10.08) Inspect the engine breather system, For MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999
P010600	MAP/Barometric pressure circuit range/performance	Intake manifold air leak (loose or missing component) MAP sensor to ECM circuit(s) fault MAP sensor failure	Check the intake system and hoses for correct installation/damage, Air Cleaner (19.10.05) Replace the air cleaner element as necessary, Air Cleaner Element (19.10.08) Check the intake manifold for correct installation/damage, Intake Manifold - VIN Range: G45704->G99999 (30.15.01) For MAP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 .
P017100	System too lean (right hand bank)	Air intake leak between MAF sensor and cylinder head Fuel filter/system restriction MAF sensor fault	Check the intake system and hoses for correct installation/damage, Air Cleaner (19.10.05) Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 Check the exhaust

		(low intake air flow) Exhaust leak (before catalyst)	system (before catalyst) for condition and security,
P017200	System too rich (right hand bank)	Restricted air filter MAF sensor fault (high intake air flow)	Clear the restriction, Air Cleaner (19.10.05) Replace the air cleaner element as necessary, Air Cleaner Element (19.10.08) For MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 .
P017400	System too lean (left hand bank)	Air intake leak between MAF sensor and cylinder head Fuel filter/system restriction MAF sensor fault (low intake air flow) Exhaust leak (before catalyst)	Check the intake system and hoses for correct installation/damage, Air Cleaner (19.10.05) Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 Check the exhaust system (before catalyst) for condition and security,
P017500	System too rich (left hand bank)	Restricted air filter MAF sensor fault (high intake air flow)	Clear the restriction, Air Cleaner (19.10.05) Replace the air cleaner element as necessary, Air Cleaner Element (19.10.08) For MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 .
P050600	Idle air control system RPM lower than expected	Restricted air cleaner element MAF sensor fault (high intake air flow)	Clear the restriction, Air Cleaner (19.10.05) Replace the air cleaner element as necessary, Air Cleaner Element (19.10.08) For MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 .
P050700	Idle air control system RPM higher than expected	Intake air leak between MAF sensor and	Check the intake system and hoses for correct installation/damage, Air Cleaner (19.10.05) Inspect the

		throttle Intake air leak between throttle and engine Engine crankcase breather leak	engine breather system,
--	--	--	-------------------------

Pinpoint tests

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

PINPOINT TEST G532443p1 : CHECK THE SUPERCHARGER AIR INTAKE ELBOW

G532443t1 : CHECK THE AIR INTAKE ELBOW VACUUM LINE

1. Check the vacuum connection to the supercharger air intake elbow at both ends. 2. Check the vacuum line to the supercharger air intake elbow along its length.

Is the vacuum line connected and in good condition?

-> **Yes**

GO to Pinpoint Test G532443t2.

-> **No**

CONNECT or replace the vacuum line as necessary. Test the system for normal operation.

G532443t2 : CHECK THE OPERATION OF THE AIR INTAKE ELBOW ACTUATOR LINKAGE

1. Disconnect the vacuum line from the actuator diaphragm. 2. Connect a suitable hand vacuum pump to the actuator diaphragm. 3. Apply a vacuum to the actuator diaphragm. 4. Observe the actuator linkage operation.

Does the actuator linkage operate?

-> **Yes**

GO to Pinpoint Test G532443t3.

-> **No**

INSTALL a new supercharger air intake elbow. Test the system for normal operation.

G532443t3 : CHECK THE OPERATION OF THE AIR INTAKE ELBOW BUTTERFLY

1. Remove the air cleaner outlet pipe,
Air Cleaner Outlet Pipe (19.10.31) 2. Remove the supercharger outlet pipe,
Supercharger Outlet Pipe (18.50.16) 3. Apply a vacuum to the actuator diaphragm. 4. Observe the butterfly operation.

Does the butterfly operate?

-> **Yes**

Check for another cause of the malfunction.

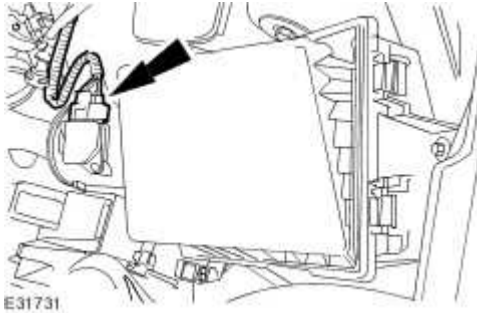
-> **No**

INSTALL a new supercharger air intake elbow. Test the system for normal operation.

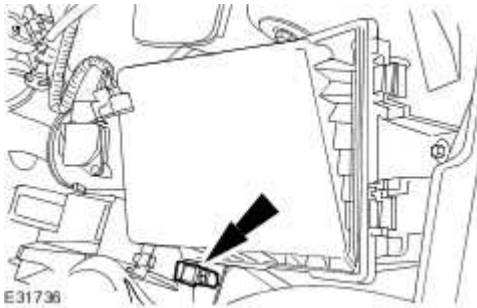
Air Cleaner (19.10.05)

Removal

- 1 . Remove the radiator grill opening panel. <<501-02>>
- 2 . Remove the air cleaner outlet pipe.
For additional information, refer to
- 3 . Disconnect the mass air flow (MAF) sensor electrical connector.



- 4 . Disconnect the extra air flap actuator electrical connector.



- 5 . Remove the air cleaner retaining bolt.



6 . Remove the air cleaner.



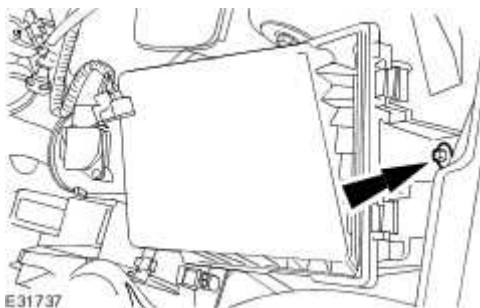
Installation

1 NOTE:

When installing the air cleaner, make sure the locating pegs fit securely in the grommets located in the inner wing.

To install, reverse the removal procedure.

► Tighten to 8Nm.



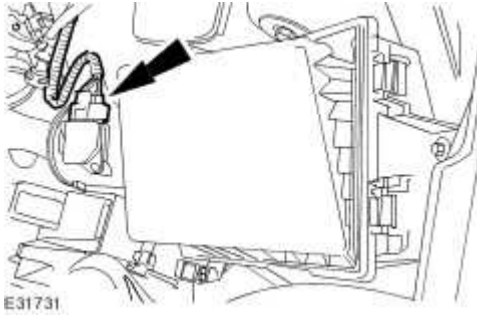
Air Cleaner Element (19.10.08)

Removal

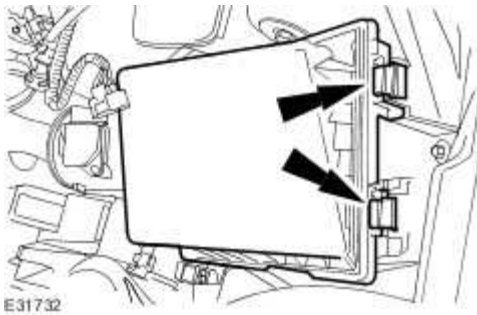
- 1 . Remove the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

- 2 . Disconnect the mass air flow sensor (MAF) electrical connector.



- 3 . Remove the air cleaner cover.



- 4 . Remove the air cleaner element.



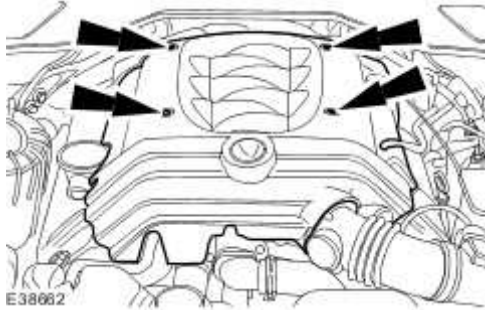
Installation

- 1 . To install, reverse the removal procedure.

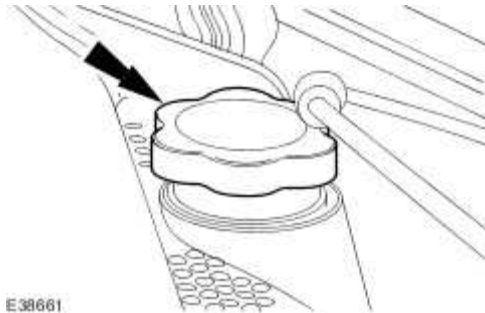
Cleaner Outlet Pipe (19.10.31)

Removal

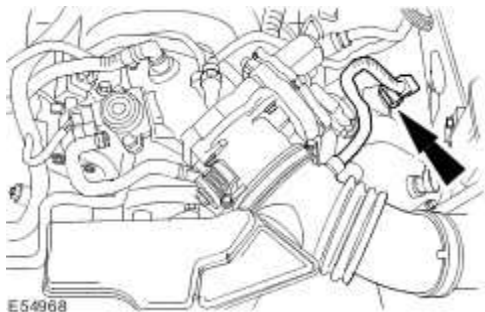
- 1 . Remove the engine cover.



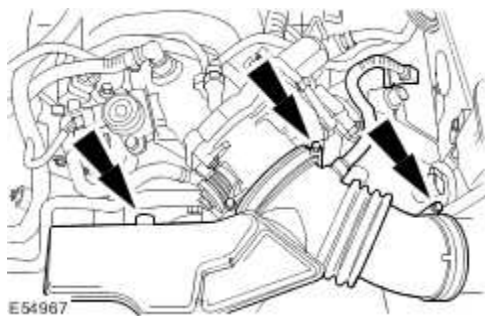
- 2 . Install the oil filler cap.



- 3 . Disconnect the engine breather hose.



- 4 . Remove the air cleaner outlet pipe.



Installation

- 1 . To install, reverse the removal procedure.

Charge Air Cooler

Removal

- 1 . Remove the supercharger.

For additional information, refer to

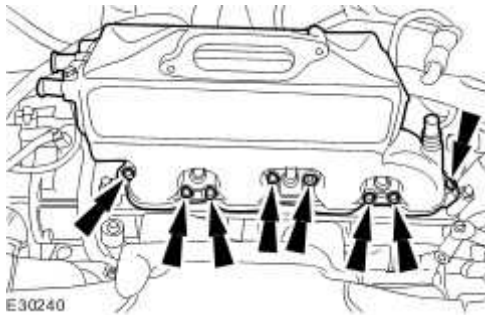
- 2 .



CAUTION: Make sure no foreign matter enters the cylinder head ports.

Remove the charge air cooler.

- ▶ Remove and discard the charge air cooler gasket.

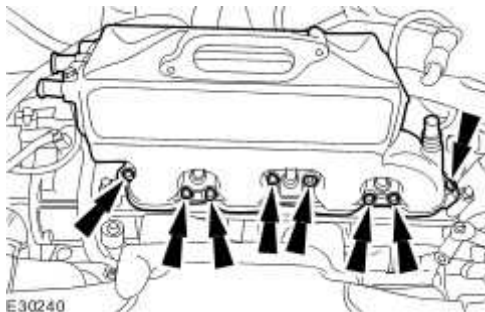


Installation

- 1 . Install the charge air cooler.

- ▶ Install a new charge air cooler gasket.

- ▶ Tighten to 13 Nm.



2 . Install the supercharger.

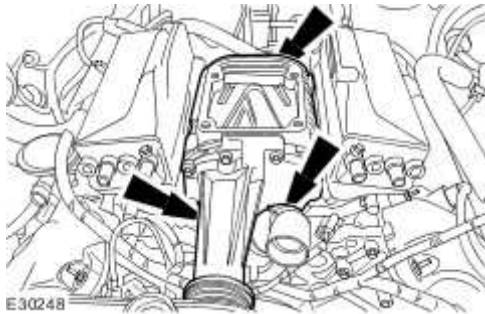
For additional information, refer to

Supercharger - VIN Range: G00442- >G45703 (18.50.15)

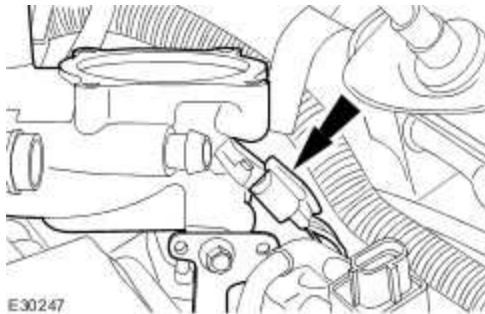
Installation

- 1 . Install the supercharger.

▶ Tighten to 24 Nm.



- 2 . Connect the manifold absolute pressure (MAP) sensor.

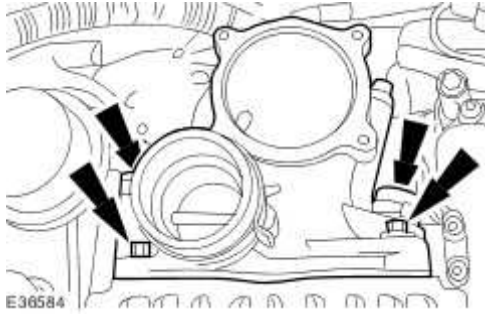


- 3 . Install the air intake elbow.

▶ Install a new gasket.

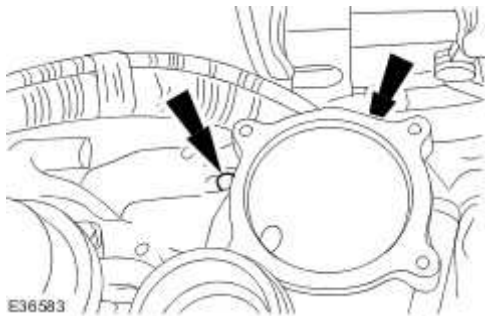
▶ Install new retaining bolt seals.

▶ Tighten to 24 Nm.

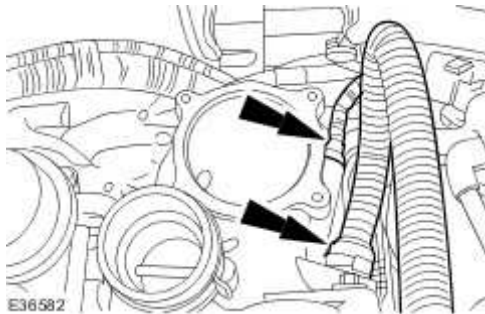


4 . Install the air intake elbow retaining bracket lower retaining bolts.

▶ Tighten to 20 Nm.



5 . Connect the air intake elbow pipes.

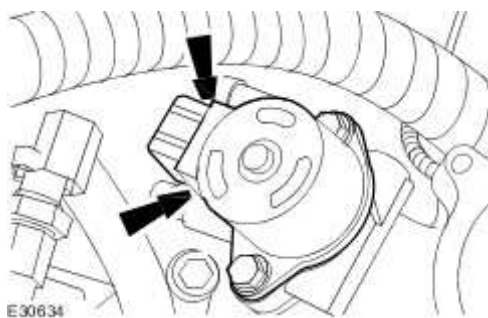


6 . Install the EGR valve and the exhaust manifold to EGR valve tube.

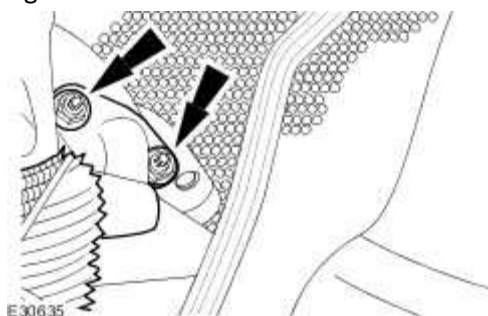
▶ Install a new exhaust manifold to EGR valve tube gasket.

▶ Install a new EGR valve to air intake elbow gasket.

▶ Tighten to 10 Nm.



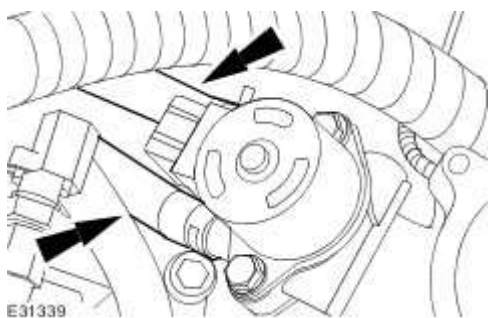
7 . Tighten to 21 Nm.



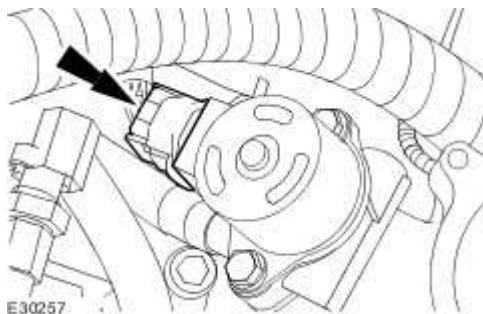
8 . **NOTE:**

Remove the sealing caps from the coolant ports.

Connect the coolant hoses.



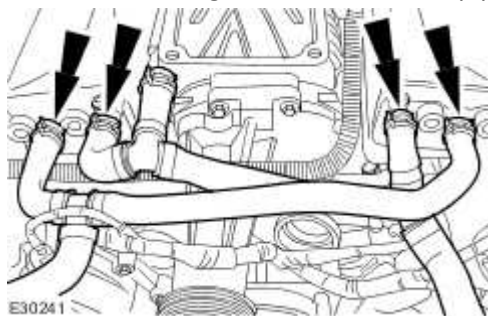
9 . Connect the exhaust gas recirculation (EGR) valve electrical connector.



10 . Connect the IAT sensor electrical connector.



11 . Connect the charge air cooler coolant pipes.

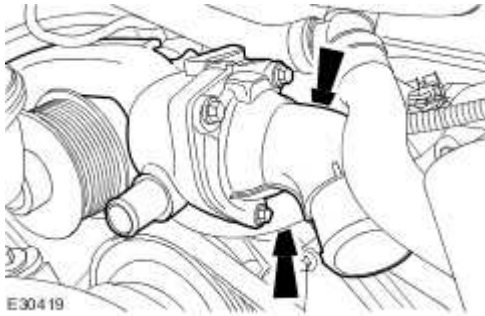


12 . **NOTE:**

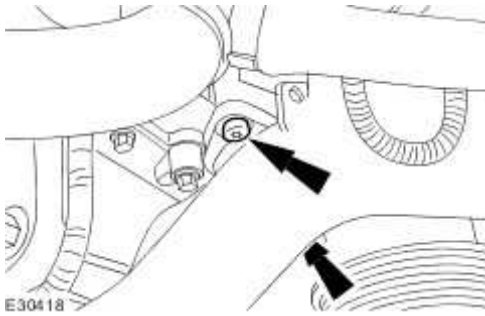
Install new O-ring seals to the thermostat housing.

Install the thermostat housing.

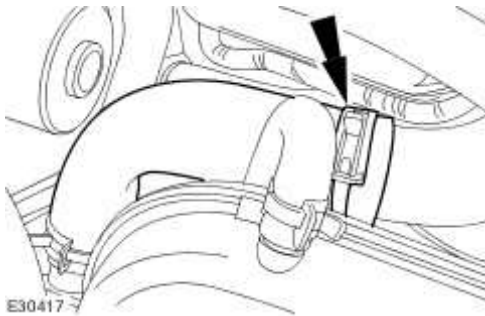
► Tighten to 10 Nm.



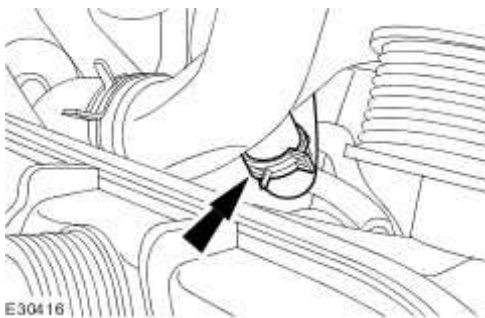
13 . Tighten to 10 Nm.



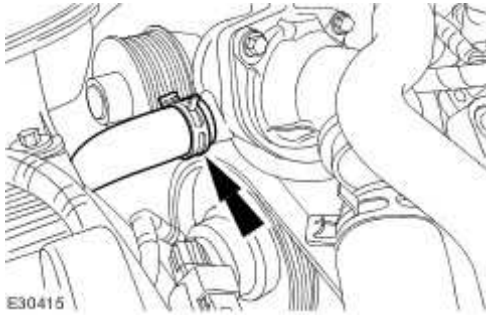
14 . Connect the hose.



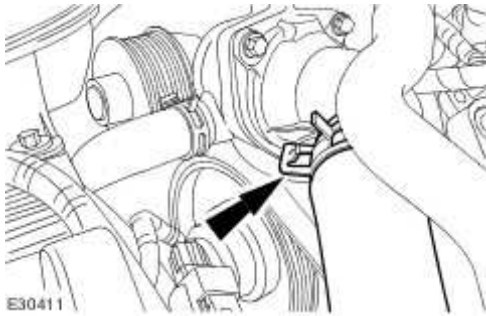
15 . Connect the hose.



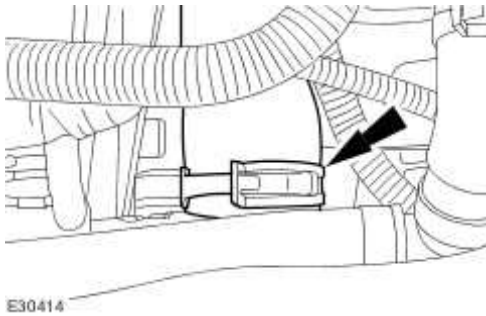
16 . Connect the hose.



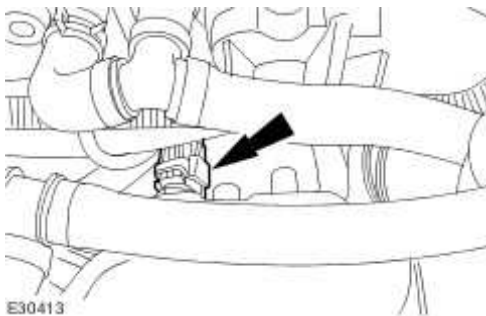
17 . Connect the hose.



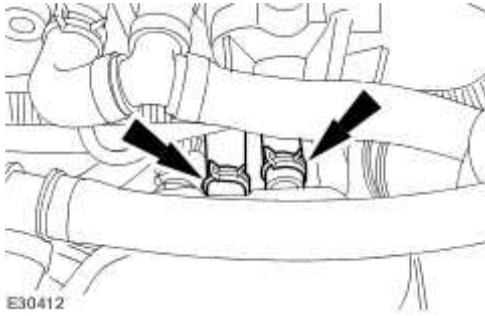
18 . Reposition the thermostat housing hose retaining clip.




19 . Connect the coolant temperature sensor electrical connector.

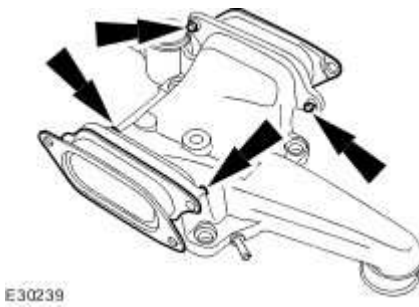


20 . Connect the thermostat housing hoses.



21 . Install new supercharger outlet pipe to charge air coolers ducts.

 Tighten to 8 Nm.

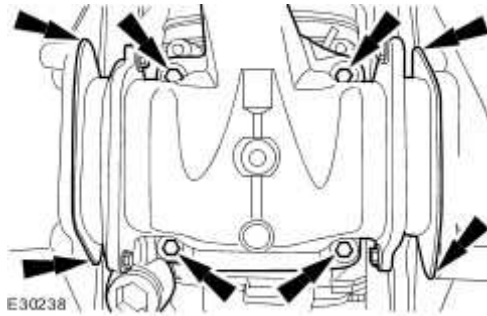


22 . Install a new supercharger outlet pipe gasket.

23 . Install new seals to the supercharger outlet pipe retaining bolts.

24 .  **CAUTION: Make sure no foreign matter enters the supercharger.**

Install the supercharger outlet pipe.



25 . **NOTE:**

Remove the sealing caps from the coolant ports.

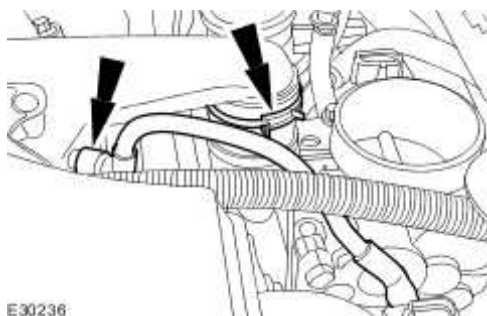
Attach the supercharger outlet pipe coolant hose.



26 . Install the throttle body. <<303-04B>>

27 . Attach the hoses.

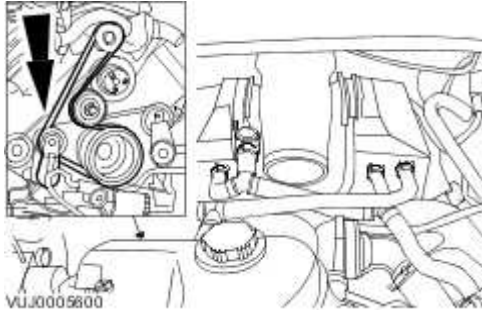
▶ Reposition the hose retaining clip.



28 . Attach the supercharger belt.

► Use a 1/2 inch square drive bar to rotate the supercharger belt tensioner.

► Attach the supercharger belt.



29 . Connect the battery ground cable. <<414-01>>

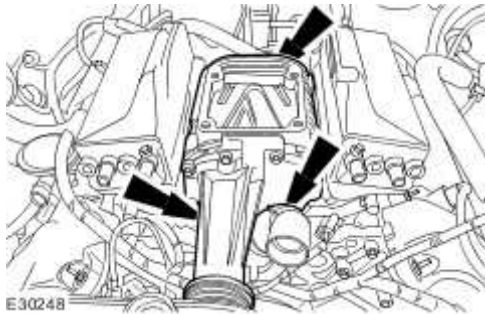
30 . Carry out the cooling system filling and bleeding procedure. <<303-03>>

Supercharger - VIN Range: G45704- >G99999 (18.50.15)

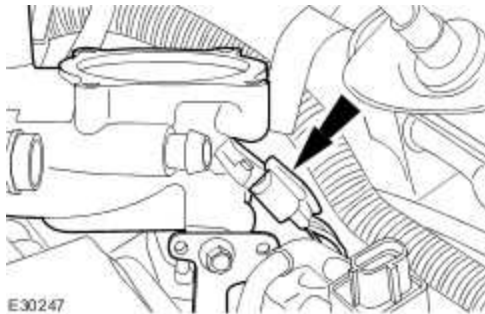
Installation

1 . Install the supercharger.

▶ Tighten to 21 Nm.



2 . Connect the MAP sensor.

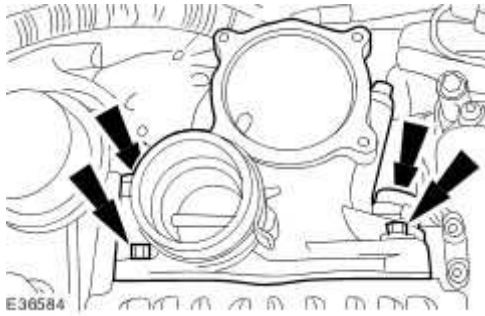


3 . Install the air intake elbow.

▶ Install a new gasket.

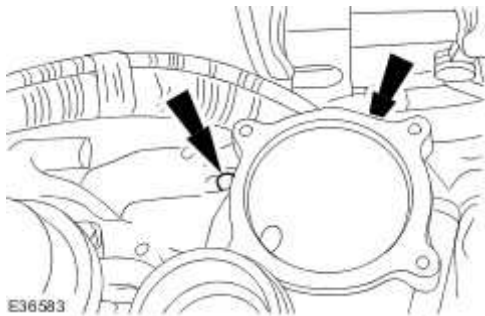
▶ Install new retaining bolt seals.

▶ Tighten to 21 Nm.

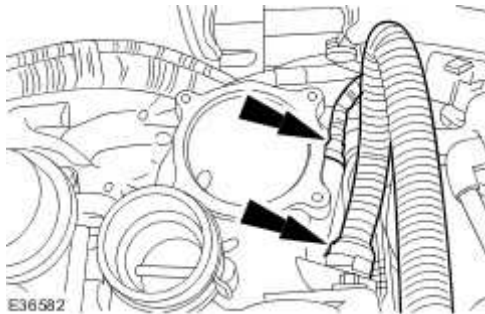


4 . Install the air intake elbow retaining bracket lower retaining bolts.

▶ Tighten to 18 Nm.



5 . Connect the air intake elbow pipes.

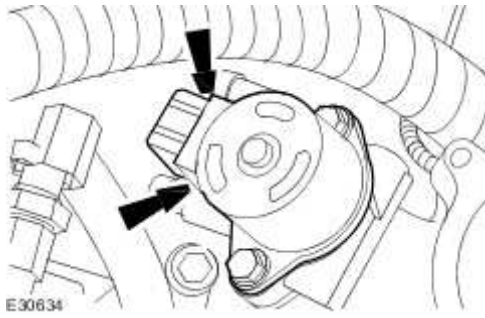


6 . Install the EGR valve and the exhaust manifold to EGR valve tube.

▶ Install a new exhaust manifold to EGR valve tube gasket.

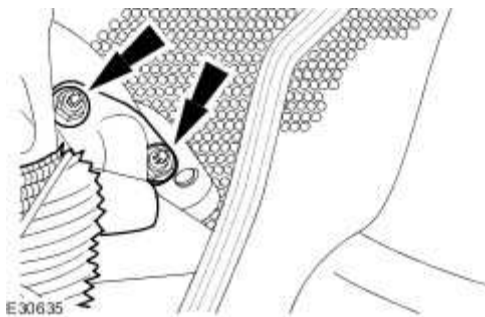
▶ Install a new EGR valve to air intake elbow gasket.

▶ Tighten to 10 Nm.



7 . Install the exhaust manifold to EGR valve tube retaining nuts.

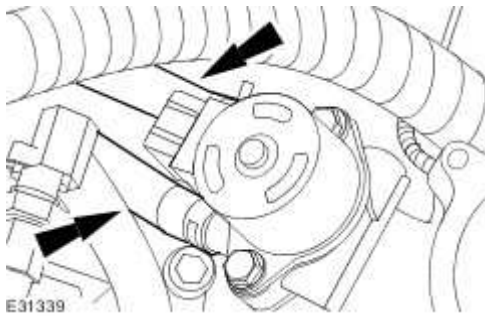
▶ Tighten to 21 Nm.



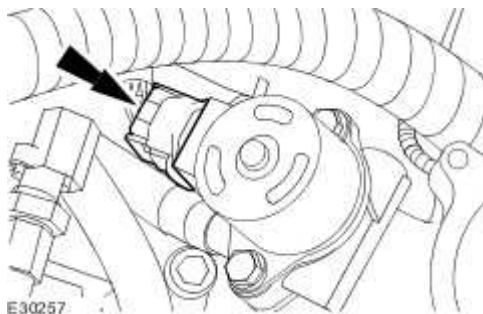
8 . **NOTE:**

Remove the sealing caps from the coolant ports.

Connect the coolant hoses.



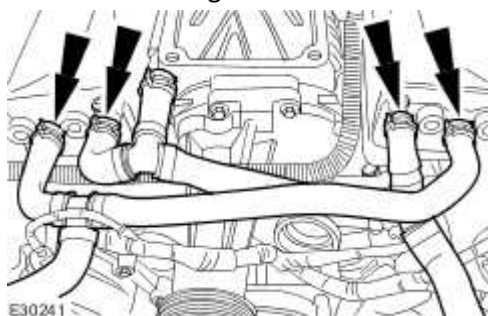
9 . Connect the EGR valve electrical connector.



10 . Connect the IAT sensor electrical connector.

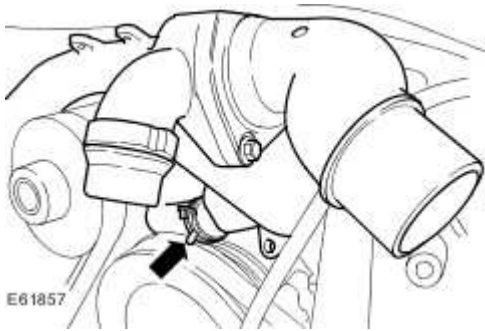


11 . Connect the charge air cooler coolant hoses.



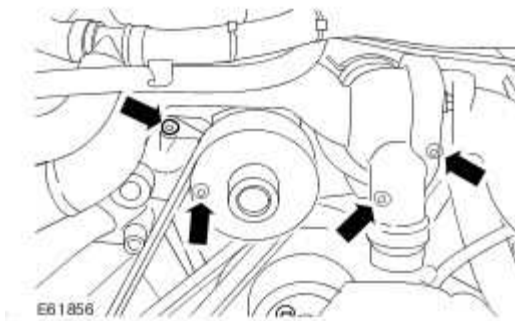
12 . Install the coolant assembly.

- ▶ Install new O-ring seals.
- ▶ Connect the coolant hose.

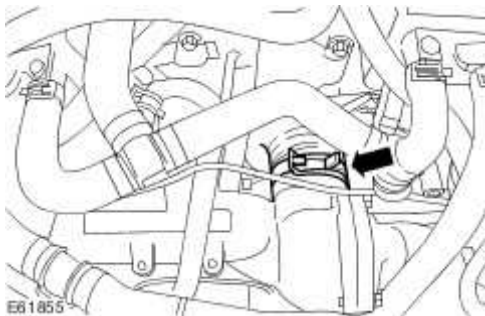


13 . Attach the coolant assembly.

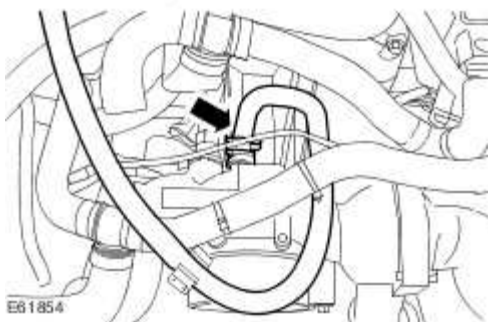
► Tighten to 10 Nm.



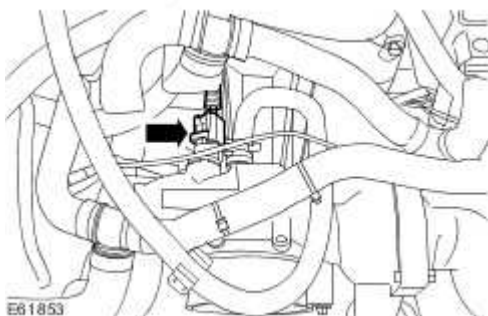
14 . Connect the coolant hose.



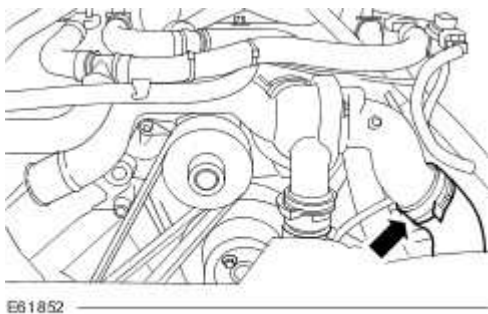
15 . Connect the coolant hose.



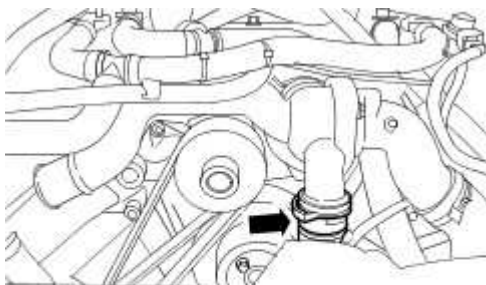
16 . Connect the ECT sensor electrical connector.



17 . Connect the coolant hose.

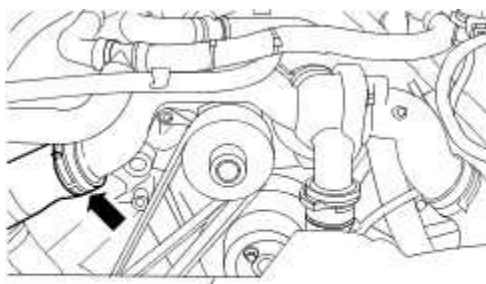


18 . Connect the coolant hose.



E61851

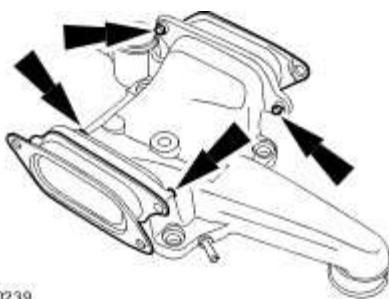
19 . Connect the coolant hose.



E61850

20 . Install new supercharger outlet pipe to charge air coolers ducts.

▶ Tighten to 8 Nm.



E30239

21 . Install a new supercharger outlet pipe gasket.

22 . Install new seals to the supercharger outlet pipe retaining bolts.

23 .

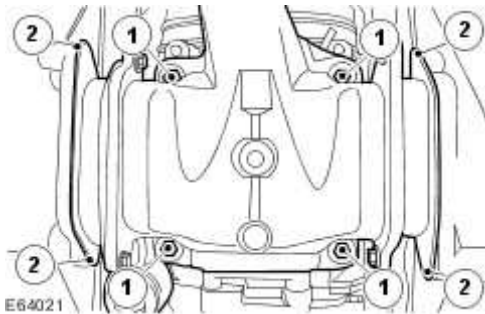


CAUTION: Make sure no foreign matter enters the supercharger.

Install the supercharger outlet pipe.

1) Tighten the supercharger outlet pipe retaining bolts to 10 Nm.

2) Tighten the charge air cooler ducts retaining bolts to 9 Nm.



24 . **NOTE:**

Remove the blanking caps.

Attach the supercharger outlet pipe coolant hose.

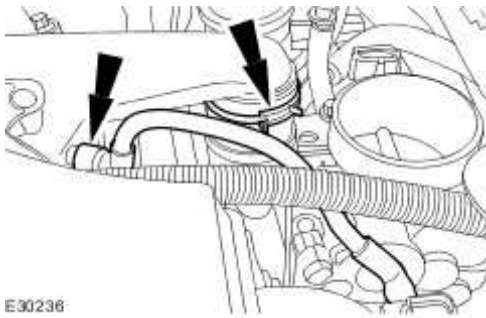


25 Install the throttle body.

- For additional information, refer to Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)

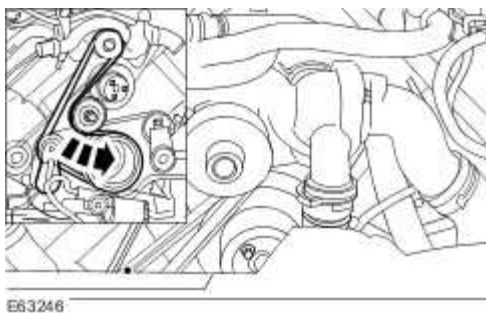
26 . Attach the hoses.

► Reposition the hose retaining clip.



27 . Attach the supercharger belt.

► Use a 1/2 inch square drive bar to rotate the supercharger belt tensioner.



28 . Install the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

29 . Install the coolant expansion tank.

For additional information, refer to Coolant Expansion Tank (26.15.01)

30 . Connect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)


31 . Carry out the cooling system filling and bleeding procedure.

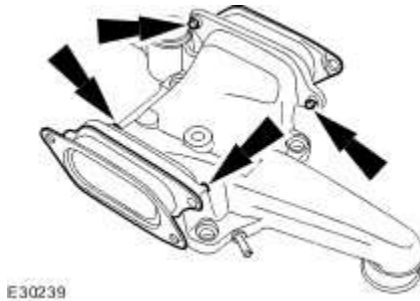
For additional information, refer to Cooling System Draining, Filling and Bleeding

Supercharger Outlet Pipe (18.50.16)

Installation

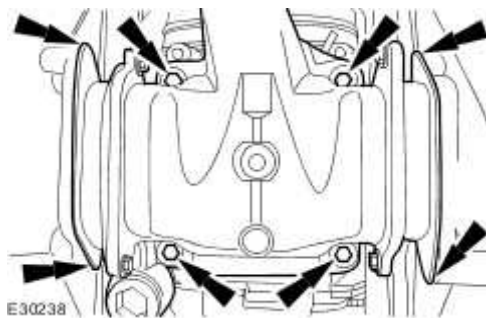
- 1 . Install new supercharger outlet pipe to charge air cooler ducts.

 Tighten to 8 Nm.



- 2 . Install a new supercharger outlet pipe gasket.
- 3 . Install new seals to the supercharger outlet pipe retaining bolts.
- 4 . Install the supercharger outlet pipe.

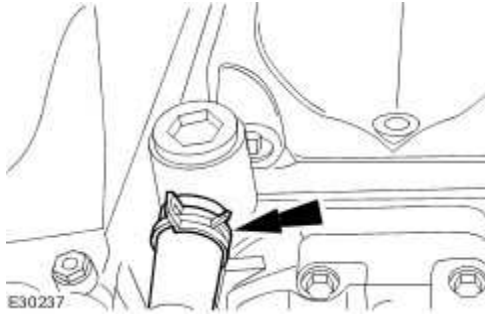
 Tighten to 9 Nm.



- 5 . **NOTE:**

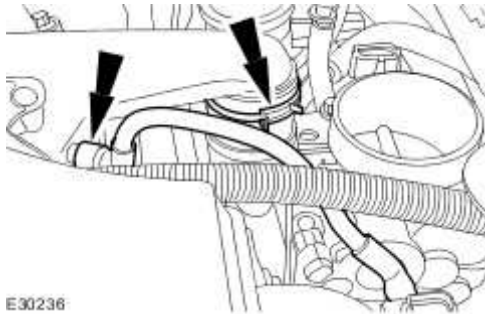
Remove the sealing caps from the coolant ports.

Attach the supercharger outlet pipe coolant hose.



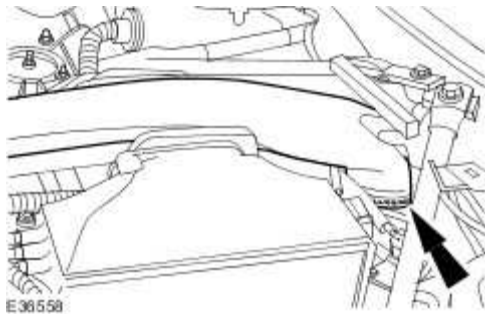
6 . Attach the hoses.

▶ Reposition the hose retaining clip.



7 . Install the throttle body intake pipe.

▶ Tighten to 5 Nm.



8 . Install the air cleaner outlet pipe.

For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

9 . Install the cowl vent screen. <<501-02>>

10 . Connect the battery ground cable. <<414-01>>

11 . Check and top up the coolant expansion tank.

303-12C : Intake Air Distribution and Filtering – 2.7L V6 – TdV6

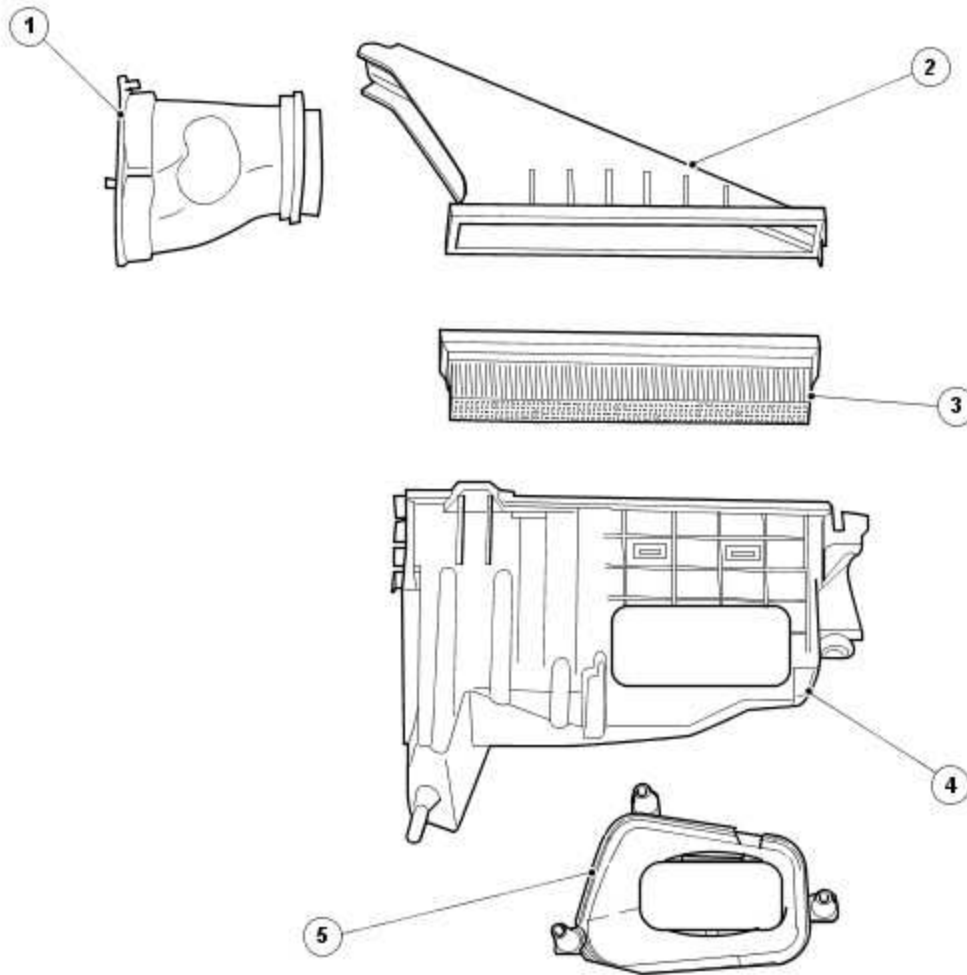
Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Air cleaner retaining bolt	8	-	71

Intake Air Distribution and Filtering



E66075

Item	Part Number	Description
1	—	Air cleaner outlet pipe
2	—	Air cleaner cover
3	—	Air cleaner element
4	—	Air cleaner base
5	—	Air cleaner intake pipe

NOTE:

The air cleaner outlet pipe and air cleaner cover are only supplied as an assembly and must not be disassembled.

The primary functional requirements of the air induction system is to:

deliver clean filtered air to the engine with minimum pressure loss.

to reduce the engine intake and structure related noises to within legal & vehicle requirements.

manage the induction of water, sand or snow to prevent adverse effect on vehicle operation.

minimize air temperature rise over ambient air temperature at the throttle body/turbo in high ambient conditions.

purge the hot air from the intake system quickly whilst the engine is hot, and after a period of rest. This is to maximize engine drive away performance.

Intake Air Distribution and Filtering

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

For information on the operation of the system,
Intake Air Distribution and Filtering

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical and electrical damage.

Mechanical	Electrical
Hoses and ducts (damage/connections)	
Air cleaner element (contaminated/blocked)	Mass air flow (MAF) sensor(s)
Restricted air intake	Intake air shutoff throttle
Vacuum hoses	Harness (security/damage)
Pipework to turbochargers	Connections (security/damage)
Turbocharger(s)	Port de-activation system
Charge air coolers (contaminated/blocked)	

- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

- 4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC index, or the symptom chart if no DTCs are set.

Symptom chart

Symptom	Possible cause	Action
---------	----------------	--------

Vehicle does not start/hard starting/poor performance	Restricted/blocked air intake Restricted/blocked air cleaner element Turbocharger fault Intake air shutoff throttle	Clear the restriction, Air Cleaner (19.10.05) Replace the air cleaner element as necessary, Air Cleaner Element (19.10.08) Check the turbochargers, Turbocharger Check the intake air shutoff throttle function (make sure the intake air shutoff throttle returns to the open position), Intake Air Shutoff Throttle
Excessive intake noise	Compressed intake air leak after the turbocharger Air intake pipe disconnected/damaged after the air cleaner Air cleaner assembly incorrectly assembled/damaged	Check the joint between the air cleaner outlet pipe and the intake air shutoff throttle. Check the joints between the intake air shutoff throttle and the intake manifolds, Intake Air Shutoff Throttle Check the charge air cooler seals, Charge Air Cooler Check the air intake system and hoses for correct installation/damage, Air Cleaner (19.10.05)
Excessive combustion noise	Port de-activation camshaft cover control valves	For control valve tests, GO to Pinpoint Test G552277p1.

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of powertrain DTCs,
Electronic Engine Controls

DTC	Description	Possible cause	Action
P009700	Air charge temperature	Air charge temperature sensor circuit: low	For air charge temperature sensor tests,

	sensor circuit	input	Electronic Engine Controls
P009800	Air charge temperature sensor circuit	Air charge temperature sensor circuit: high input	For air charge temperature sensor tests, Electronic Engine Controls
P009900	Air charge temperature sensor circuit	Air charge temperature sensor circuit: intermittent/erratic	For air charge temperature sensor tests, Electronic Engine Controls
P010000	Mass air flow (MAF) sensor range/performance (right hand bank)	MAF sensor circuit: high resistance MAF sensor circuit: short circuit to ground MAF sensor circuit: short circuit to power MAF sensor failure ECM failure	For MAF sensor tests, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P010200	Mass air flow (MAF) too low on right hand bank	MAF sensor circuit: high resistance MAF sensor circuit: short circuit to ground MAF sensor failure Exhaust gas recirculation (EGR) valve stuck open/closed Air leakage Turbocharger fault ECM failure	For MAF sensor tests, Electronic Engine Controls For EGR system tests, Engine Emission Control Check for evidence of air leakage (see visual inspection). Check for turbocharger codes. For turbocharger tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.
P010300	Mass air flow (MAF) too high on right hand bank	MAF sensor circuit: short circuit to power MAF sensor failure Air leakage Turbocharger fault ECM failure	For MAF sensor tests, Electronic Engine Controls Check for evidence of air leakage (see visual inspection). Check for turbocharger codes. For turbocharger tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.

			manual if an ECM is suspect.
P010400	Mass air flow (MAF) sensor circuit intermittent/erratic (right hand bank)	MAF sensor circuit: high resistance MAF sensor circuit: short circuit to ground MAF sensor circuit: short circuit to power MAF sensor failure ECM failure	For MAF sensor tests, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P010A00	Mass air flow (MAF) sensor range/performance (left hand bank)	MAF sensor circuit: high resistance MAF sensor circuit: short circuit to ground MAF sensor circuit: short circuit to power MAF sensor failure ECM failure	For MAF sensor tests, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P010C00	Mass air flow (MAF) too low on left hand bank	MAF sensor circuit: high resistance MAF sensor circuit: short circuit to ground MAF sensor failure Exhaust gas recirculation (EGR) valve stuck open/closed Air leakage Turbocharger fault ECM failure	For MAF sensor tests, Electronic Engine Controls For EGR system tests, Engine Emission Control Check for evidence of air leakage (see visual inspection). Check for turbocharger codes. For turbocharger tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.
P010D00	Mass air flow (MAF) too high on left hand bank	MAF sensor circuit: short circuit to power MAF sensor failure	For MAF sensor tests, Electronic Engine Controls Check for evidence of air leakage (see visual inspection). Check for turbocharger codes.

		<p>Air leakage</p> <p>Turbocharger fault</p> <p>ECM failure</p>	<p>For turbocharger tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P010E00	Mass air flow (MAF) sensor intermittent/erratic (left hand bank)	<p>MAF sensor circuit: high resistance</p> <p>MAF sensor circuit: short circuit to ground</p> <p>MAF sensor circuit: short circuit to power</p> <p>MAF sensor failure</p> <p>ECM failure</p>	<p>For MAF sensor tests, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P010F00	Mass air flow (MAF) sensor correlation	<p>MAF sensor(s) circuit: high resistance</p> <p>MAF sensor(s) circuit: short circuit to ground</p> <p>MAF sensor(s) circuit: short circuit to power</p> <p>MAF sensor failure</p> <p>Turbocharger actuator(s) circuit: high resistance</p> <p>Turbocharger actuator(s) circuit: short circuit to ground</p> <p>Turbocharger actuator(s) circuit: short circuit to power</p> <p>Turbocharger actuator failure</p> <p>ECM failure</p>	<p>For MAF sensor tests, Electronic Engine Controls Check for turbocharger codes. For turbocharger tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P011200	Intake air temperature (IAT) 1 sensor circuit	<p>IAT1 sensor circuit: low input</p>	<p>For IAT1 sensor tests, Electronic Engine Controls</p>

P011300	Intake air temperature (IAT) 1 sensor circuit	IAT1 sensor circuit: high input	For IAT1 sensor tests, Electronic Engine Controls
P011400	Intake air temperature (IAT) 1 sensor circuit	IAT1 sensor circuit: intermittent/erratic	For IAT1 sensor tests, Electronic Engine Controls
P200800	Port de-activation solenoid circuit	Port de-activation solenoid circuit: high resistance	For port de-activation solenoid circuit tests, GO to Pinpoint Test G552277p2.
P200900	Port de-activation solenoid circuit	Port de-activation solenoid circuit: short circuit to ground	For port de-activation solenoid circuit tests, GO to Pinpoint Test G552277p2.
P201000	Port de-activation solenoid circuit	Port de-activation solenoid circuit: short circuit to battery	For port de-activation solenoid circuit tests, GO to Pinpoint Test G552277p2.

Pinpoint tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

NOTE:

If DTCs are recorded and a fault is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

PINPOINT TEST G552277p1 : CHECK THE OPERATION OF THE PORT DE-ACTIVATION CAMSHAFT COVER CONTROL VALVE(S)

G552277t1 : CHECK THE VACUUM LINES TO THE CONTROL VALVES

1. Check the vacuum lines for connection, security and condition.

Are the vacuum lines connected, secure and in good condition?

-> **Yes**

GO to Pinpoint Test G552277t2.

-> **No**

RECTIFY or replace as necessary. Test the system for normal operation.

G552277t2 : CHECK THE FUNCTION OF THE CONTROL VALVES

1. Disconnect the vacuum line to the suspect control valve actuator. 2. Connect a suitable hand vacuum pump to the control valve actuator. 3. Apply a vacuum to the actuator. 4. Observe the actuator linkage operation.

Does the actuator linkage operate?

-> **Yes**

CHECK for DTCs indicating an intake air shutoff throttle fault.

-> **No**

INSTALL a new camshaft cover. Test the system for normal operation.

PINPOINT TEST G552277p2 : PORT DE-ACTIVATION SOLENOID AND CIRCUIT

G552277t3 : CHECK FOR POWER TO THE PORT DE-ACTIVATION SOLENOID

1. Port de-activation solenoid connector, C36

Circuit	Pin
Power	01

Signal from ECM	02
-----------------	----

2. Engine control module (ECM) connector, C100

Circuit	Pin
Port de-activation solenoid - signal	K4

3. Key off. 4. Disconnect the port de-activation solenoid connector, C36. 5. Key on, engine off. 6. Measure the voltage between:

C36, harness side	Battery
Pin 01	Negative terminal

Is the voltage between 9 and 15 volts?

-> Yes

GO to Pinpoint Test G552277t4.

-> No

REPAIR the power circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552277t4 : CHECK THE PORT DE-ACTIVATION SOLENOID SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C36, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552277t5.

-> No

GO to Pinpoint Test G552277t8.

G552277t5 : CHECK THE PORT DE-ACTIVATION SOLENOID SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C36, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552277t6.

-> **No**

GO to Pinpoint Test G552277t9.

G552277t6 : CHECK THE PORT DE-ACTIVATION SOLENOID SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C36, harness side	C100, harness side
Pin 02	Pin K4

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G552277t7.

-> **No**

REPAIR the high resistance. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552277t7 : CHECK THE COMPONENT RESISTANCE

1. Measure the resistance between:

C36, component side	C36, component side
Pin 01	Pin 02

Is the resistance between 0 and 5.5 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Port de-activation solenoid connector - Port de-activation solenoid - ECM connector - ECM

-> No

INSTALL a new port de-activation solenoid. Clear any DTCs, test the system for normal operation.

G552277t8 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C36, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552277t9 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C36, harness side	Battery

Pin 02	Positive terminal
--------	-------------------

Is the resistance greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

Air Cleaner (19.10.05)

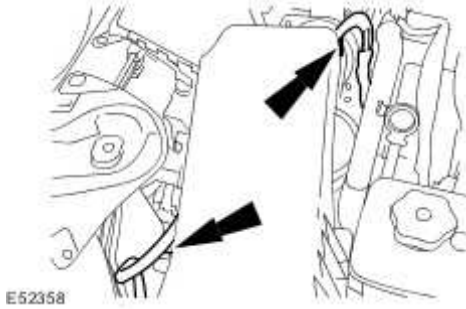
Special Service Tools



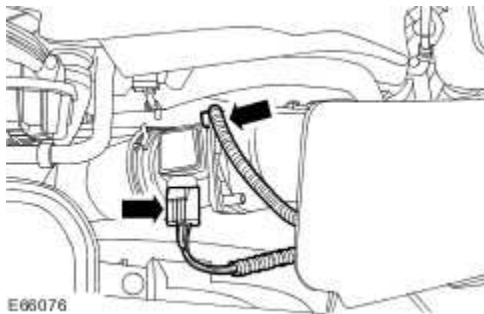
Remover/Install, Cooling Hose Clamp
303-397

Removal

- 1 . Remove the radiator grille opening panel.
For additional information, refer to Radiator Grille Opening Panel (76.10.06)
- 2 . Detach the mass air flow (MAF) sensor wiring harness.



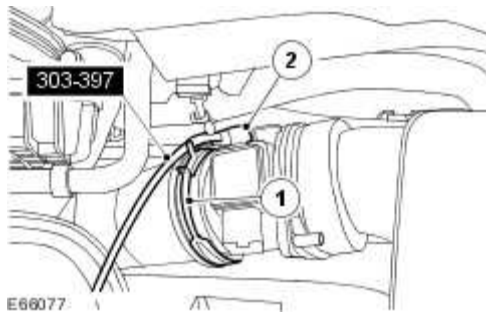
- 3 . Disconnect the MAF sensors electrical connectors.



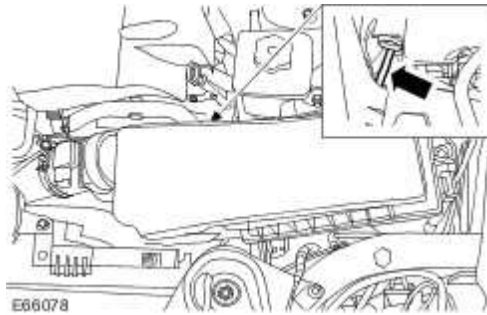
- 4 . Using the special tool, detach the MAF sensor outlet pipes.

1) Detach the upper MAF sensor outlet pipe.

2) Detach the lower MAF sensor outlet pipe.

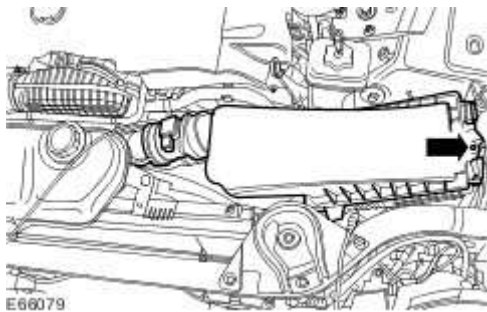


5 . Disconnect the port deactivation vacuum hose.



6 . Remove the air cleaner.

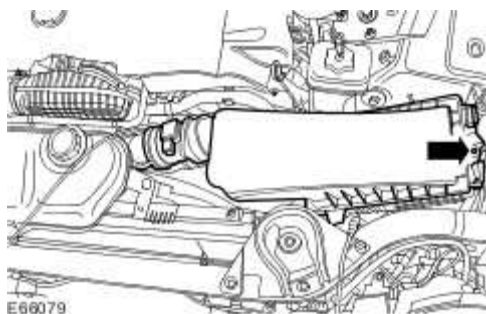
▶ Remove the air cleaner retaining bolt.



Installation

- 1 . To install, reverse the removal procedure.

▶ Tighten to 8 Nm.



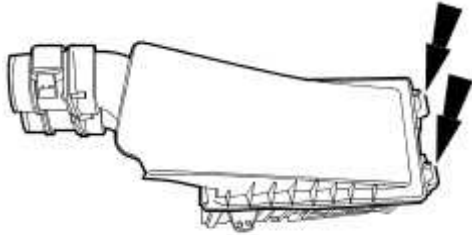
Air Cleaner Element (19.10.08)

Removal

- 1 . Remove the air cleaner.

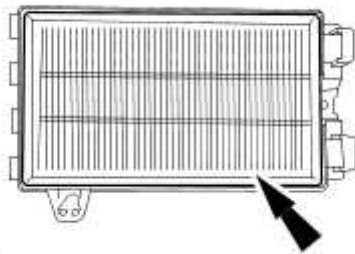
For additional information, refer to Air Cleaner (19.10.05)

- 2 . Remove the air cleaner cover.



E50536

- 3 . Remove the air cleaner element.



E50537

Installation

- 1 . To install, reverse the removal procedure.

Charge Air Cooler

- 1 The charge air cooler is removed as part of the radiator assembly and can be serviced separately.
For additional information, refer to

303-13 : Evaorative Emissions

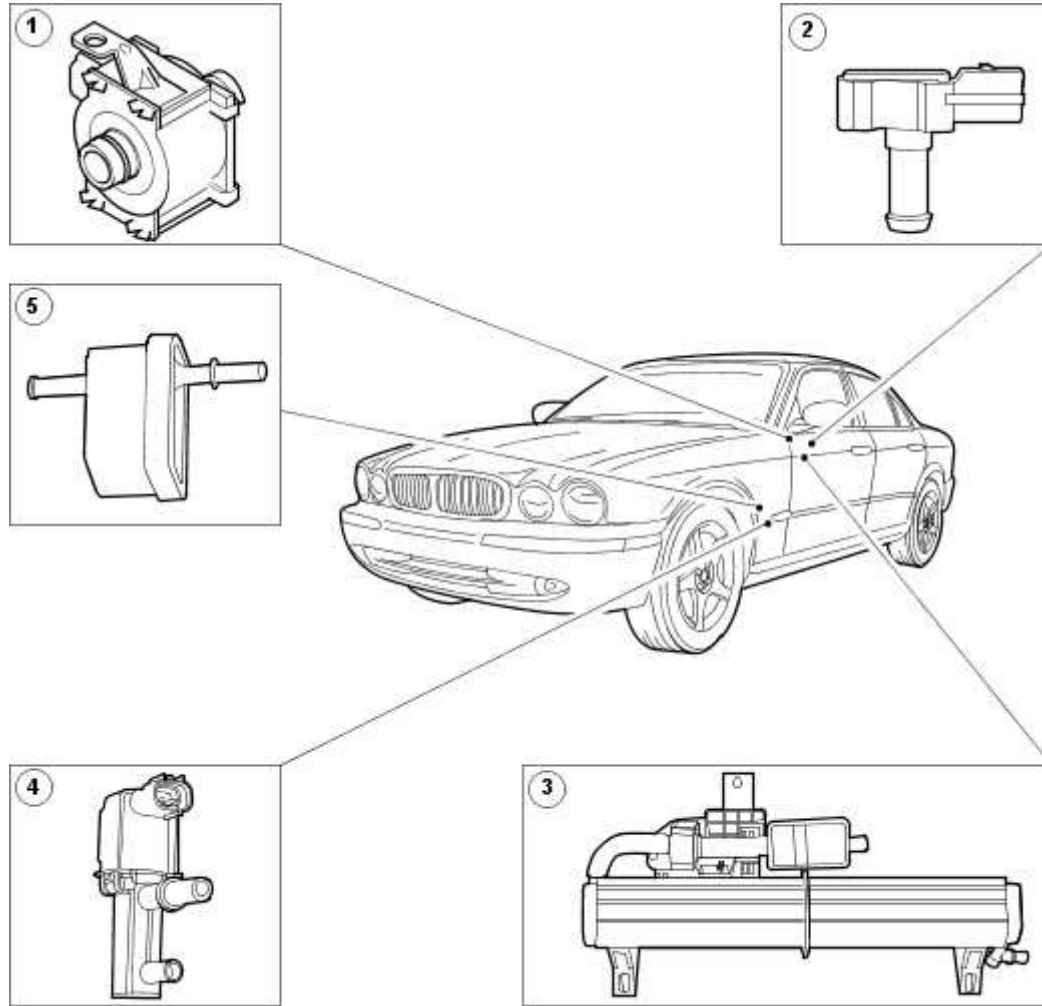
Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Evaporative emission canister carrier bolts	7	—	62

Evaporative Emissions - VIN Range: G00442->G45703

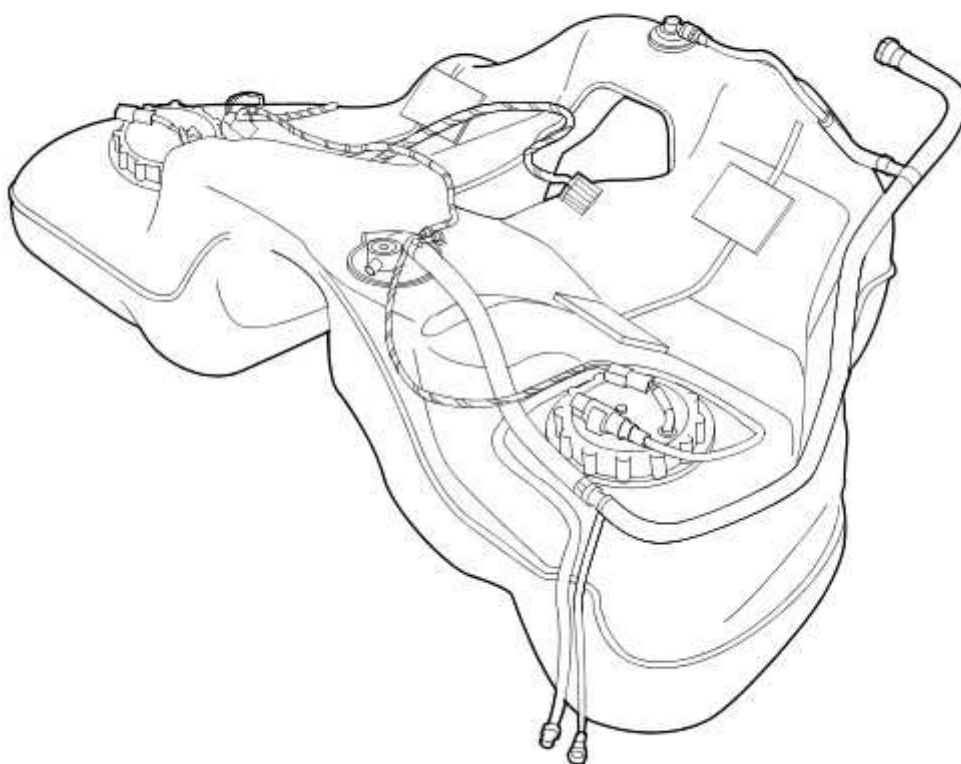


E37231

Item	Part Number	Description
1	—	Evaporative emission canister vent solenoid
2	—	Fuel tank pressure sensor
3	—	Evaporative emission canister
4	—	Evaporative emission canister purge valve

5	—	Evaporative emission canister purge valve resonator.
---	---	--

The evaporative emission fuel vapor management system consists of an evaporative emission canister, evaporative emission canister purge valve and an evaporative emission canister purge valve resonator. A combination of plastic pipes and rubber hoses connect the evaporative emission canister to the fuel tank and the evaporative emission canister purge valve to the intake manifold.



E37332

Onboard refuel vapour recovery (ORVR).

The vehicle is fitted with an onboard refuel vapour recovery (ORVR) type fuel tank. During refuelling all vapour is collected in the evaporative emission canister as well as in normal vehicle operations.

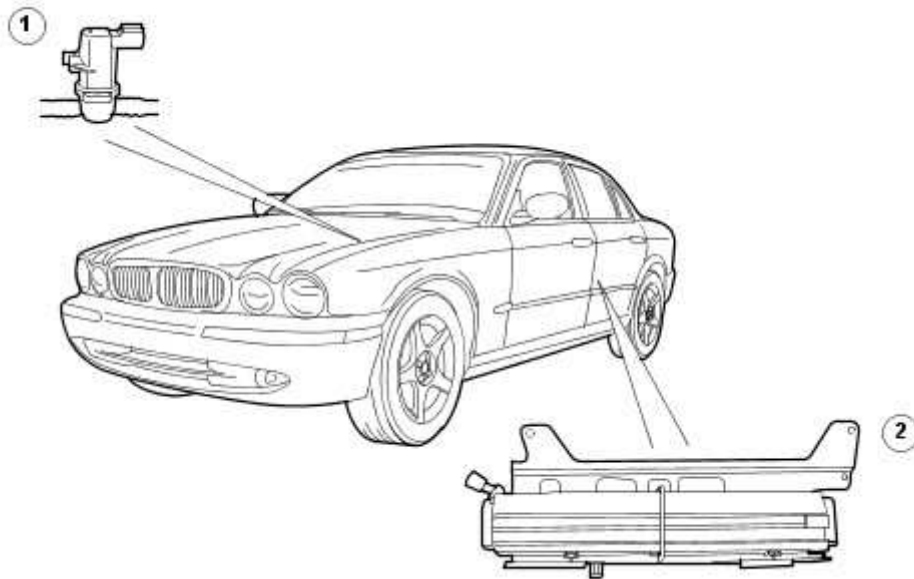
On Federal (USA) specification vehicles the fuel vapor management system uses a canister vent solenoid and a fuel tank pressure sensor which are used during the engine management system on board diagnostic routines.

When the evaporative emission canister purge valve is closed, the fuel tank is vented into the evaporative emission canister through the fuel tank roll-over valve. The evaporative emission

canister absorbs the fuel vapor and prevents the release of hydrocarbons into the atmosphere. When the vapor evaporative emission canister purge valve is opened, the canister is exposed to the intake manifold vacuum and the fuel vapor deposits are drawn into the manifold where they mix with the incoming air/fuel charge.

The evaporative emission fuel vapor management system is controlled by the engine control module according to calibrated data tables.

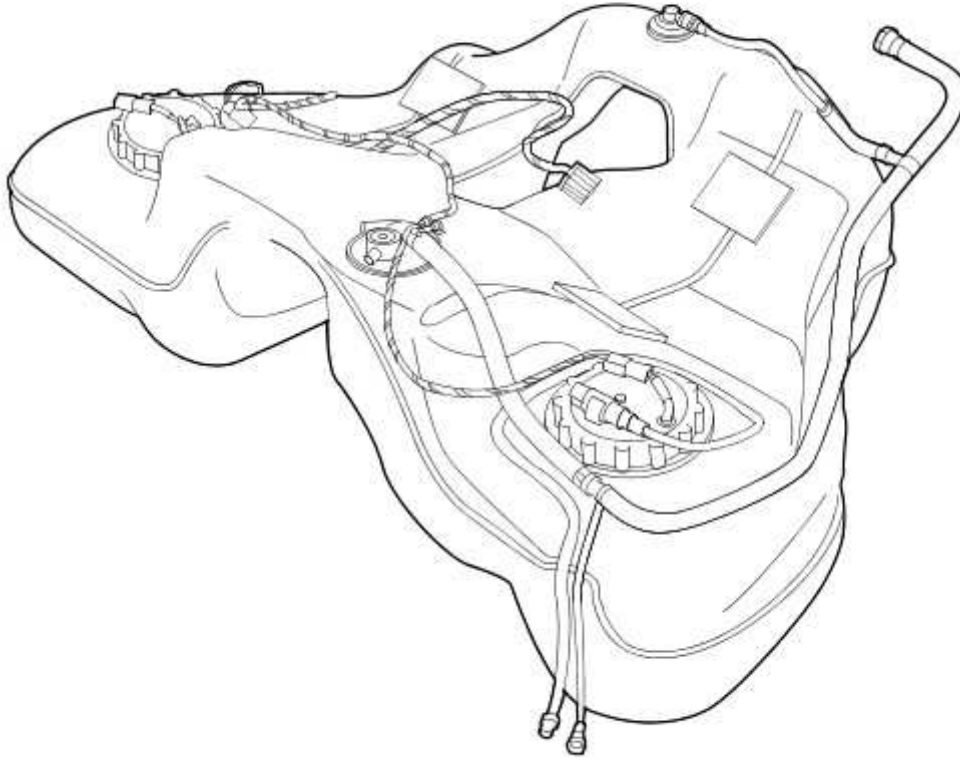
Evaporative Emissions - VIN Range: G45704->G99999



E63946

Item	Part Number	Description
1	—	Evaporative emission canister purge valve
2	—	Evaporative emission canister

The evaporative emission fuel vapor management system consists of an evaporative emission canister and an evaporative emission canister purge valve. A combination of plastic pipes and rubber hoses connect the evaporative emission canister to the fuel tank and the evaporative emission canister purge valve to the intake manifold.



E37332

Onboard refuel vapor recovery (ORVR).

The vehicle is fitted with an onboard refuel vapor recovery (ORVR) type fuel tank. During refuelling all vapor is collected in the evaporative emission canister as well as in normal vehicle operations.

When the evaporative emission canister purge valve is closed, the fuel tank is vented into the evaporative emission canister through the fuel tank roll-over valve. The evaporative emission canister absorbs the fuel vapor and prevents the release of hydrocarbons into the atmosphere.

When the vapor evaporative emission canister purge valve is opened, the canister is exposed to the intake manifold vacuum and the fuel vapor deposits are drawn into the manifold where they mix with the incoming air/fuel charge.

The evaporative emission fuel vapor management system is controlled by the engine control module (ECM) according to calibrated data tables.

Evaporative Emissions - VIN Range: G00442->G45703

Preliminary Inspection

- 1 . Visually inspect for obvious signs of mechanical or electrical damage, blown fuses, etc.
- 2 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 3 . If the concern is not visually evident, verify the symptom and proceed with diagnosis, using the Jaguar approved diagnostic system, where available.
- 4 . Where K-Line or Vacutec equipment is available, it should be used as an aid to diagnosis. The equipment must be capable of testing to the 0.020 thou standard.

Diagnostic Drive Cycles

Following the setting of a DTC, the appropriate repairs must be carried out, and the normal operation of the system checked. This will be done by performing a series of drive cycles which will enable the vehicle to operate the evaporative emissions system as a function check. The following drive cycles cover the use of the Jaguar approved diagnostic system, a scan tool, and a test with no additional equipment, where possible.

Flow check monitor drive cycle conditions (non-Federal)

NOTE:

These conditions must be satisfied before the test is commenced.

This drive cycle should be performed following rectification work on the system.

Make sure the fuel tank is between one third and three quarters full. (Adding fuel will increase vapor generation; the diagnostic will not run if the vapor concentration is too great).

Make sure the ambient air temperature is above -5°C (23°F).

Flow check monitor drive cycle (non-Federal)

Drive the vehicle for a minimum of 15 minutes, avoiding severe or excessive fuel movement.

Avoiding excessive fuel movement, gently bring the vehicle to rest (coast to a stop).

Allow the vehicle to idle for two minutes.

Full Evaporative system monitor drive cycle conditions

NOTE:

These conditions must be satisfied before the test is commenced.

Make sure the fuel filler cap is correctly fitted.

Clear the DTCs. (Perform a code clear, even if no codes are present. This will reset TIDs).

Make sure the fuel tank is between one third and three quarters full (adding fuel will increase vapor generation; the diagnostic will not run if the vapor concentration is too great).

Drive the vehicle for a minimum of two minutes, and until fully warm (temperature gauge just below mid-point).

Make sure that the purge valve is operating, either by touch, sound, or using datalogger (purge vapor management valve-duty cycle). If the purge is not active, perform the "drive cycle for green ECM" in this section.

Full Evaporative system monitor drive cycle

Drive the vehicle to a suitable road where the test can be carried out, switch off the ignition.

Leave the ignition switched off for 30 seconds.

Restart the engine, accelerate briskly to 80 kilometers per hour (50 miles per hour), making sure that the engine speed reaches at least 3500 rpm for a minimum of five seconds.

40 thou test, using the Jaguar approved diagnostic system

Avoiding high engine loads, drive the vehicle steadily between 64 and 97 kilometers per hour (40 and 60 miles per hour). Using the Jaguar approved diagnostic system, monitor the evaporative valve duty cycle (purge vapor management valve-duty cycle), CCV status (canister close valve-vapor recovery system), and the FTPS (fuel tank pressure-vapor recovery system). The Jaguar approved diagnostic system will give an indication when the test is active. Dependant on the level of vapor concentration, it may take up to 30 minutes for the test to initialize. (Vapor concentration cannot be measured using the Jaguar approved diagnostic equipment). When the test has initialized (CCV closed), it will take up to 90 seconds to complete. Avoid excessive fuel movement while the test is active.

20 thou test, using the Jaguar approved diagnostic system

Continue driving the vehicle steadily between 64 and 97 kilometers per hour (40 and 60 miles per hour) avoiding high engine loads for a further 10 minutes.

Avoiding excessive fuel movement, gently bring the vehicle to rest (coast to a stop).

Allow the vehicle to idle for 2 minutes.

Use the Jaguar approved diagnostic system to monitor the evaporative valve duty cycle (purge vapor management valve-duty cycle), CCV status (canister close valve-vapor recovery system), and the FTPS (fuel tank pressure-vapor recovery system). The Jaguar approved diagnostic system will give an indication when the test is active. When the test has initialized (CCV closed), it will take up to 90 seconds to complete.

If the 20 thou test has not run, it is likely that the vapor concentration in the purge system is too great. In this case, carry out the following:

Drive the vehicle steadily for a further 30 minutes, avoiding excessive fuel movement.

Avoiding excessive fuel movement, gently bring the vehicle to rest (coast to a stop).

Allow the vehicle to idle for 2 minutes.

Use the Jaguar approved diagnostic system to monitor the evaporative valve duty cycle (purge vapor management valve-duty cycle), CCV status (canister close valve-vapor recovery system), and the FTPS (fuel tank pressure-vapor recovery system). The Jaguar approved diagnostic system will give an indication when the test is active. When the test has initialized (CCV closed), it will take up to 90 seconds to complete.

If the 20 thou test fails to run a second time, repeat the entire test.

Check for DTCs. Rectify as indicated.

40 thou test, using scan tool

Avoiding high engine loads, drive the vehicle steadily between 64 and 97 kilometers per hour (40 and 60 miles per hour).

When the test has initialized, using the scan tool, monitor the evaporative valve duty cycle, CCV status, and the FTPS (the scan tool should give an indication when the test is active).

When the test has initialized (CCV closed), it will take up to 90 seconds to complete.

To make sure that the test has completed, TID 08 in mode 6 must be checked (if the test has not completed, this TID will display 0. Any other value indicates test completion).

If the test did not complete, repeat the test.

20 thou test, using scan tool

Continue driving the vehicle steadily between 64 and 97 kilometers per hour (40 and 60 miles per hour) avoiding high engine loads for a further 10 minutes.

Avoiding excessive fuel movement, gently bring the vehicle to rest (coast to a stop).

Allow the vehicle to idle for 2 minutes.

When the test has initialized, using the scan tool, monitor the evaporative valve duty cycle, CCV status, and the FTPS (the scan tool should give an indication when the test is active).

When the test has initialized (CCV closed), it will take up to 90 seconds to complete.

To make sure that the test has completed, TID 06 in mode 6 must be checked (if the test has not completed, this TID will display 0. Any other value indicates test completion).

If the test did not complete, repeat the test.

If the 20 thou test has not run, it is likely that the vapor concentration in the purge system is too great. In this case, drive the vehicle steadily for a further 30 minutes, avoiding excessive fuel movement, then repeat the test.

Check for DTCs. Rectify as indicated.

40 thou and 20 thou tests using no additional equipment

The test procedure and conditions are as for the Jaguar approved diagnostic system or scan tool, but no confirmation of the test having run is possible without the use of one of these instruments. The DTC will be set if the fault still exists, but the possibility exists that the conditions for the test to run may not have been met, in which case, the DTC may not be set until the owner reproduces the conditions in which the fault originally occurred.

Drive cycle for "green" ECM

To enable the ECM to re-learn fuelling adaptations.

NOTE:

This procedure should be performed whenever the vehicle battery has been disconnected.

Due to component tolerance and wear during the normal running of a vehicle, fuelling and air requirements for an engine will vary over time. The ECM has the ability to adjust for this variation by "learning" the level of compensation that is required (these compensation values are referred to as adaptations).

If the vehicle battery is disconnected, all adaptations held within the ECM will be lost (ie, set to zero). The ECM is then referred to as "green". To enable the vehicle to function correctly, the ECM must "relearn" these adaptations.

There are five areas or sites that need to be relearned:

Allow the vehicle to idle until fully warm (temperature gauge just below mid-point).

Allow to idle for a further three minutes, minimum.

Drive the vehicle with the air conditioning **OFF** on a level road using a constant throttle, or speed control if fitted, for at least one minute in the following gears, at the stated engine speeds for each of the sites below.

"Green" ECM drive cycle chart. Site 1

NOTE:

The vehicle speed is for guidance only. **DO NOT** use the vehicle speed as the target to set adaptations.

Monitor condition	Parameters
GEAR	P
ENGINE SPEED	Idle
VEHICLE SPEED (GUIDE ONLY)	0 mph

"Green" ECM drive cycle chart. Site 2

NOTE:

The vehicle speed is for guidance only. **DO NOT** use the vehicle speed as the target to set adaptations.

Monitor condition	Parameters
GEAR	2
ENGINE SPEED	1595 rpm
VEHICLE SPEED (GUIDE ONLY)	15.4 kph (9.56 mph)

Monitor condition	Parameters
GEAR	2
ENGINE SPEED	1295 rpm

VEHICLE SPEED (GUIDE ONLY)	11.0 kph (6.8 mph)
----------------------------	--------------------

Monitor condition	Parameters
GEAR	2
ENGINE SPEED	1158 rpm
VEHICLE SPEED (GUIDE ONLY)	14.4 kph (8.7 mph)

Monitor condition	Parameters
GEAR	2
ENGINE SPEED	984 rpm
VEHICLE SPEED (GUIDE ONLY)	6.4 kph (4.0 mph)

"Green" ECM drive cycle chart. Site 3

NOTE:

The vehicle speed is for guidance only. **DO NOT** use the vehicle speed as the target to set adaptations.

Monitor condition	Parameters
GEAR	2
ENGINE SPEED	2385 rpm
VEHICLE SPEED (GUIDE ONLY)	37.5 kph (23.3 mph)

Monitor condition	Parameters
GEAR	2

ENGINE SPEED	1877 rpm
VEHICLE SPEED (GUIDE ONLY)	30.4 kph (18.9 mph)

Monitor condition	Parameters
GEAR	2
ENGINE SPEED	1831 rpm
VEHICLE SPEED (GUIDE ONLY)	32.0 kph (19.9 mph)

Monitor condition	Parameters
GEAR	2
ENGINE SPEED	1481 rpm
VEHICLE SPEED (GUIDE ONLY)	22.4 kph (14.0 mph)

"Green" ECM drive cycle chart. Site 4

NOTE:

The vehicle speed is for guidance only. **DO NOT** use the vehicle speed as the target to set adaptations.

Monitor condition	Parameters
GEAR	3
ENGINE SPEED	2635 rpm
VEHICLE SPEED (GUIDE ONLY)	66.5 kph (41.3 mph)

Monitor condition	Parameters
-------------------	------------

GEAR	3
ENGINE SPEED	1937 rpm
VEHICLE SPEED (GUIDE ONLY)	44.8 kph (27.8 mph)

Monitor condition	Parameters
GEAR	3
ENGINE SPEED	2152 rpm
VEHICLE SPEED (GUIDE ONLY)	57.6 kph (35.8 mph)

Monitor condition	Parameters
GEAR	3
ENGINE SPEED	2250 rpm
VEHICLE SPEED (GUIDE ONLY)	64.0 kph (39.8 mph)

"Green" ECM drive cycle chart. Site 5

NOTE:

The vehicle speed is for guidance only. **DO NOT** use the vehicle speed as the target to set adaptations.

Monitor condition	Parameters
GEAR	3
ENGINE SPEED	3500 rpm
VEHICLE SPEED (GUIDE ONLY)	89.0 kph (55.3 mph)

Monitor condition	Parameters
GEAR	3
ENGINE SPEED	3287 rpm
VEHICLE SPEED (GUIDE ONLY)	80.0 kph (50.0 mph)

Monitor condition	Parameters
GEAR	3
ENGINE SPEED	2891 rpm
VEHICLE SPEED (GUIDE ONLY)	80.0 kph (50.0 mph)

Monitor condition	Parameters
GEAR	3
ENGINE SPEED	2592 rpm
VEHICLE SPEED (GUIDE ONLY)	80.0 kph (50.0 mph)

Bring the vehicle to rest, allow to idle for one minute.



WARNING: The following tests may involve parts which are hot.

If sufficient adaptations have occurred, the canister purge valve should now be operating. This can be verified manually by either touching or listening to the valve. By touching the canister purge valve, it should be possible to feel the valve switching. Listening to the canister purge valve is best done using a workshop stethoscope, through which it should be possible to hear the valve operating.

Diagnostic Trouble Code (DTC) Index/Symptom Chart

1 . Where the Jaguar approved diagnostic system is available, complete the S93 report before clearing any or all fault codes from the vehicle.

NOTE:

If a DTC cannot be cleared, then there is a permanent fault present that flags again as soon as it is cleared. (The exception to this is P1260, which will only clear following an ignition **OFF/ON** cycle after rectification).

2 . If the cause is not visually evident and the Jaguar approved diagnostic system is not available, use a fault code reader to retrieve the fault codes before proceeding to the Diagnostic Trouble Code (DTC) Index Chart, or the Symptom Chart if no DTCs are set.

3 . Using the Jaguar approved diagnostic system where available, and a scan tool where not, check the freeze frame data for information on the conditions applicable when the fault was flagged. The format of this will vary, depending on the tool used, but can provide information useful to the technician in diagnosing the fault.



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

Symptom	Possible Source	Action
Difficulty in filling	Restriction in the vapor line between the fuel tank and the carbon canister outlet/atmospheric port	Refer to Action for DTC P0446
Fuel smell	Adaptations incomplete Purge valve inoperative	Carry out adaptations procedure, check purge valve operation
Message center display (see below)	Fuel filler cap missing/not tightened after refuelling	Check fuel filler cap, refer to Action for DTC P0455,

Warning Light	Message	Default Mode	DTC
Check engine (after two trips)	None	ECM default. (Canister purge inhibited, adaptive fuel metering inhibited).	P0441, P0442, P0443, P0444, P0445, P0446, P0447, P0448, P0455, P0456
Check engine (after two trips)	None	None	P0450, P0452, P0453
Red	Check fuel filler cap	ECM default. (Canister purge inhibited, adaptive fuel metering inhibited).	P0455

Diagnostic Trouble Code	Description	Possible Source	Action
P0441 (Euro only)	Incorrect purge flow	<p>Evaporative canister purge pipe restricted, leaking, disconnected</p> <p>Evaporative canister vent restricted</p> <p>Evaporative canister purge valve to engine pipe(s) restricted, leaking, disconnected</p> <p>Evaporative canister purge valve failure</p>	GO to Pinpoint Test G307413p1.
P0442	Leak detected. 40 thou	<p>Fuel tank filler cap seal defective</p> <p>System leak (canister damage, pipework damage)</p> <p>Canister close valve leaking</p> <p>Fuel tank leak</p>	<p>Check filler cap, system pipework, fuel tank. GO to Pinpoint Test G307413p2.</p> <p>. For fuel tank information, <<310-01>> Where K-Line or Vacutec equipment is available, carry out the appropriate test. See bulletin 05.1-29, or Vacutec operating instructions</p>
P0443	Canister purge valve malfunction	Canister purge valve failure	Carry out system pressure check (K-Line or Vacutec equipment. See

	(leaking)		bulletin 05.1-29, or Vacutec operating instructions)
P0444	Canister purge valve circuit open circuit	<p>Canister purge valve disconnected</p> <p>Canister purge valve to ECM drive circuit; open circuit, high resistance</p> <p>Canister purge valve failure</p>	<p>Check purge valve connections, GO to Pinpoint Test G307413p2.</p> <p>.</p>
P0445	Canister purge valve circuit short circuit	<p>Canister purge valve to ECM drive circuit; short circuit to ground</p> <p>Canister purge valve failure</p>	<p>GO to Pinpoint Test G307413p2.</p> <p>.</p>
P0446	Canister close valve malfunction (CCV stuck closed)	<p>Restricted flow through; air vent, filter, CCV or canister</p> <p>Canister close valve failure</p>	<p>Inspect the components listed, and interconnecting pipework for blockage, kinks or flattened areas</p>
P0447	Canister close valve circuit open circuit.	<p>Canister close valve power supply circuit; open circuit, short circuit</p> <p>Canister close valve to ECM drive circuit; open circuit, high resistance, short circuit to B+ voltage</p> <p>Canister close valve failure</p>	<p>GO to Pinpoint Test G307413p3.</p> <p>.</p>
P0448	Canister close valve circuit short circuit	<p>Canister close valve to ECM drive circuit; short circuit to ground</p> <p>Canister close valve failure</p>	<p>GO to Pinpoint Test G307413p3.</p> <p>.</p>
P0450	Fuel tank pressure (FTP) sensor	FTP sensor disconnected	<p>Check FTP sensor connections. GO to Pinpoint Test G307413p4.</p>

	malfunction (output stuck/not changing)	FTP sensor failure	.
P0452	Fuel tank pressure (FTP) sensor circuit; low voltage (low pressure)	<p>FTP sensor disconnected</p> <p>FTP sensor to ECM sense circuit; open circuit, short circuit to ground</p> <p>FTP sensor to splice in sensor supply circuit; open circuit, high resistance</p> <p>FTP sensor failure</p>	<p>For FTP sensor supply tests, <<303-14>> GO to Pinpoint Test G307413p4.</p> <p>.</p>
P0453	Fuel tank pressure (FTP) sensor circuit; high voltage (high pressure)	<p>FTP sensor to splice in sensor ground circuit; open circuit, high resistance</p> <p>FTP sensor to ECM sense circuit; open circuit, short circuit to high voltage</p> <p>FTP sensor failure</p>	<p>Check fuel filler cap and seal, pipework, etc. GO to Pinpoint Test G307413p2.</p> <p>. For fuel tank information, <<310-01>></p>
P0455	Leak detected-large	<p>Fuel filler cap missing</p> <p>Fuel filler cap seal defective</p> <p>System leak (canister damage, pipework damage)</p> <p>CCV stuck open</p> <p>Canister purge valve to engine purge pipe; restricted, leaking, disconnected</p> <p>Canister purge valve stuck closed</p> <p>Fuel tank leak</p>	<p>Check fuel filler cap and seal, pipework, etc. GO to Pinpoint Test G307413p2.</p> <p>. For fuel tank information, <<310-01>></p>

P0456	Leak detected - 20 thou	Fuel filler cap seal defective System leak (canister damage, pipework damage) CCV leaking Fuel tank leak	Check fuel filler cap and seal, pipework, etc. GO to Pinpoint Test G307413p2. . For fuel tank information, <<310-01>>
-------	-------------------------	---	--

Pinpoint Tests

PINPOINT TEST G307413p1 : DTC P0441; EVAPORATIVE SYSTEM INCORRECT PURGE FLOW

G307413t1 : CHECK FUEL FILLER CAP FITMENT AND CONDITION OF CANISTER, PIPES AND CONNECTORS

1. Make sure that the fuel filler cap is correctly installed and tightened. 2. Check the condition of the carbon canister. 3. Check the condition of all accessible pipes and connectors in the vapor line.

Are the canister and all pipes and connectors in good condition?

-> **Yes**

GO to Pinpoint Test G307413t2.

-> **No**

REPAIR as necessary. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle. Recheck DTCs. For additional information, see "diagnostic drive cycles" above.

G307413t2 : CHECK EVAPORATIVE PURGE VALVE IS OPERATING

1. Disconnect the vapor pipe from the inlet port of the evaporative purge valve (ie, from fuel tank). 2. **RUN** the engine for 2 minutes, making sure that the engine reaches normal operating temperature. 3. Check that the evaporative purge valve is operating, by touch or by sound (using a stethoscope, it will be possible to hear the valve operating).

Is the valve operating?

-> **Yes**

Recheck DTCs. Carry out a flow check monitor drive cycle. For additional information, see "diagnostic drive cycles" above.

-> **No**

CHECK for DTC P0444, P0445. Conduct "green" ECM drive cycle. For additional information, see "diagnostic drive cycles" above.

PINPOINT TEST G307413p2 : DTC P0442, P0444, P0445, P0455, P0456; LEAK DETECTED: LARGE/20 THOU/40 THOU, PURGE VALVE CIRCUIT MALFUNCTION, OPEN/SHORT CIRCUIT,

G307413t3 : CHECK FUEL FILLER CAP FITMENT AND CONDITION OF CANISTER, PIPES AND CONNECTORS

1. Make sure that the fuel filler cap is correctly installed and tightened. 2. Check the condition of the carbon canister. 3. Check the condition of all accessible pipes and connectors in the vapor line.

Are the canister and all pipes and connectors in good condition?

-> **Yes**

GO to Pinpoint Test G307413t4.

-> **No**

REPAIR as necessary. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle. Recheck DTCs. For additional information, see "diagnostic drive cycles" above.

G307413t4 : CHECK THE CANISTER PURGE VALVE DRIVE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the canister purge valve electrical connector, EC63. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between EC63, pin 02 (UY) and PI01, pin 66 (UY).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle.

-> **No**

GO to Pinpoint Test G307413t5.

G307413t5 : CHECK THE CANISTER PURGE VALVE DRIVE CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the **ON** position. 3. Measure the voltage between EC63, pin 02 (UY) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle.

-> **No**

GO to Pinpoint Test G307413t6.

G307413t6 : CHECK THE CANISTER PURGE VALVE DRIVE CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the **OFF** position. 2. Measure the resistance between EC63, pin 02 (UY) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle.

-> **No**

GO to Pinpoint Test G307413t7.

G307413t7 : CHECK THE CANISTER PURGE VALVE POWER SUPPLY

1. Turn the ignition switch to the **ON** position.

Make sure the EMS relay is energized. 2. Measure the voltage between EC63, pin 01 (GU) and GROUND.

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the canister purge valve and battery. This circuit includes the front power distribution box, fuse 14, the EMS relay, and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle.

-> **No**

INSTALL a new canister purge valve.

Evaporative Emission Canister Purge Valve - VIN Range: G00442->G45703 (17.15.30) Carry out a full evaporative system monitor drive cycle. Recheck DTCs. For additional information, see "diagnostic drive cycles" above.

PINPOINT TEST G307413p3 : DTC P0447, P0448; CANISTER CLOSE VALVE (CCV) CIRCUIT MALFUNCTION, OPEN /SHORT CIRCUIT

G307413t8 : CHECK THE CANISTER CLOSE VALVE POWER SUPPLY

1. Disconnect the CCV electrical connector, CV02. 2. Turn the ignition switch to the **ON** position.

Make sure the EMS relay is energized. 3. Measure the voltage between CV02, pin 02 (GU) and GROUND.

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G307413t9.

-> **No**

REPAIR the circuit between the CCV and battery. This circuit includes the front power distribution box, fuse 14, the EMS relay and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle.

G307413t9 : CHECK THE CANISTER CLOSE VALVE POWER SUPPLY CIRCUIT FOR SHORT CIRCUIT

1. Turn the ignition switch to the **OFF** position. 2. Measure the voltage between CV02, pin 02 (GU) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle.

-> **No**

GO to Pinpoint Test G307413t10.

G307413t10 : CHECK THE CANISTER CLOSE VALVE DRIVE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Measure the resistance between CV02, pin 01 (O) and PI01, pin 67 (O).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle.

-> No

GO to Pinpoint Test G307413t11.

G307413t11 : CHECK THE CANISTER CLOSE VALVE DRIVE CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Measure the voltage between CV02, pin 01 (O) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle.

-> No

GO to Pinpoint Test G307413t12.

G307413t12 : CHECK THE CANISTER CLOSE VALVE DRIVE CIRCUIT FOR SHORT TO GROUND

1. Measure the resistance between CV02, pin 01 (O) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle.

-> No

INSTALL a new CCV. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle.

PINPOINT TEST G307413p4 : DTC P0450, P0452, P0453; FUEL TANK PRESSURE (FTP) SENSOR CIRCUIT MALFUNCTION, LOW/HIGH VOLTAGE

G307413t13 : CHECK THE FTP SENSOR SENSE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the FTP sensor electrical connector, FP01.
3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between FP01, pin 02
(RG) and PI01, pin 104 (RG).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the
DTC. Carry out a full evaporative system monitor drive cycle.

-> No

GO to Pinpoint Test G307413t14.

G307413t14 : CHECK THE FTP SENSOR SENSE CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the **ON** position. 3.
Measure the voltage between FP01, pin 02 (RG) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
Carry out a full evaporative system monitor drive cycle.

-> No

GO to Pinpoint Test G307413t15.

G307413t15 : CHECK THE FTP SENSOR SENSE CIRCUIT FOR SHORT TO GROUND

1. Measure the resistance between FP01, pin 02 (RG) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full evaporative system monitor drive cycle.

-> **No**

INSTALL a new FTP sensor.

Fuel Tank Pressure Sensor (19.55.31) CLEAR the DTC. Carry out a full evaporative system monitor drive cycle.

Evaporative Emissions - VIN Range: G45704->G99999

Overview

2006my changes

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit, plus the addition of secondary air injection and changes to Federal evaporative emissions (Europe is unchanged) and all market exhaust gas recirculation to comply with stage four emissions requirements.

The hardware changes to the Federal evaporative emissions system are the deletion of the canister close valve and the fuel tank pressure sensor, which have been replaced with a combined unit incorporating a DMTL (diagnostic monitoring of tank leakage) pump and a COV (change-over valve) into one module.

The software changes will have more effect on the technician, as there is no longer the need to carry out extensive drive cycles to confirm the success of a repair.

DMTL conditions

The DMTL test is performed after the engine has stopped following a 10 minute run, providing that the vehicle fuel tank is between 15 and 85 percent full and that the ambient temperature is above 0°C (32°F) and less than 40°C (104°F).

The DMTL pump is driven to pressurize the fuel tank and the current is measured with the change-over valve in different states.

A comparison of the current draw in each state indicates the degree of any leak, and the ECM then sets the appropriate DTC.

Inspection and verification

- 1 . Visually inspect for obvious signs of mechanical or electrical damage.
- 2 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

Mechanical	Electrical
Fuel filler cap and seal	Fuses
Fuel filler neck	Connectors

DMTL fresh air filter (restriction, etc)	Harness(es)
Fuel tank (leaks, damage, etc)	Purge valve
Fuel lines and joints, etc	DMTL pump
Carbon canister	
Purge valve	
DMTL pump module	

3 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC Index.

4 . NOTE:

On all vehicles equipped with Diagnostic Monitor Tank Leakage (DMTL), there is a requirement to blank off the ventilation port (large diameter stub pipe) of the DMTL module, to prevent mis-diagnosis when carrying out a smoke test.

Where K-Line, Vacutec or other proprietary smoke test equipment is available, it should be utilised to assist with Evaporative Emissions System leak diagnosis.

Symptom Chart

Symptom	Possible Source	Action
Difficulty in filling	Restriction in the vapor line between the fuel tank and the carbon canister outlet/atmospheric port	Check for restrictions/damage, etc (see visual inspection).
Fuel smell	System leak Purge valve inoperative	Check for leaks, check the purge valve operation. GO to Pinpoint Test G532445p1.
Message center display (refer to the owners handbook)	Fuel filler cap missing/not tightened after refuelling	Check the fuel filler cap and seal (see visual inspection).

Diagnostic Trouble Code	Description	Possible Source	Action
P044100	Incorrect purge flow	Evaporative canister purge pipe restricted,	For basic checks. GO to Pinpoint Test G532445p1.

		leaking, disconnected Evaporative canister vent restricted Evaporative canister purge valve to engine pipe(s) restricted, leaking, disconnected Evaporative canister purge valve failure	Check for DTCs indicating a purge valve fault.
P044700	Change-over valve (COV) control circuit	DMTL COV circuit short circuit to ground	For COV circuit tests, GO to Pinpoint Test G532445p3.
P044800	COV control circuit	DMTL COV circuit short circuit to power	For COV circuit tests, GO to Pinpoint Test G532445p3.
P045600	Leak detected (very small leak)	DMTL has detected a leak in the fuel system	Check the fuel system integrity (see visual inspection). Carry out K line or Vacutec tests to identify the leak.
P045800	Purge valve control circuit	Purge valve control circuit: short circuit to ground Purge valve control circuit: high resistance	For purge valve circuit tests. GO to Pinpoint Test G532445p2.
P045900	Purge valve control circuit	Purge valve control circuit: short circuit to power	For purge valve circuit tests. GO to Pinpoint Test G532445p2.
P240100	DMTL pump control circuit	DMTL pump control circuit: short circuit to ground	For DMTL pump circuit tests. GO to Pinpoint Test G532445p4.
P240200	DMTL pump control circuit	DMTL pump control circuit: short circuit to power	For DMTL pump circuit tests. GO to Pinpoint Test G532445p4.
P240429	DMTL pump sense circuit range/performance - signal invalid	DMTL reference leak DMTL pump circuit: short circuit, high resistance DMTL pipework	Check the DMTL pipework. For DMTL pump tests, GO to Pinpoint Test G532445p4.

		blocked/leaking	
P24042F	DMTL pump sense circuit range/performance - signal erratic	DMTL reference leak DMTL pump circuit: short circuit, high resistance DMTL pipework blocked/leaking	Check the DMTL pipework. For DMTL pump tests, GO to Pinpoint Test G532445p4.
P240500	DMTL pump sense circuit low	DMTL pump circuit: short circuit, high resistance	For DMTL pump tests, GO to Pinpoint Test G532445p4.
P240600	DMTL pump sense circuit high	DMTL pump circuit: short circuit, high resistance	For DMTL pump tests, GO to Pinpoint Test G532445p4.
P240B00	DMTL pump heater circuit low	DMTL heater control circuit: short circuit to ground DMTL heater control circuit: high resistance	For DMTL heater circuit tests. GO to Pinpoint Test G532445p5.
P240C00	DMTL pump heater circuit high	DMTL heater control circuit: short circuit to power	For DMTL heater circuit tests. GO to Pinpoint Test G532445p5.
P245000	COV performance/stuck open	DMTL pump circuit: short circuit, high resistance DMTL COV stuck open	For DMTL pump tests, GO to Pinpoint Test G532445p4. For DMTL COV tests, GO to Pinpoint Test G532445p3. If the circuits are good, replace the DMTL assembly.
P245100	COV performance/stuck closed	DMTL pump circuit: short circuit, high resistance DMTL COV stuck closed	For DMTL pump tests, GO to Pinpoint Test G532445p4. For DMTL COV tests, GO to Pinpoint Test G532445p3. If the circuits are good, replace the DMTL assembly.

Pinpoint Tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

PINPOINT TEST G532445p1 : EVAPORATIVE SYSTEM INCORRECT PURGE FLOW

G532445t1 : CHECK FUEL FILLER CAP FITMENT AND CONDITION OF CANISTER, PIPES AND CONNECTORS

1. Make sure that the fuel filler cap is correctly installed and tightened. 2. Check the condition of the carbon canister. 3. Check the condition of all accessible pipes and connectors in the vapor line.

Are the canister and all pipes and connectors in good condition?

-> Yes

GO to Pinpoint Test G532445t2.

-> No

REPAIR as necessary. CLEAR the DTC, test the system for normal operation.

G532445t2 : CHECK THAT THE PURGE VALVE IS OPERATING

1. Disconnect the vapor pipe from the inlet port of the evaporative purge valve. 2. **RUN** the engine for 2 minutes, making sure that the engine reaches normal operating temperature. 3. Check that the evaporative purge valve is operating, by touch or by sound (using a stethoscope, it will be possible to hear the valve operating).

Is the valve operating?

-> **Yes**

CHECK for related DTCs. Refer to the index above.

-> **No**

CHECK the purge valve circuits. GO to Pinpoint Test G532445p2.

PINPOINT TEST G532445p3 : CHANGE-OVER VALVE (COV) CONTROL CIRCUIT

G532445t8 : CHECK THE COV CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Disconnect the DMTL electrical connector, CV09. 3. Measure the resistance between:

DMTL connector CV09, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532445t9.

G532445t9 : CHECK THE COV CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

DMTL connector CV09, harness side	Battery
Pin 03	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532445t10.

G532445t10 : CHECK THE COV CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

DMTL connector CV09, harness side	ECM connector EC300, harness side
Pin 03	Pin 48

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> **No**

INSTALL a new DMTL assembly. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G532445p2 : PURGE VALVE CONTROL CIRCUIT

G532445t3 : CHECK THE POWER SUPPLY TO THE PURGE VALVE

1. Disconnect the purge valve connector, PI363. 2. Key on, engine off. 3. Measure the voltage between:

Purge valve connector PI363, harness side	Battery
Pin 01	Negative terminal

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the purge valve and battery. This circuit includes harness splices and fuse 14 of the front power distribution box. For additional information, refer to the wiring diagrams. Clear

the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532445t4.

G532445t4 : CHECK THE PURGE VALVE CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Purge valve connector PI363, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532445t5.

G532445t5 : CHECK THE PURGE VALVE CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Purge valve connector PI363, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532445t6.

G532445t6 : CHECK THE PURGE VALVE CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

Purge valve connector PI363, harness side	ECM connector PI300, harness side
Pin 02	Pin 92

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> No

INSTALL a new purge valve. Clear the DTC, test the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G532445p4 : DIAGNOSTIC MONITORING OF FUEL TANK LEAKAGE (DMTL) PUMP CONTROL CIRCUIT

G532445t7 : CHECK THE POWER SUPPLY TO THE DMTL PUMP

1. Key off. 2. Disconnect the DMTL pump electrical connector, CV09. 3. Key on, engine off. 4. Measure the voltage between:

DMTL pump connector CV09, harness side	Battery
Pin 04	Negative terminal

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the DMTL pump and battery. This circuit includes harness splice ECS20 and fuse 14 of the front power distribution box. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532445t11.

G532445t11 : CHECK THE DMTL PUMP CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

DMTL pump connector CV09, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532445t12.

G532445t12 : CHECK THE DMTL PUMP CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

DMTL pump connector CV09, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532445t13.

G532445t13 : CHECK THE DMTL PUMP CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

DMTL pump connector CV09, harness side	ECM connector EC300, harness side
Pin 01	Pin 33

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> No

INSTALL a new DMTL pump. Clear the DTC, test the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G532445p5 : DIAGNOSTIC MONITORING OF FUEL TANK LEAKAGE (DMTL) HEATER CIRCUIT

G532445t14 : CHECK THE POWER SUPPLY TO THE DMTL PUMP

1. Key off. 2. Disconnect the DMTL pump electrical connector, CV09. 3. Key on, engine off. 4. Measure the voltage between:

DMTL pump connector CV09, harness side	Battery
Pin 04	Negative terminal

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the DMTL pump and battery. This circuit includes harness splice ECS20 and fuse 14 of the front power distribution box. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532445t15.

G532445t15 : CHECK THE DMTL HEATER CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

DMTL pump connector CV09, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532445t16.

G532445t16 : CHECK THE DMTL HEATER CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

DMTL pump connector CV09, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532445t17.

G532445t17 : CHECK THE DMTL HEATER CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

DMTL pump connector CV09, harness side	ECM connector EC300, harness side
---	--

Pin 02	Pin 23
--------	--------

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear the DTC, test the system for normal operation.

-> No

INSTALL a new DMTL pump. Clear the DTC, test the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

Evaporative Emission Canister - VIN Range: G00442->G45703 (17.15.13)

Special Service Tools



Powertrain assembly jack

HTJ1200-2

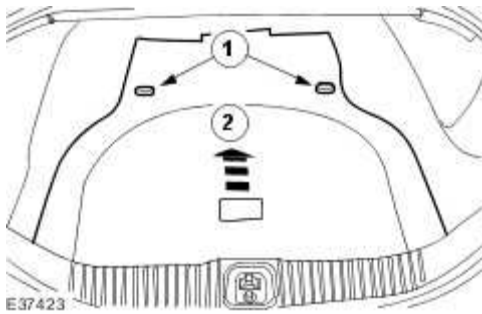
Removal

All vehicles

1 . Remove the luggage compartment floor covering.

1) Remove the luggage compartment floor covering securing screws.

2) Remove the luggage compartment floor covering.



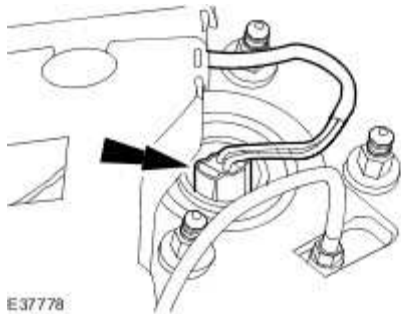
2 . Remove the left-hand luggage compartment side trim panel.



3 . Remove the left-hand air spring trim panel.



4 . Disconnect the left-hand air spring electrical connector.

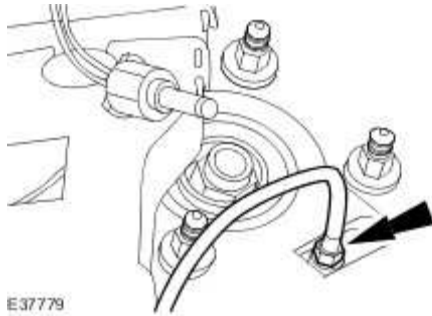


5

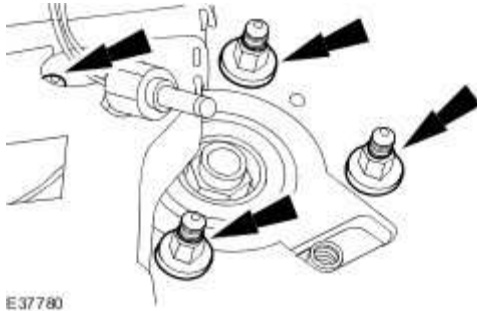


· **WARNING:** Loosen the pipe no more than one full turn to allow the stored air pressure to vent for a minimum of one minute.

Detach the left-hand air pipe.




- 6 . Remove the left-hand air spring retaining nuts.



- 7 . Raise and support the vehicle.
For additional information, refer to Lifting

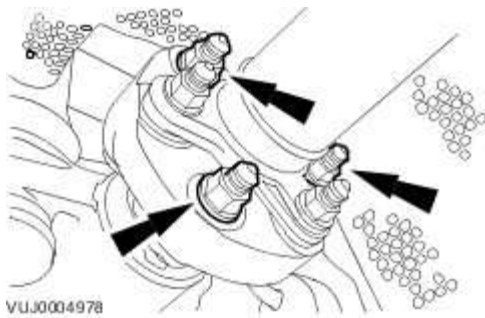
- 8 . Remove both rear mufflers and tail pipes.
For additional information, refer to Muffler and Tailpipe (30.10.52)

- 9 .  **CAUTION: Under no circumstances must the flexible coupling (or its fixings) be loosened or removed from the driveshaft**

Detach the driveshaft from the rear drive axle flange.

- Mark the position of the driveshaft in relation to the rear drive axle flange.
- Mark the position of the balance nut in relation to the rear drive axle flange (if fitted).
- Mark the position of each nut and bolt in relation to the rear drive axle

flexible joint.



10 . Remove both rear wheels and tires.

For additional information, refer to Wheel and Tire (74.20.05)

Vehicles without Brembo brakes

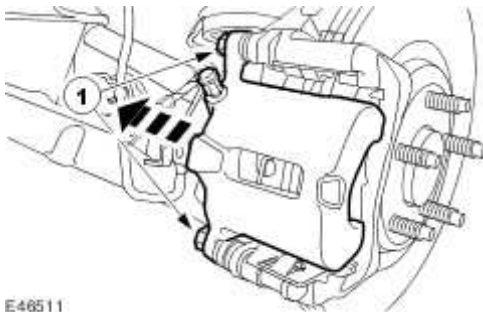
11 . **NOTE:**

Left-hand shown, right-hand similar.

Detach the brake caliper.

1) Remove and discard the brake caliper retaining bolts.

► Detach the brake caliper.



12 .

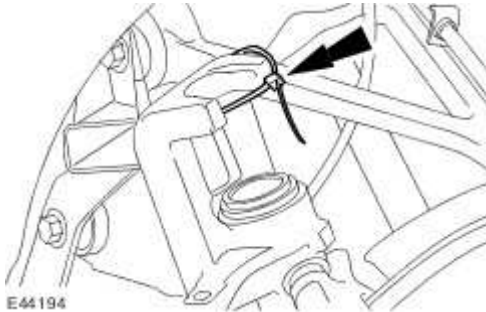


CAUTION: The brake caliper must be supported at all times.

NOTE:

Left-hand shown, right-hand similar.

Using a suitable tie strap, secure the caliper to one side.



Vehicles with Brembo brakes

13 .



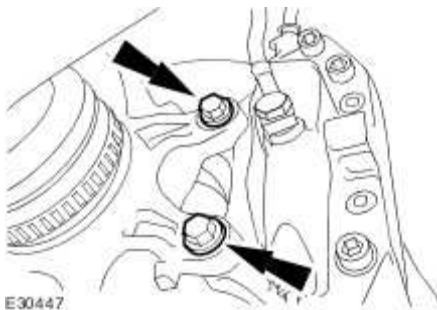
CAUTION: The brake caliper must be supported at all times.

NOTE:

Left-hand shown, right-hand similar.

Detach the brake caliper and secure to one side.

- ▶ Remove and discard the brake caliper retaining bolts.
- ▶ Using a suitable tie strap, secure the caliper to one side.

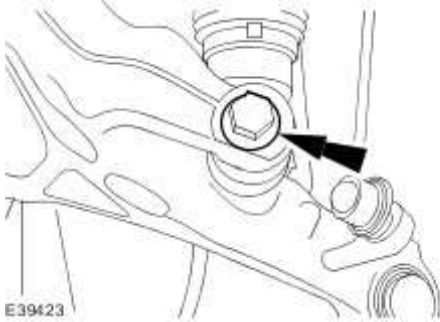


All vehicles

14 . **NOTE:**

Right-hand shown, left-hand similar.

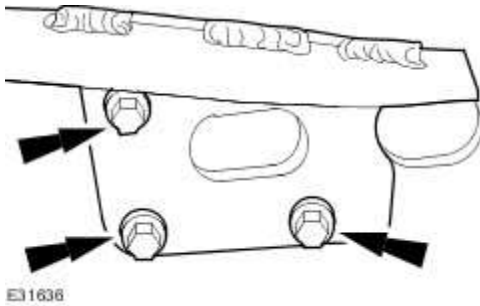
Detach the air springs.



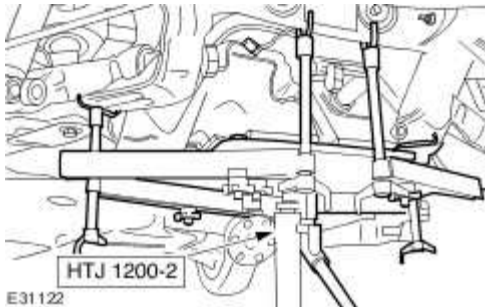
15 . **NOTE:**

Left-hand shown, right-hand similar.

Remove the noise, vibration and harshness brace retaining bolts.



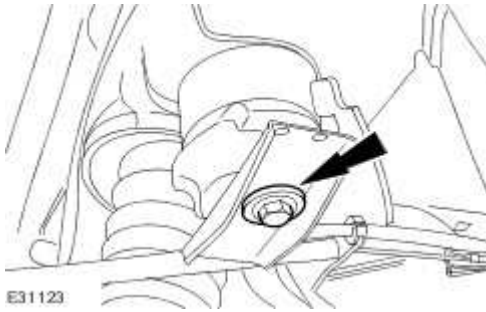
16 . Install the special tool to support the rear subframe.



17 . **NOTE:**

Left-hand shown, right-hand similar.

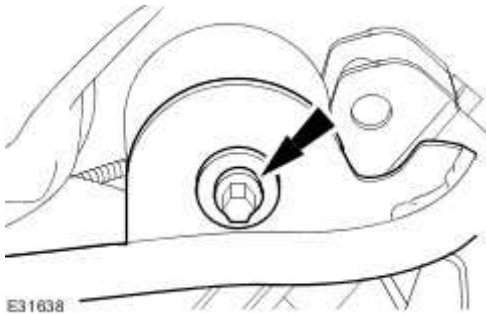
Remove and discard the rear subframe rear retaining bolt.



18 . **NOTE:**

Left-hand shown, right-hand similar.

Remove and discard the rear subframe front retaining bolt.

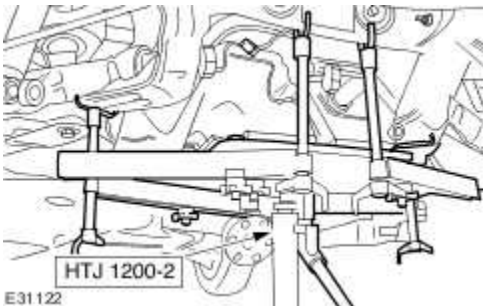


19



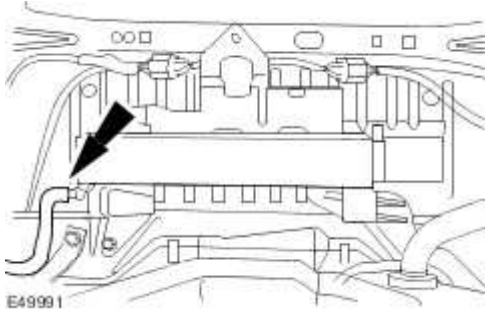
CAUTION: Make sure the rear subframe does not come into contact with the fuel tank filler pipe.

Lower the rear subframe to a suitable height.



20 . Disconnect the emission hose.

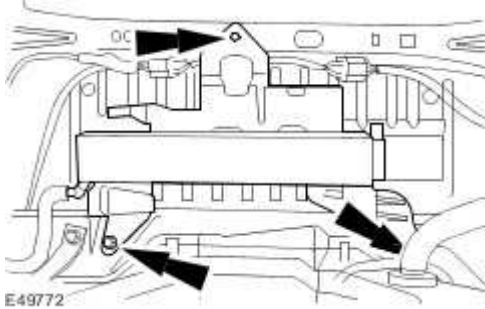
▶ Disconnect the carbon canister electrical connector (if equipped).



21 . **NOTE:**

Rear subframe shown removed for clarity.

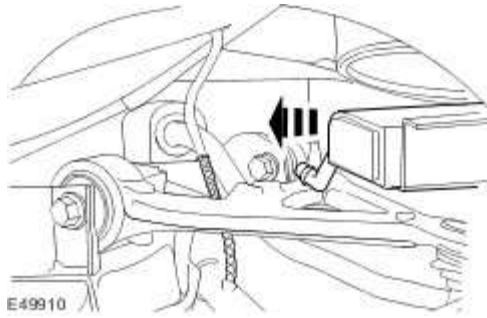
Detach the evaporative emission canister.



22 . **NOTE:**

Remove the evaporative emission canister between the subframe and vehicle body.

Remove the evaporative emission canister.



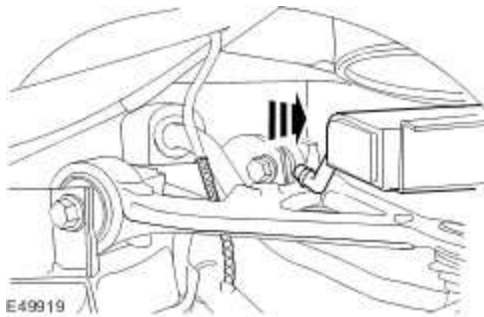
Installation

All vehicles

1 . NOTE:

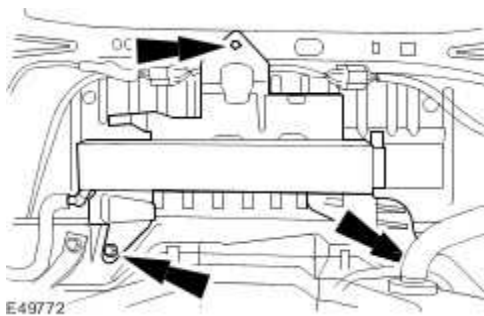
Install the evaporative emission canister between the subframe and vehicle body.

Install the evaporative emission canister.



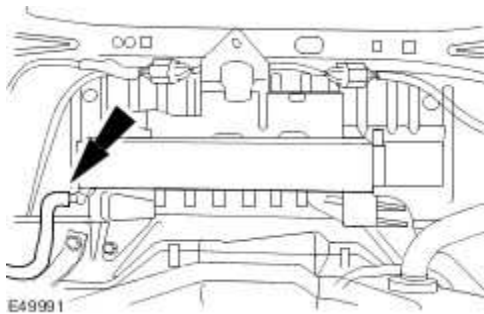
2 . To install, reverse the removal procedure.

▶ Tighten to 7 Nm.



3 . Connect the emission hose.

▶ Connect the carbon canister electrical connector (if equipped).

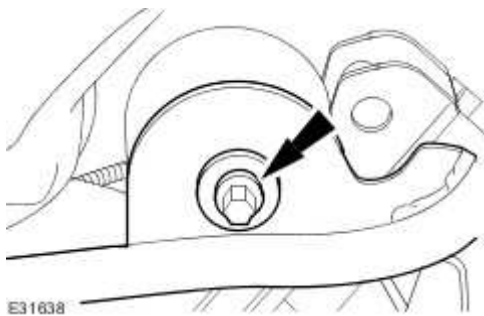


4 . **NOTE:**

Left-hand shown, right-hand similar.

Loosely install the rear subframe front retaining bolt.

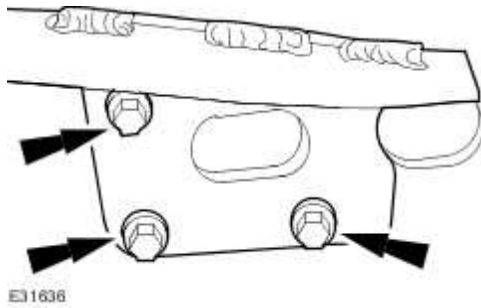
▶ Install a new retaining bolt.



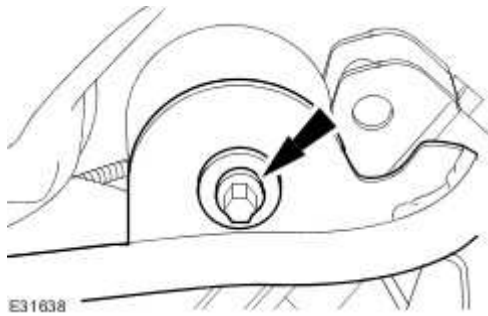
5 . **NOTE:**

Left-hand shown, right-hand similar.

Loosely install the noise, vibration and harshness brace retaining bolts.



6 . Tighten to 125 Nm.



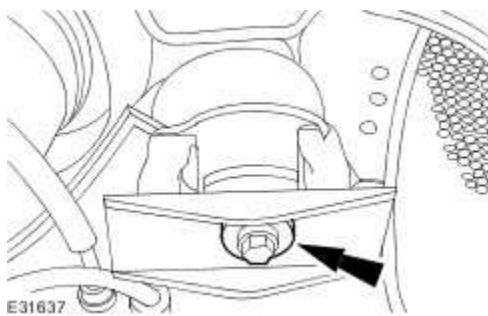
7 . **NOTE:**

Left-hand shown, right-hand similar.

Install the rear subframe rear retaining bolt.

▶ Install a new retaining bolt.

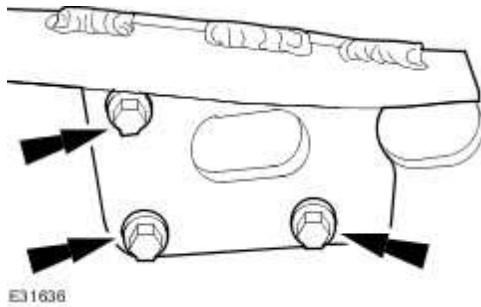
▶ Tighten to 125 Nm.



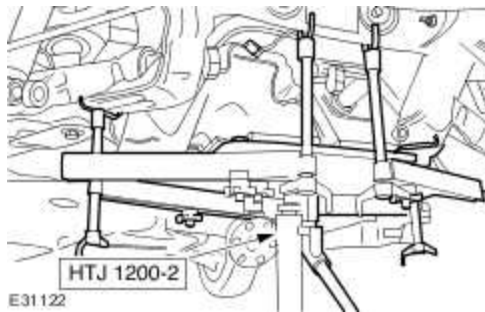
8 . **NOTE:**

Left-hand shown, right-hand similar.

Tighten to 48 Nm.



9 . Remove the special tool.

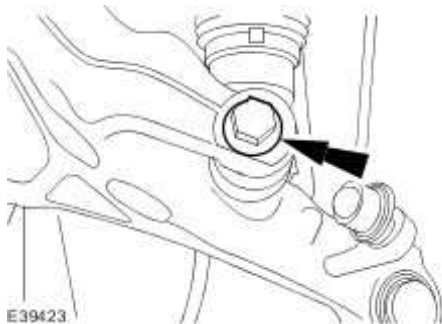


10 . **NOTE:**

Right-hand shown, left-hand similar.

Attach the rear air springs.

► Tighten to 133 Nm.



Vehicles with Brembo brakes

11 .



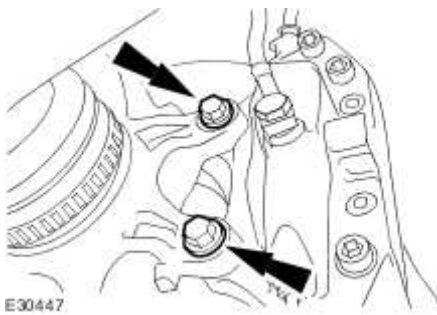
CAUTION: The brake caliper must be supported at all times.

NOTE:

Left-hand shown, right-hand similar.

Attach the brake caliper.

- Remove the tie strap.
- Install new brake caliper retaining bolts.
- Tighten to 70 Nm.



Vehicles without Brembo brakes

12 .

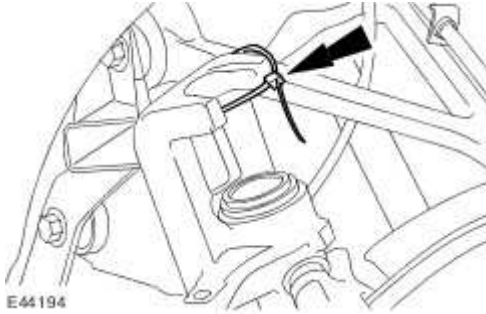


CAUTION: The brake caliper must be supported at all times.

NOTE:

Left-hand shown, right-hand similar.

Remove the tie strap.



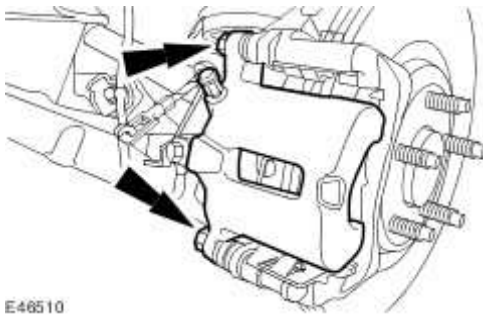
13 . NOTE:

Left-hand shown, right-hand similar.

Attach the caliper.

► Install new brake caliper retaining bolts.

► Tighten to 34 Nm.



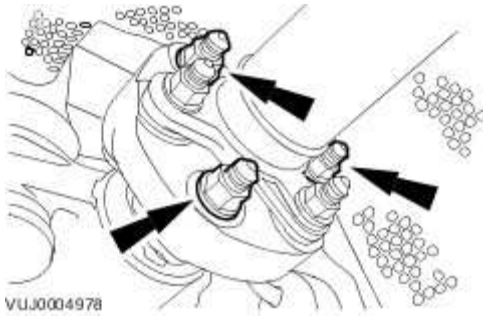
All vehicles

14 . Install both rear wheels and tires.

For additional information, refer to Wheel and Tire (74.20.05)

15 . Attach the driveshaft to the rear drive axle flange.

► Tighten to 88 Nm.



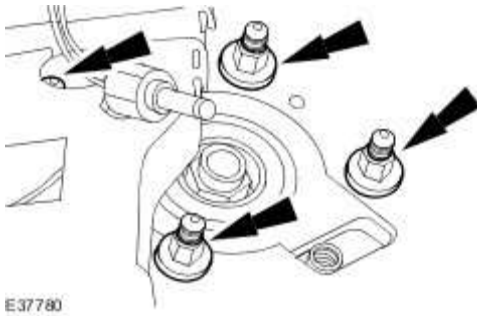
16 . Install both rear mufflers and tail pipes.

For additional information, refer to Muffler and Tailpipe (30.10.52)

17 . Lower the vehicle.

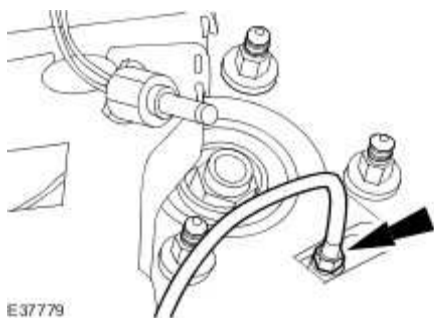
18 . Install the left-hand rear air spring retaining nuts.

► Tighten to 25 Nm.

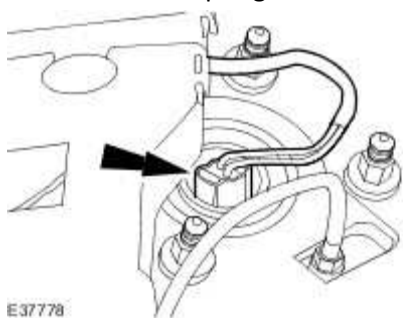


19 . Attach the left-hand air pipe.

► Tighten to 5 Nm.



20 . Connect the air spring electrical connector.



21 . Install the air spring trim panel.



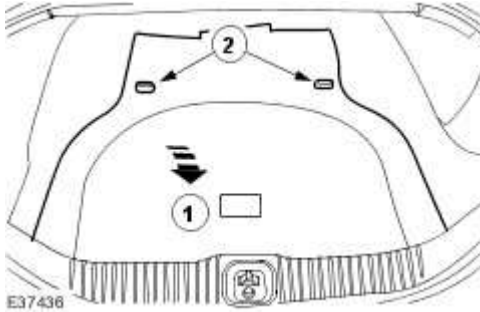
22 . Install the luggage compartment side trim panel.



23 . Install the luggage compartment floor covering.

1) Install the luggage compartment floor covering.

2) Install the luggage compartment floor covering securing screws.



24 Start and run the engine for 2 minutes to allow the air spring to recharge and to allow the compressor to replenish the reservoir.

Evaporative Emission Canister - VIN Range: G45704->G99999 (17.15.13)

Special Service Tools



Powertrain assembly jack
HTJ1200-2

Removal

All vehicles

- 1 . Drain the fuel tank.

For additional information, refer to Fuel Tank Draining - VIN Range: G00442->G45703

- 2 . Remove the rear wheels and tires.


For additional information, refer to Wheel and Tire (74.20.05)

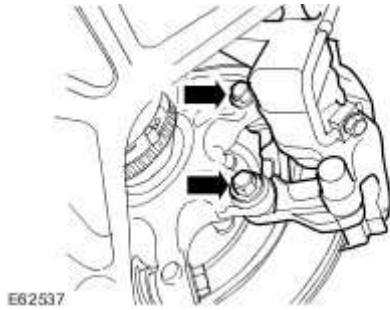
- 3 .  **CAUTION: The brake caliper must be supported at all times.**

NOTE:

Left-hand shown, right-hand similar.

Detach the brake caliper and anchor plate.

 Remove and discard the brake caliper anchor plate retaining bolts.




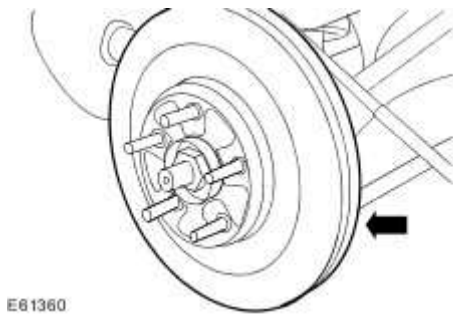
4.  **CAUTION: The brake caliper must be supported at all times.**

NOTE:

Left-hand shown, right-hand similar.

Remove the brake disc.

-  Mark the brake disc position in relation to the hub.

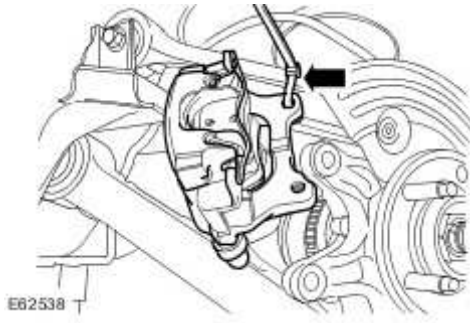


5.  **CAUTION: The brake caliper must be supported at all times.**

NOTE:

Left-hand shown, right-hand similar.

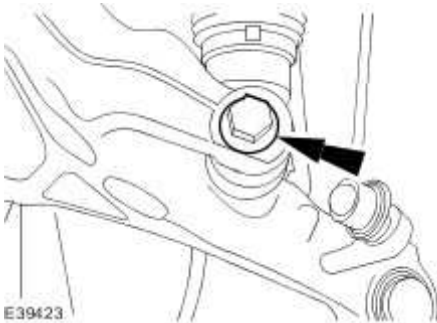
Using a suitable tie strap, secure the brake caliper to the upper arm.



6 . NOTE:

Left-hand shown, right-hand similar.

Detach the air springs.



7 . Remove both rear exhaust mufflers and tail pipes.

For additional information, refer to Muffler and Tailpipe (30.10.52)

8

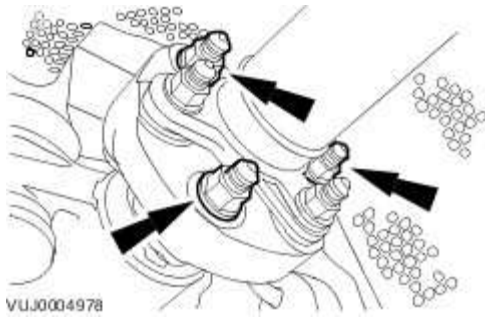


CAUTION: Under no circumstances must the flexible coupling (or its fixings) be loosened or removed from the driveshaft.

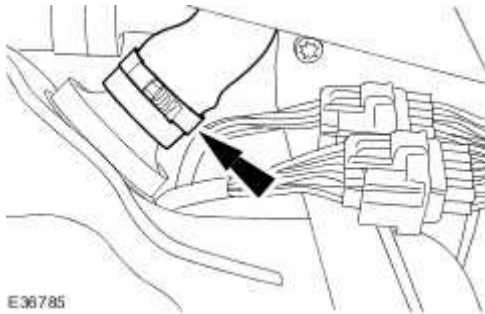
Detach the driveshaft from the rear drive axle flange.

- ▶ Mark the position of the driveshaft in relation to the rear drive axle flange.
- ▶ Mark the position of the balance nut in relation to the rear drive axle flange (if fitted).
- ▶ Mark the position of each nut and bolt in relation to the rear drive axle

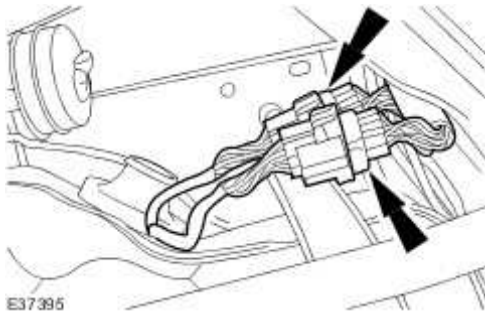
flexible joint.



9 . Remove the fuel tank filler pipe to fuel tank hose.



10 . Detach the rear axle electrical connectors.



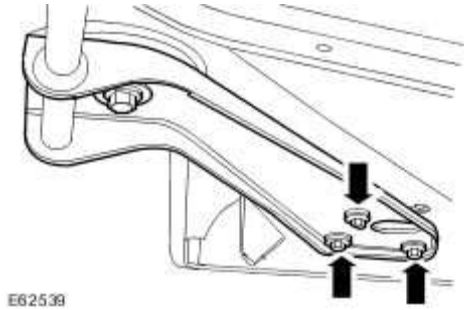
11 . **NOTE:**

Left-hand shown, right-hand similar.

NOTE:

Using a suitable tool, mark the position of the rear subframe to the vehicle body.

Remove the noise, vibration and harshness (NVH) brace retaining bolts.

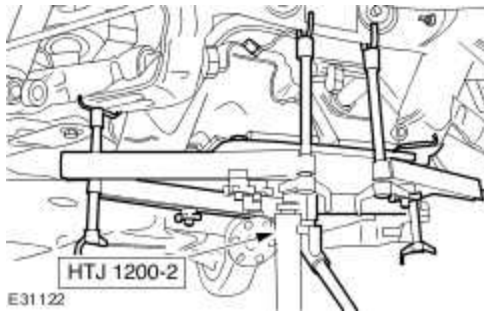


12



WARNING: Rotate the special tool height adjustment valve slowly. Failure to follow this instruction may result in personal injury.

Install the special tool to support the rear subframe.



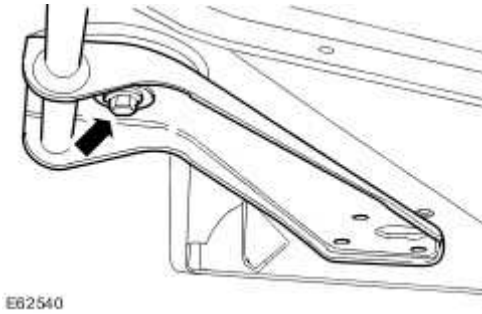
13 . **NOTE:**

Left-hand shown, right-hand similar.

Remove the NVH brace.



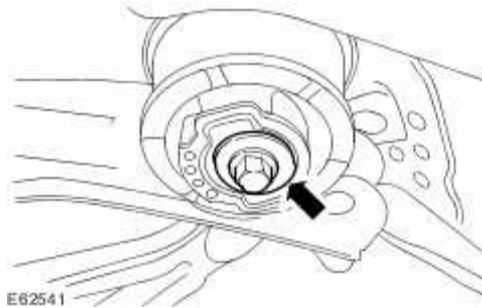
Remove and discard the rear subframe front retaining bolts.



14 . **NOTE:**

Left-hand shown, right-hand similar.

Remove and discard the rear subframe rear retaining bolts.



15



WARNING: Rotate the special tool height adjustment valve slowly. Failure to follow this instruction may result in personal injury.

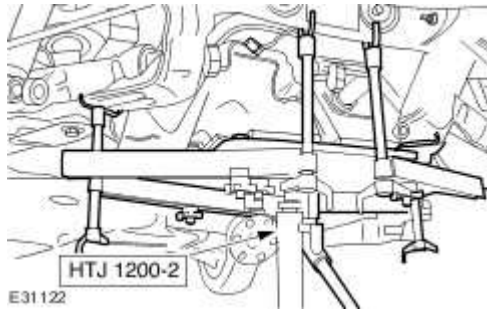


CAUTION: Make sure the rear subframe weight is evenly supported on the special tool. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure when lowering the rear subframe damage does not occur to the surrounding components.

Using the special tool, lower the rear subframe to a maximum of 152mm (6 inch)

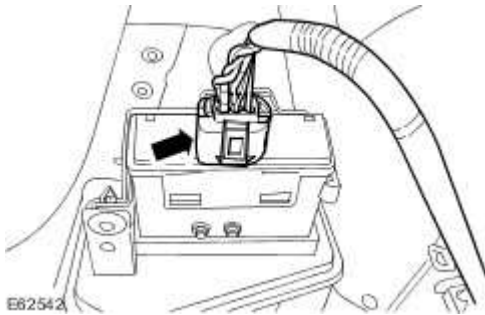


Vehicles with supercharger

16 . NOTE:

Rear subframe shown removed for clarity.

Disconnect the fuel pump driver module electrical connector.

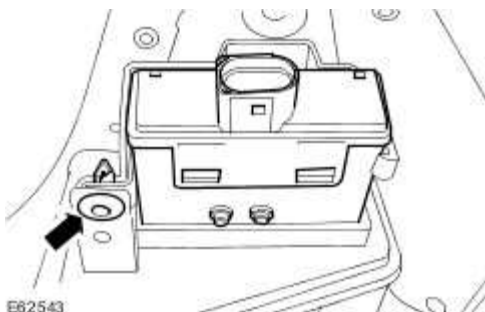


17 . NOTE:

Rear subframe shown removed for clarity.

Remove the fuel pump driver module.

▶ Remove the retaining clip.

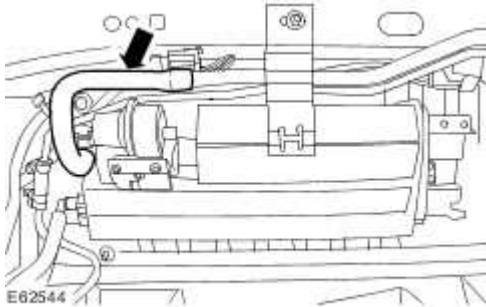


All vehicles

18 . NOTE:

Rear subframe shown removed for clarity.

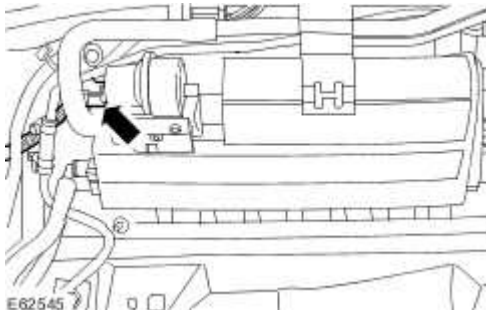
Disconnect the evaporative emission canister vent solenoid vent hose.



19 . NOTE:

Rear subframe shown removed for clarity.

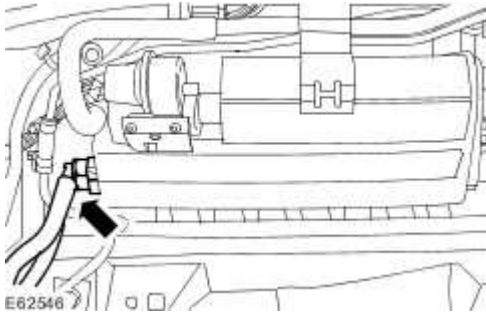
Disconnect the evaporative emission canister vent solenoid electrical connector.



20 . NOTE:

Rear subframe shown removed for clarity.

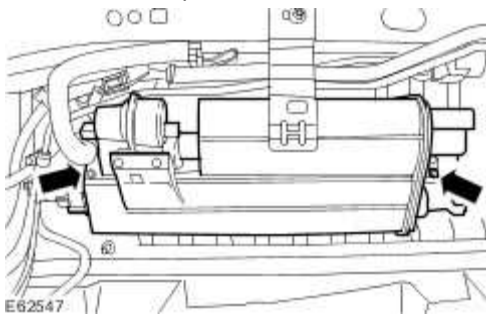
Disconnect the evaporative emission canister vapor pipes.
For additional information, refer to Quick Release Coupling



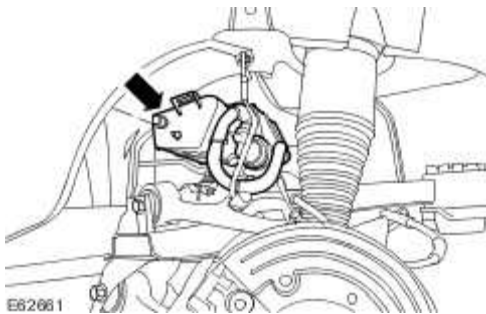
21 . NOTE:

Rear subframe shown removed for clarity.

Detach the evaporative emission canister.



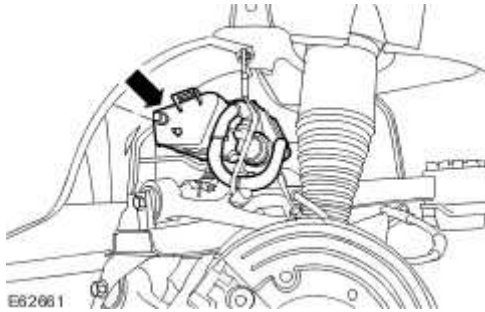
22 . Remove the evaporative emission canister.



Installation

All vehicles

- 1 . Install the evaporative emission canister.

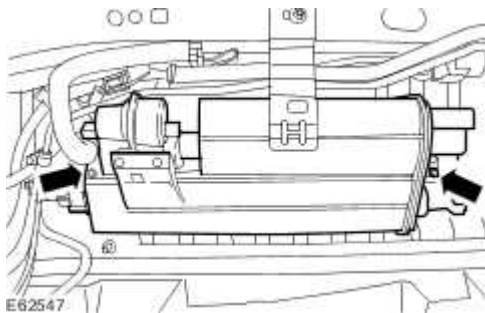


2 . NOTE:

Rear subframe shown removed for clarity.

Attach the evaporative emission canister.

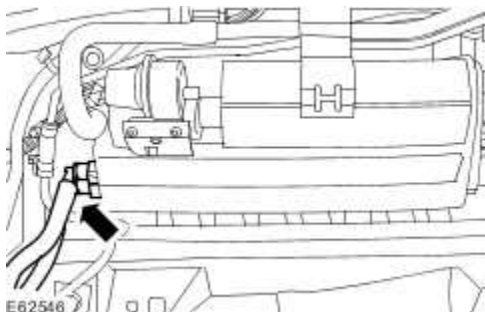
▶ Tighten to 7 Nm.



3 . NOTE:

Rear subframe shown removed for clarity.

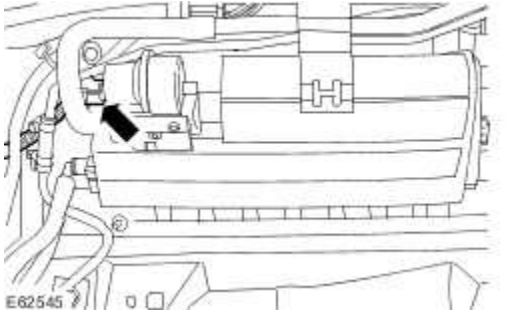
Connect the evaporative emission canister vapor pipes.
For additional information, refer to Quick Release Coupling



4 . NOTE:

Rear subframe shown removed for clarity.

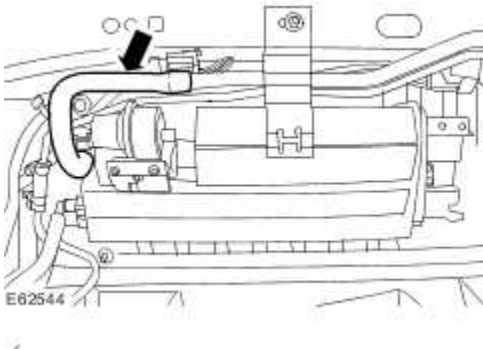
Connect the evaporative emission canister vent solenoid electrical connector.



5 . NOTE:

Rear subframe shown removed for clarity.

Connect the evaporative emission canister vent solenoid vent hose.



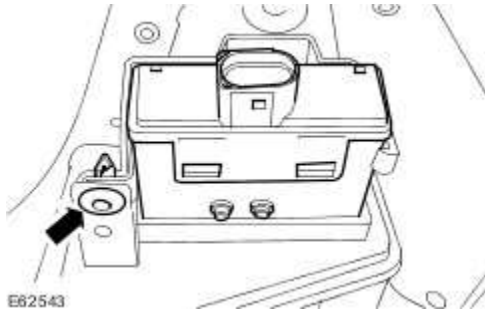
Vehicles with supercharger

6 . NOTE:

Rear subframe shown removed for clarity.

Install the fuel pump driver module.

▶ Install the retaining clip.



7 . NOTE:

Rear subframe shown removed for clarity.

Connect the fuel pump driver module electrical connector.



All vehicles

8



CAUTION: Make sure the rear subframe weight is evenly supported on the special tool. Failure to follow this instruction may result in damage to the vehicle.

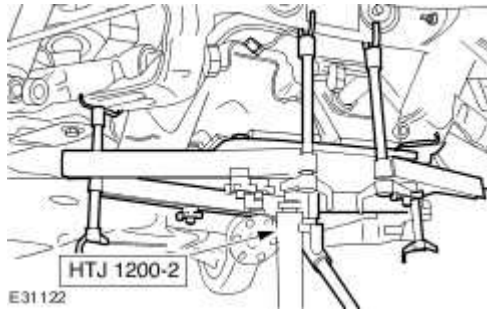


CAUTION: Make sure when raising the rear subframe damage does not occur to the surrounding components. Failure to follow this instruction may result in damage to the vehicle.

Using the special tool, raise the rear subframe to the vehicle body.



Align the subframe to the original position in relation to the vehicle body.



9 . NOTE:

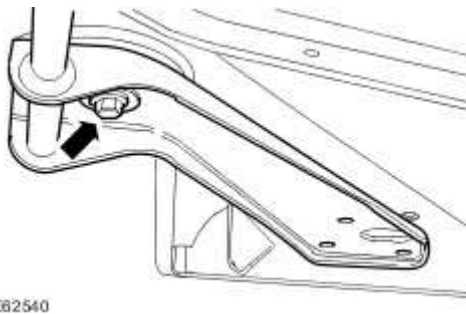
Left-hand shown, right-hand similar.

NOTE:

Install new rear subframe retaining bolts.

Loosely install the rear subframe front retaining bolts.

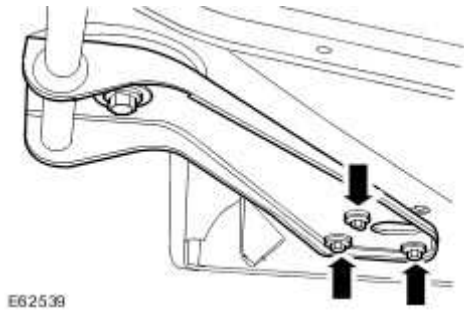
▶ Install the NVH brace



10 . NOTE:

Left-hand shown, right-hand similar.

Loosely install the NVH brace retaining bolts.



11 . NOTE:

Left-hand shown, right-hand similar.

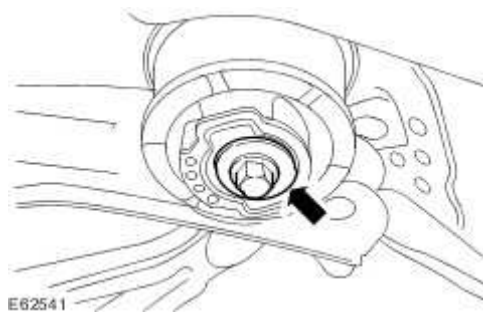
NOTE:

Install new rear subframe retaining bolts.

Install the rear subframe rear retaining bolt.

► Tighten to 125 Nm.

► Align the subframe to the original position in relation to the vehicle body.

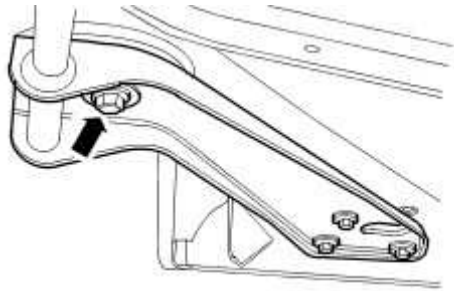


12 . NOTE:

Left-hand shown, right-hand similar.

Tighten the rear subframe front retaining bolt.

► Tighten to 125 Nm.



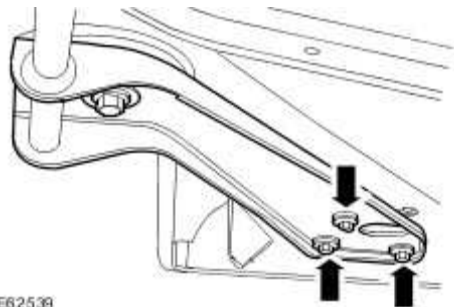
E62712

13 . **NOTE:**

Left-hand shown, right-hand similar.

Tighten the NVH brace retaining bolts.

▶ Tighten to 48Nm.



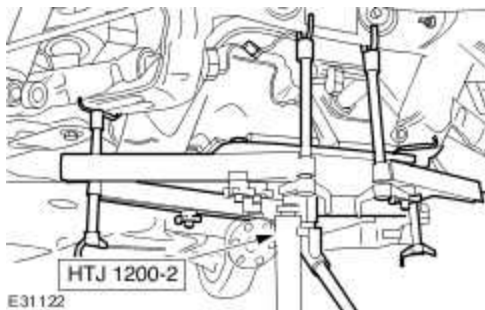
E62539

14



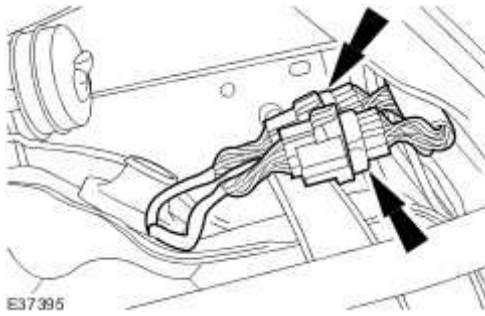
WARNING: Rotate the special tool height adjustment valve slowly. Failure to follow this instruction may result in personal injury.

Remove the special tool from the rear subframe.

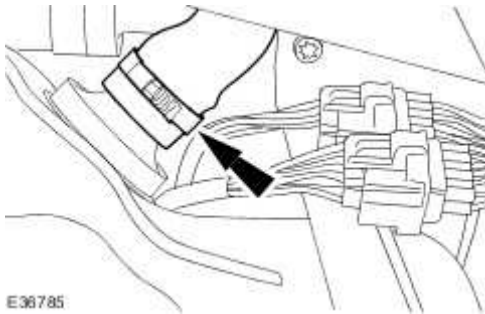


E31122

15 . Attach the rear axle electrical connectors.



16 . Attach the fuel tank filler pipe to fuel tank hose.



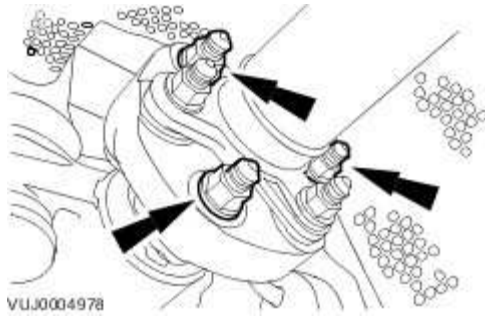
17



CAUTION: Under no circumstances must the flexible coupling (or its fixings) be loosened or removed from the driveshaft

Attach the driveshaft to the rear drive axle flange.

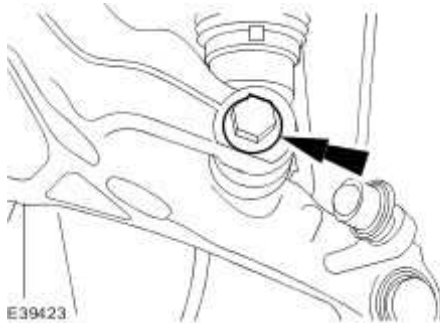
- Install the driveshaft to the original position in relation to the rear drive axle flange.
- Tighten to 88 Nm.
- If a balance nut is fitted, install onto the original bolt position and tighten to 12 Nm .



18 . NOTE:

Left-hand shown, right-hand similar.

Tighten to 133 Nm.

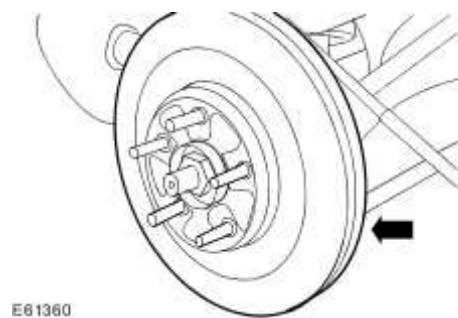


19 . NOTE:

Left-hand shown, right-hand similar.

Install the brake disc.

▶ Install the brake disc to the original position in relation to the hub.



20 .



CAUTION: The brake caliper must be supported at all times.

NOTE:

Left-hand shown, right-hand similar.

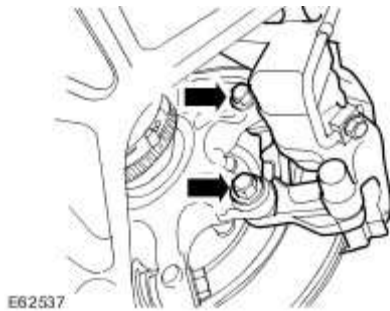
NOTE:

Remove and discard the securing tie strap.

NOTE:

Install new brake caliper anchor plate retaining bolts.

Attach the brake caliper and anchor plate.



21 . Install the rear wheels and tires.

For additional information, refer to Wheel and Tire (74.20.05)

22 . Lower the vehicle.

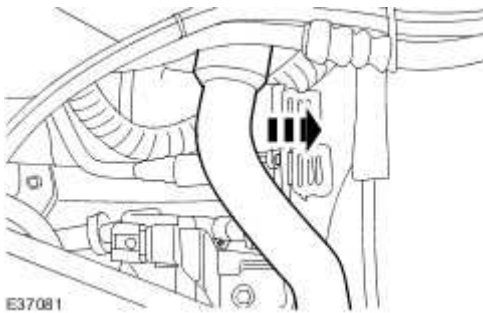
23 . Fill the fuel tank with fuel.

Evaporative Emission Canister Purge Valve

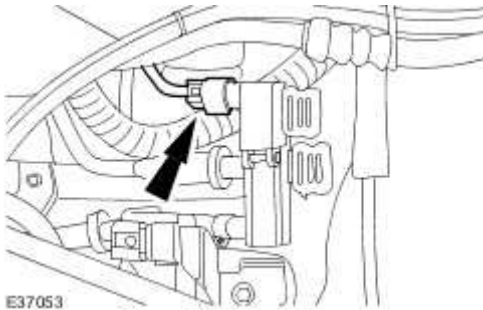
- VIN Range: G00442->G45703 (17.15.30)

Removal

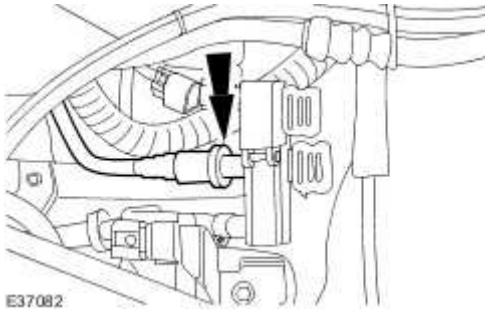
- 1 . Raise and support the vehicle. <<100-02>>
- 2 . Remove the left-hand front wheel and tire. <<204-04>>
- 3 . Remove the left-hand front fender splash shield. <<501-02>>
- 4 . Remove the bulkhead drain tube.



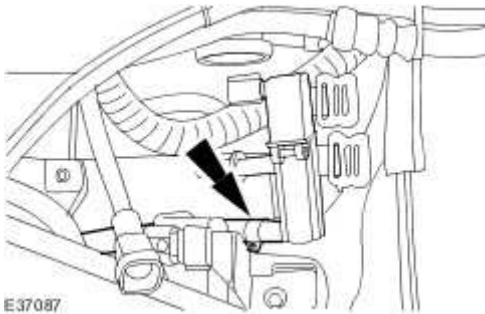
- 5 . Disconnect the evaporative emission canister purge valve electrical connector.



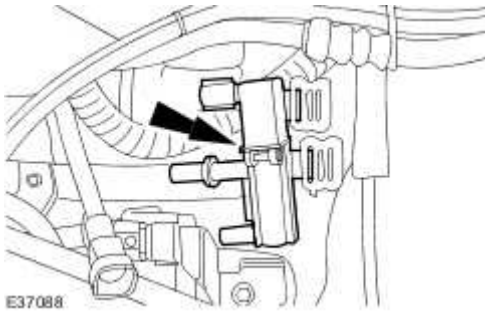
- 6 . Disconnect the evaporative emission canister purge valve outlet hose.



- 7 . Disconnect the evaporative emission canister purge valve inlet hose.



- 8 . Remove the evaporative emission canister purge valve.



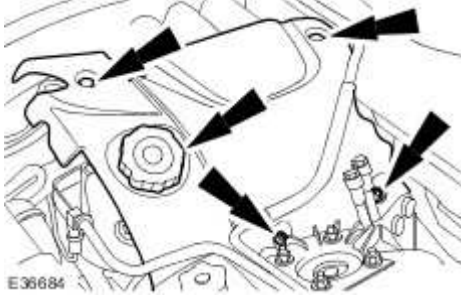
Installation

- 1 . To install, reverse the removal procedure.

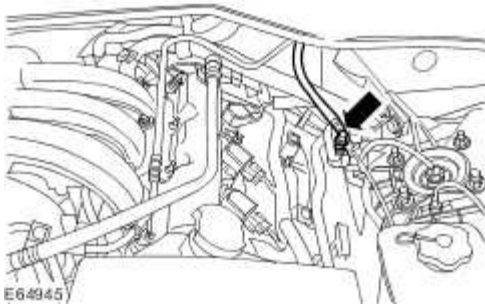
Evaporative Emission Canister Purge Valve - 3.0L NA V6 - AJ27, VIN Range: G45704- >G99999 (17.15.30)

Removal

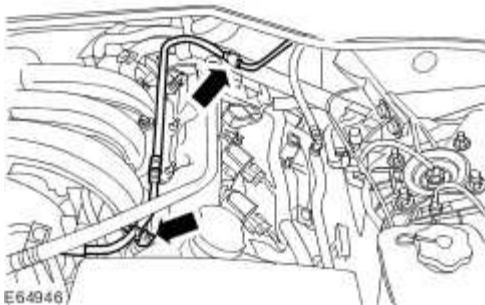
- 1 . Remove the engine cover.



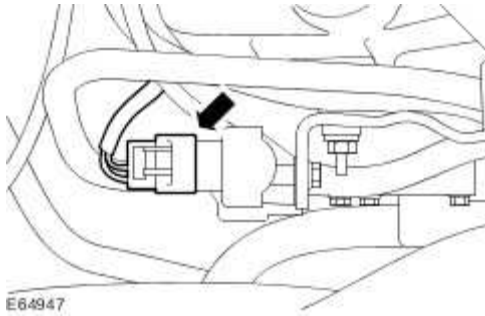
- 2 . Disconnect the evaporative emission canister purge valve hose.



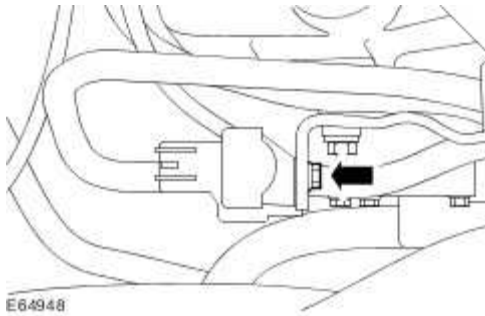
- 3 . Detach the evaporative emission canister purge valve hose.



- 4 . Disconnect the evaporative emission canister purge valve electrical connector.

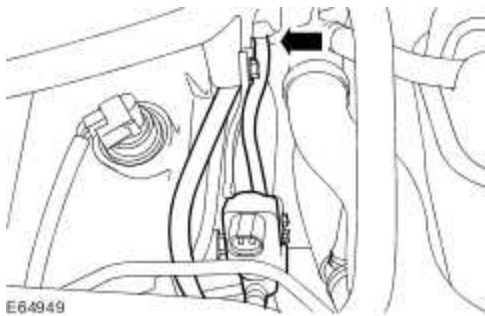


5 . Remove the evaporative emission canister purge valve retaining bolt.



6 . Remove the evaporative emission canister purge valve.

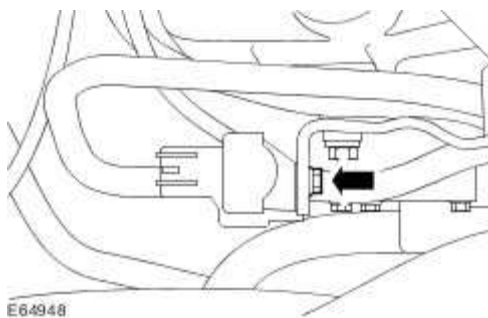
▶ Disconnect the evaporative emission canister purge valve hose.



Installation

1 . To install, reverse the removal procedure.

▶ Tighten to 6 Nm.



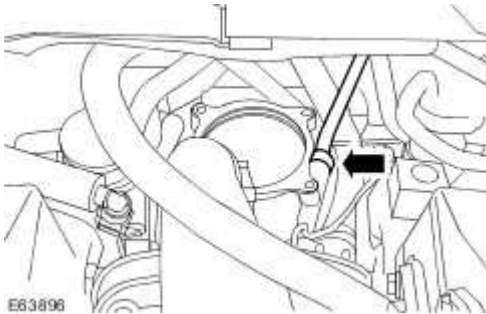
E64948

Evaporative Emission Canister Purge Valve - 4.2L SC V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G45171->G99999 (17.15.30)

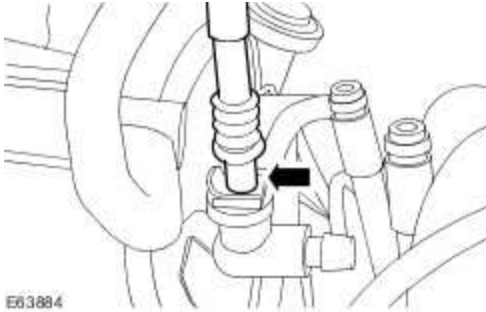
Removal

- 1 Remove the throttle body.
 - . For additional information, refer to Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)

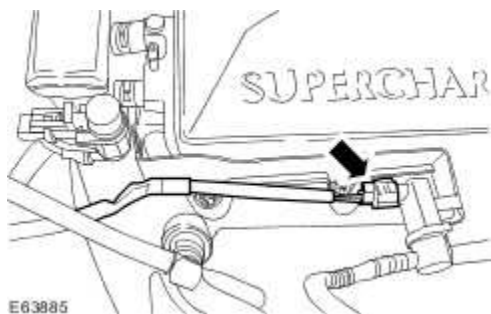
- 2 . Disconnect the evaporative emission canister purge valve hose.



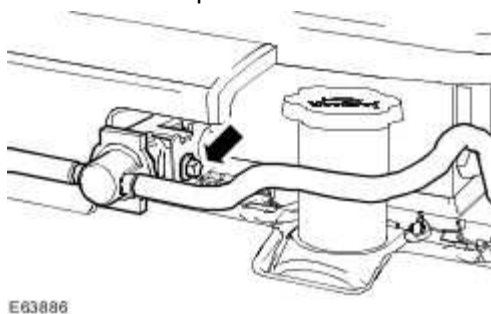
- 3 . Disconnect the evaporative emission canister purge valve hose.



- 4 . Disconnect the evaporative emission canister purge valve electrical connector.



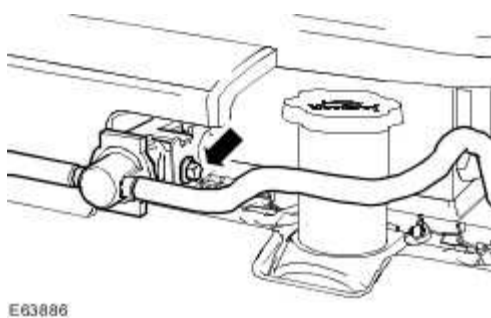
5 . Remove the evaporative emission canister purge valve.



Installation

1 . To install, reverse the removal procedure.

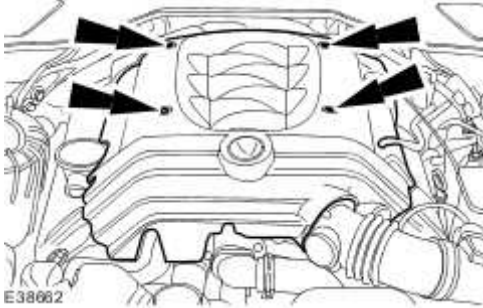
► Tighten to 10 Nm.



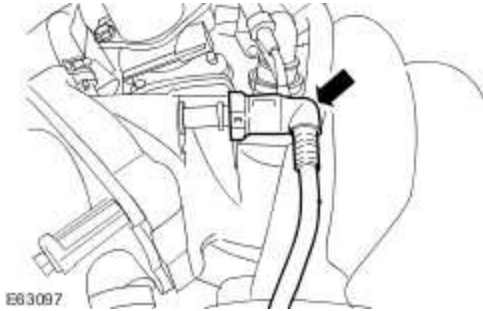
Evaporative Emission Canister Purge Valve - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G45171->G99999 (17.15.30)

Removal

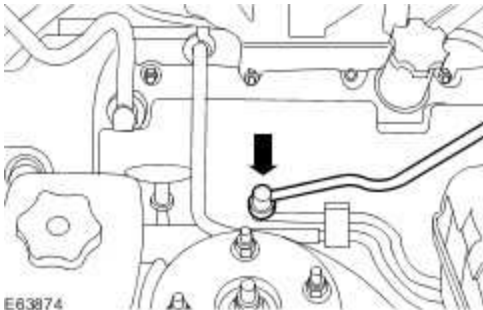
- 1 . Remove the engine cover.



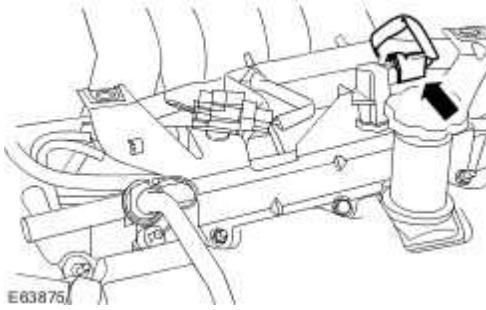
- 2 . Disconnect the evaporative emission canister purge valve hose.



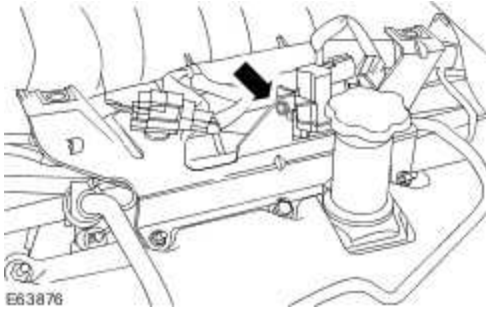
- 3 . Disconnect the evaporative emission canister purge valve hose.



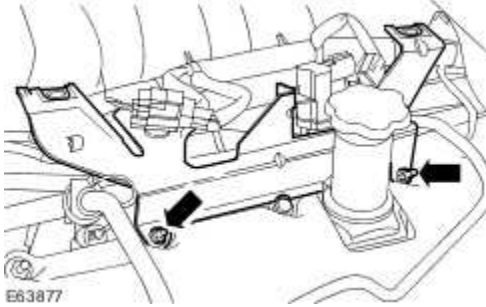
- 4 . Disconnect the evaporative emission canister purge valve electrical connector.



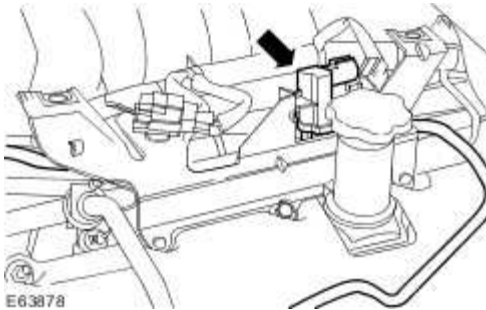
5 . Remove the evaporative emission canister purge valve retaining bolt.



6 . Reposition the engine cover left-hand mounting bracket.



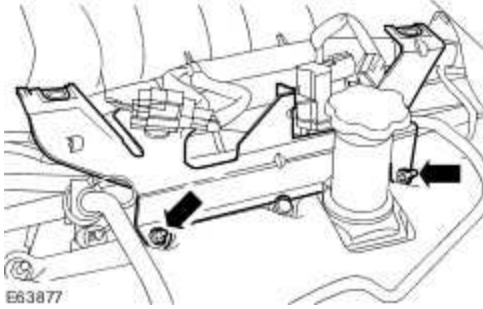
7 . Remove the evaporative emission canister purge valve.



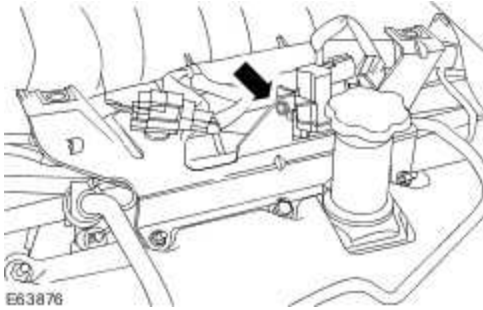
Installation

1 . To install, reverse the removal procedure.

► Tighten to 10 Nm.



2 . Tighten to 10 Nm.



Evaporative Emission Canister Vent Solenoid (17.15.45)

Removal

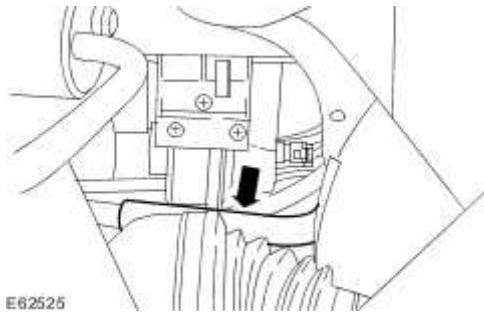


WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

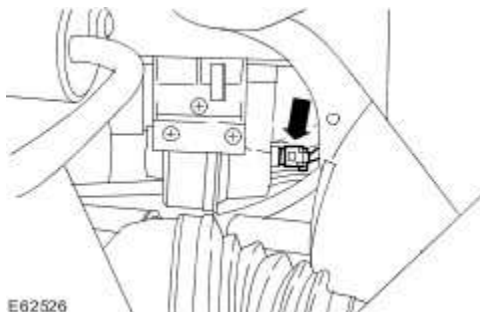


WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapours are always present and may ignite. Failure to follow these instructions may result in personal injury.

- 1 . Raise and support the vehicle.
For additional information, refer to Lifting
- 2 . Disconnect the evaporative emission canister vent solenoid vapor hose.

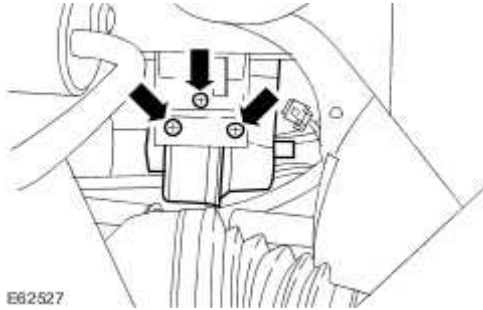


- 3 . Disconnect the evaporative emission canister vent solenoid electrical connector.



4 Remove the evaporative emission canister vent solenoid.

▶ Remove and discard the evaporative emission canister vent solenoid O-ring seal.



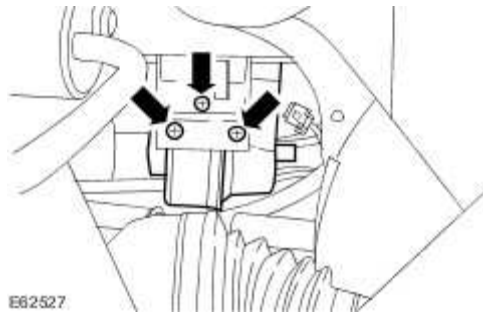
Installation

1 . NOTE:

Install a new evaporative emission canister vent solenoid O-ring seal.

To install, reverse the removal procedure.

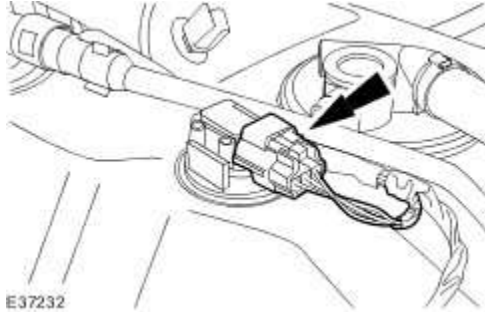
▶ Tighten to 6 Nm.



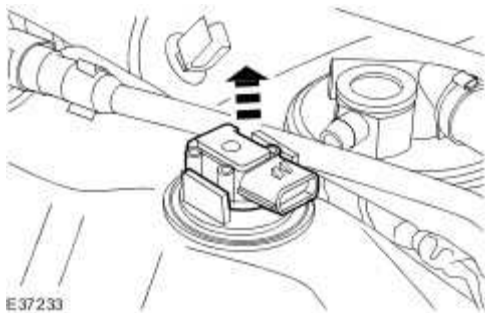
Fuel Tank Pressure Sensor (19.55.31)

Removal

- 1 . Remove the fuel tank. <<310-01>>
- 2 . Disconnect the fuel pressure sensor electrical connector.



- 3 . Remove the fuel pressure sensor.



Installation

- 1 . To install, reverse the removal procedure.

303-14A : Electronic Engine Controls – 3.0L NA V6 – AJ27

Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Camshaft position (CMP) sensor retaining bolt	7	-	62
Heated oxygen sensor (H02S)	40	30	-
Catalyst monitor sensor	40	30	-
Crankshaft position (CKP) sensor retaining bolt	7	-	62
Knock sensor retaining bolt	25	18	-
Variable camshaft timing oil control solenoid retaining bolt	10	-	89
Intake manifold tuning (IMT) valve retaining bolts	10	-	89
Engine coolant temperature (ECT) sensor	17	13	-
Manifold absolute pressure (MAP) sensor retaining screws	10	-	89
Oil temperature sensor	15	11	-
Fuel rail pressure (FRP) sensor retaining bolts	10	-	89
Fuel rail pressure (FRP) sensor bracket upper retaining bolts	6	-	53
Fuel rail pressure (FRP) sensor bracket lower retaining bolt	10	-	89
Engine control module (ECM) electrical connector retaining bolt	5	-	44

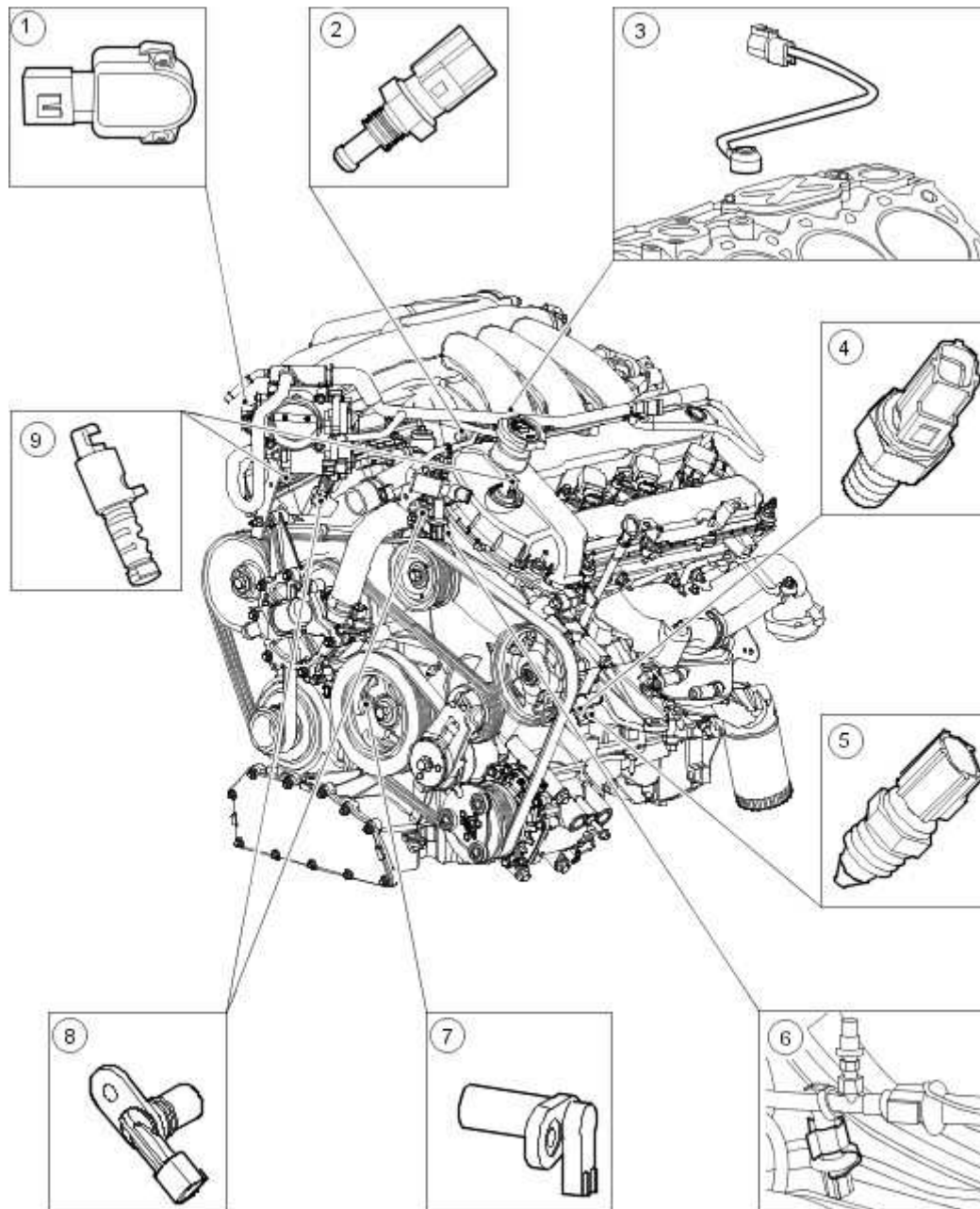
Lubricants, fluids, sealers and adhesives

Description	Specification
Sealant	WSK-M4G-328-A3

Brake Pedal Position (BPP) Switch Adjustment

No Data Available

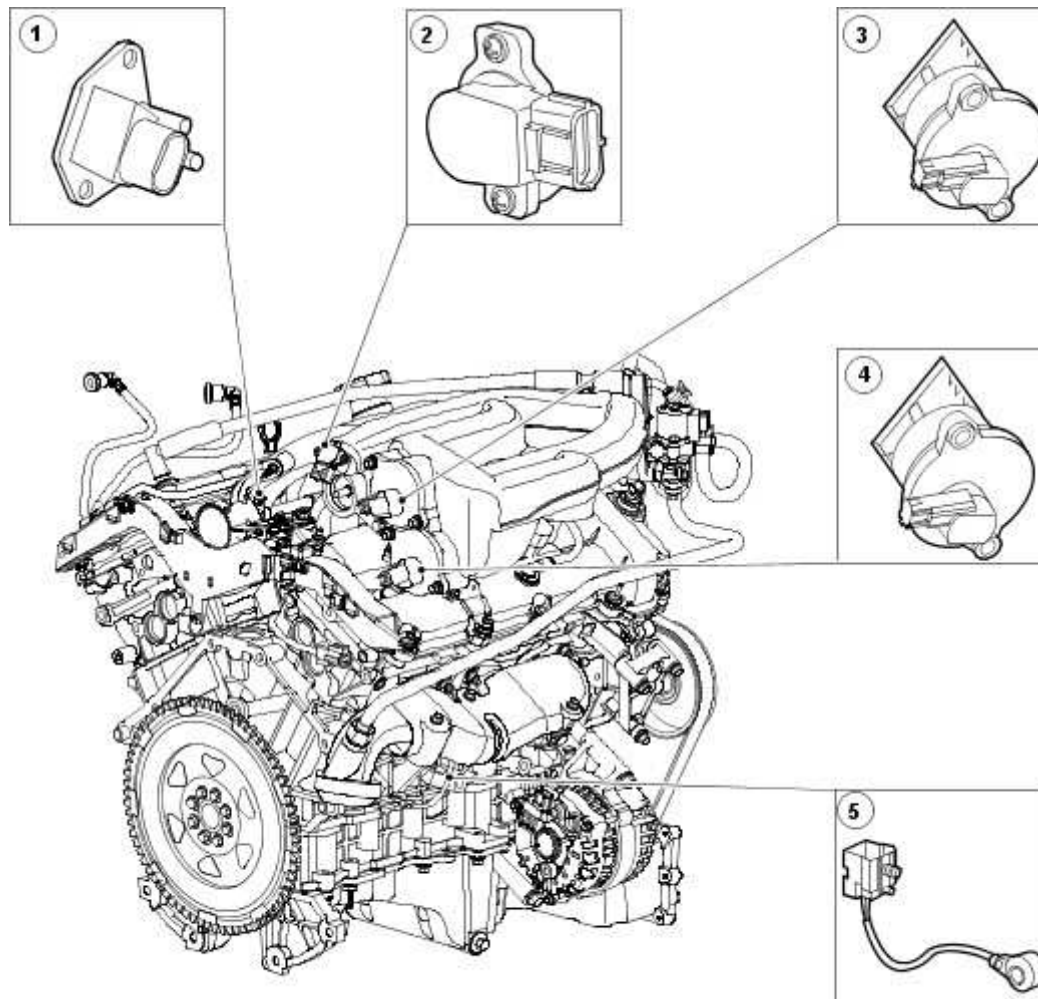
Electronic Engine Controls



E30343

Item	Part Number	Description
1	—	Throttle position (TP) sensor
2	—	Engine coolant temperature (ECT) sensor

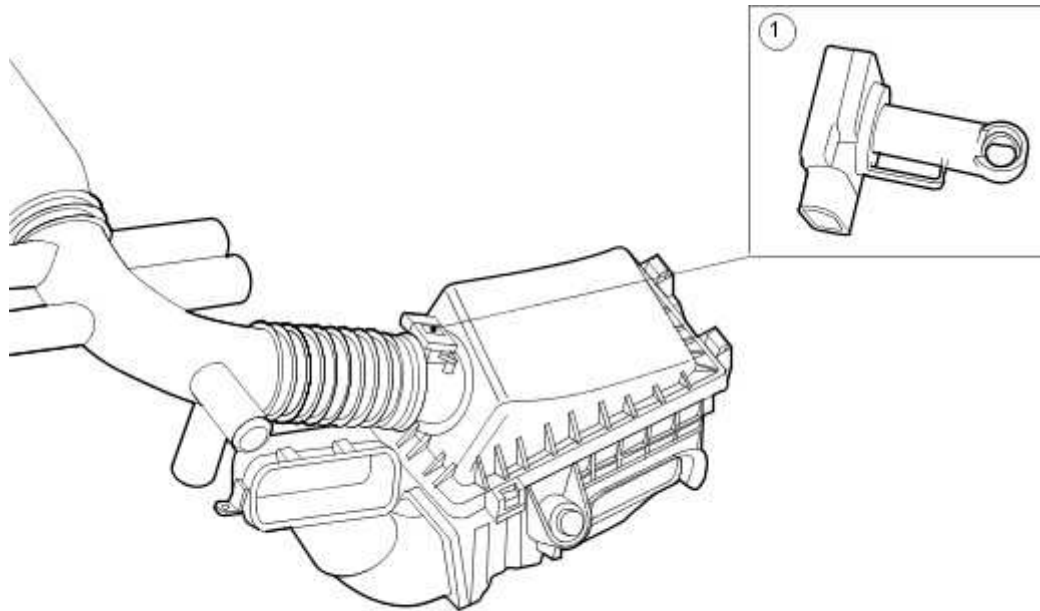
3	—	Knock sensor - LH
4	—	Oil pressure sensor
5	—	Oil temperature sensor
6	—	Fuel temperature sensor
7	—	Crankshaft position (CKP) sensor
8	—	Camshaft position (CMP) sensor
9	—	Variable camshaft timing oil control solenoid



E37303

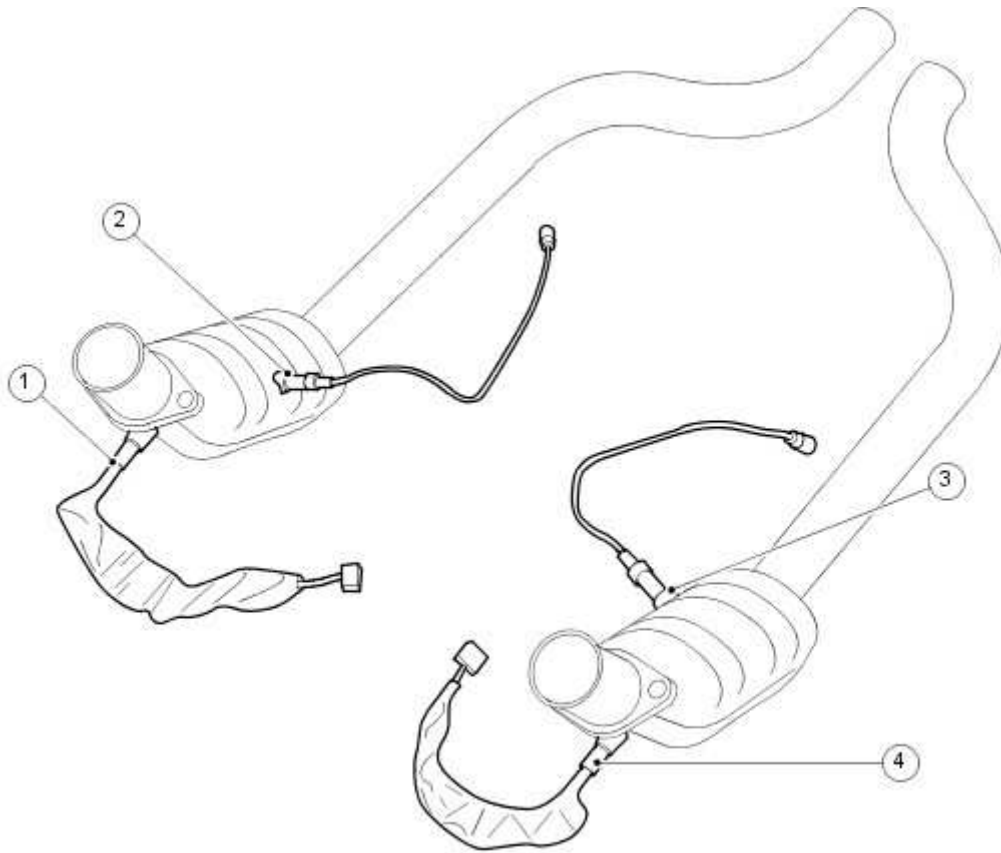
Item	Part Number	Description
1	—	Fuel rail pressure (FRP) sensor

2	—	Manifold absolute pressure (MAP) sensor
3	—	Intake manifold tuning (IMT) valve
4	—	Intake manifold tuning (IMT) valve
5	—	Knock sensor - RH



E30344

Item	Part Number	Description
1	—	Mass air flow (MAF) sensor



E30438

Item	Part Number	Description
1	—	Heated oxygen sensor (HO2S) - RH
2	—	Catalyst monitor sensor - RH
3	—	Catalyst monitor sensor - LH
4	—	Heated oxygen sensor (HO2S) - LH

Engine Control Module (ECM)

The electronic engine control system consists of a engine control module (ECM), located behind the glove compartment, and a number of sensing and actuating devices. The sensors supply the ECM with input signals which relate to the engine operating conditions and driver requirements. The sensor information is evaluated by the ECM using the results to activate the appropriate response from the actuating devices. The system provides the necessary engine control accuracy and adaptability to:

minimize exhaust emissions and fuel consumption.

provide optimum driver control under all conditions.

minimize evaporative emissions.

provide system diagnostics.

In addition to these functions the ECM also interfaces with other vehicle systems through the controller area network (CAN).

Camshaft Position (CMP) Sensor

The camshaft position (CMP) sensors monitor the position of both camshafts to allow the ECM to control the phase of the inlet camshafts relative to the position of the crankshaft.

Variable Camshaft Timing Oil Control Solenoid

The variable camshaft timing oil control solenoid is a hydraulic actuator, which advances and retards the inlet camshaft timing, thereby altering the camshaft to crankshaft phasing for optimum engine performance.

Intake Manifold Tuning (IMT) Valve

There are two intake manifold tuning (IMT) valves, an upper and a lower, sometimes referred to as number one and two respectively. They are a two position (open and close) device used to create a variable air intake system. The IMT valve positions are switched by signals from the ECM to optimize torque across the engine's speed and load range. The upper IMT valve opens between 4,100 and 6,150 rpm while the lower IMT valve opens between 3,900 and 6,150 rpm.

Knock Sensors (KS)

The knock sensors (KS) detect combustion knock within the engine cylinders and sends a signal to the ECM. The ECM uses this information to gradually adjust the ignition timing until the combustion knock is eliminated.

Mass Air flow (MAF) Sensor

The mass air flow (MAF) sensor informs the ECM of the rate of air flow entering the engine by producing a voltage which is proportional to the rate of air flow into the engine. The voltage produced by the MAF sensor increases as the rate of air flow increases. The ECM also takes into account the density of the air entering the air intake system so that it is possible to maintain the required air to fuel ratio, and to compensate for variations in atmospheric pressure.

Integral to the MAF sensor is the intake air temperature sensor (IAT) which measures the temperature of the air entering the air intake system. The ECM uses this information to compensate for higher than normal air intake temperatures.

Fuel Rail Pressure (FRP) Sensor

The fuel rail pressure (FRP) sensor is a pressure transducer device. A vacuum pipe connects to the intake manifold for manifold pressure. The ECM receives a voltage from the FRP sensor which is proportional to the fuel pressure in the fuel injection supply manifold.

Throttle Position (TP) Sensor

The ECM monitors the angle of the throttle blade within the throttle housing through the throttle position (TP) sensor. The TP sends a voltage to the ECM which is proportional to the angle of the throttle plate. The voltage from the TP increases with the angle of the throttle plate. There are two sensor tracks within the TP sensor.

Crankshaft Position (CKP) Sensor

The crankshaft position (CKP) sensor is an inductive pulse generator, which scans protrusions on a pulse ring fitted to the front of the crankshaft to inform the ECM of the crankshaft's position and speed. The CKP sensor produces an alternating voltage. The frequency of this voltage increases proportional to engine speed.

Engine Coolant Temperature (ECT) Sensor

The engine coolant temperature (ECT) sensor is a thermistor type sensor that provides an input signal to the ECM which is proportional to the engine coolant temperature. The ECT sensor is a negative temperature coefficient (NTC) sensor and its resistance decreases with a proportional increase in engine coolant temperature.

Oil Temperature Sensor

The oil temperature sensor is a thermistor type sensor that provides an input signal to the ECM which is proportional to the engine oil temperature.

Oil Pressure Switch

The oil pressure switch is connected to the instrument cluster and is not directly part of the electronic engine control system.

Heated Oxygen Sensor (HO2S)

The heated oxygen sensor (HO2S) is a linear characteristic type sensor, fitted forward of the exhaust system's catalytic converter. The ECM uses this as it's primary sensor to measure the oxygen content of the exhaust gasses within the exhaust system to provide closed-loop fuelling control.

Catalyst Monitor Sensor

The catalyst monitor sensor is a non-linear characteristic type sensor fitted to the exhaust system's catalytic converter. The ECM uses this as it's secondary sensor to measure the oxygen content of the exhaust gasses within the exhaust after they have passed through the catalytic converter. As well as providing additional closed-loop fuelling control the ECM uses this information to determine the efficiency of the catalytic converter.

Electronic Engine Controls - VIN Range: G00442->G45703

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Confirm which, if any, warning lights and/or messages were displayed on the instrument cluster.

NOTE:

If any warning lights and/or messages were displayed when the fault occurred, refer to the driver information table for Diagnostic Trouble Codes (DTCs) associated with the display, then to the DTC index table for possible sources and actions. Some warnings will appear to clear when the ignition is cycled. This is often because the warning has flagged as a result of one of the vehicle's on-board diagnostic routines having run to detect the fault. If the same routine is not run when the ignition is switched **ON**, the warning will not reflag until the routine does run. See the DTC summaries for drive cycle routines.

- 3 . Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Engine oil level	
Cooling system coolant level	Fuses
Fuel level	Wiring harness
Fuel contamination/grade/quality	Electrical connector(s)
Throttle body	Sensor
Poly-vee belt	

Electronic Engine Controls - VIN Range: G45704->G99999

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit, plus the addition of secondary air injection, changes to evaporative emissions and exhaust gas recirculation to comply with stage four emissions requirements.

For more information on these systems,

Engine Emission Control - VIN Range: G45704->G99999

Evaporative Emissions - VIN Range: G45704->G99999

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Engine oil level and condition	Fuses
Cooling system coolant level	Wiring harness
Fuel level	Electrical connector(s)
Fuel contamination/grade/quality	Sensor(s)
Throttle body	Engine control module (ECM)
Poly-vee belt	Transmission control module (TCM)
Air cleaner condition	

- 1 . Verify the following systems are working correctly:

Air intake system

Cooling system

Charging system

Fuel charging system

Ignition system

2 . If an obvious cause for an observed or reported symptom is found, correct the cause (if possible) before proceeding to the next step.

3 . If the cause is not visually evident, use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC Index, or the symptom chart if no DTCs are set.

Symptom Chart

Symptom (general)	Symptom (specific)	Possible source	Action
Non-Start	Engine does not crank	Security system /Immobiliser engaged Engine in shut-down mode ECM relay Battery Park/Neutral switch Starting system Harness Engine seized	Check that the security system is disarmed. Check for DTCs. For ECM relay tests, GO to Pinpoint Test G531330p32. For battery information, Battery For Park/Neutral tests, External Controls For starting system, For engine information, Engine
	Engine cranks, but does not fire	Engine breather system disconnected/restricted Ignition system Fuel system Harness Crankshaft position (CKP) sensor ECM fault	Check the engine breather system, Engine Emission Control - VIN Range: G45704->G99999 For ignition system tests, Engine Ignition - VIN Range: G45704->G99999 For fuel system, Fuel Charging and Controls - VIN Range: G45704->G99999 For CKP tests, GO to Pinpoint Test G531330p17. Refer to the warranty policy and procedures manual if an ECM is suspect.
	Engine cranks and fires, but will not start	Evaporative emissions purge valve Fuel pump	For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999 For fuel pump circuit tests,

		<p>Spark plugs</p> <p>Check for water ingress into spark plug wells</p> <p>HT short to ground (tracking) check rubber boots for cracks/damage</p> <p>Ignition coil failure(s)</p> <p>Harness</p>	<p>Fuel Charging and Controls - VIN Range: G45704->G99999</p> <p>For ignition system, Engine Ignition - VIN Range: G45704->G99999</p>
Difficult to start	Difficult to start cold	<p>Coolant anti-freeze content</p> <p>Battery</p> <p>CKP sensor</p> <p>Exhaust gas recirculation (EGR) valve stuck open</p> <p>Fuel pump</p> <p>Purge valve</p>	<p>Check the coolant anti-freeze content. For battery information, Battery For CKP sensor tests, GO to Pinpoint Test G531330p17.</p> <p>For EGR valve tests, Engine Emission Control - VIN Range: G45704->G99999</p> <p>Check the fuel pressure, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999</p> <p>For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999</p>
	Difficult to start hot	<p>Injector leak</p> <p>Engine fuel temperature (EFT) sensor</p> <p>Intake air temperature (IAT) sensor</p> <p>Mass air flow (MAF) sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p>	<p>For injector information, Fuel Charging and Controls - VIN Range: G45704->G99999</p> <p>For EFT sensor tests, GO to Pinpoint Test G531330p34.</p> <p>For IAT sensor tests, GO to Pinpoint Test G531330p2.</p> <p>For MAF sensor tests, GO to Pinpoint Test G531330p1.</p> <p>For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999</p>

	Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)	<p>Injector leak</p> <p>EFT sensor</p> <p>IAT sensor</p> <p>MAF sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p>	
	Engine cranks too fast/slow	<p>Compressions high/low</p> <p>Battery</p> <p>Starting system</p>	<p>Check compressions, Engine For battery information, Battery For starting system,</p>
Engine stalls	Engine stalls soon after start	<p>Breather system disconnected/restricted</p> <p>ECM relay</p> <p>Harness</p> <p>MAF sensor</p> <p>Ignition system</p> <p>Fuel lines</p> <p>Fuel rail pressure (FRP) sensor</p> <p>Air filter restricted</p> <p>Air leakage</p>	<p>Check the engine breather system,</p> <p>Engine Emission Control - VIN Range: G45704->G99999 For ECM relay tests, GO to Pinpoint Test G531330p32.</p> <p>For MAF sensor tests, GO to Pinpoint Test G531330p1.</p> <p>For ignition system tests, Engine Ignition - VIN Range: G45704->G99999 Check the fuel lines,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For FRP sensor tests, GO to Pinpoint Test G531330p21.</p> <p>For air filter and intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999</p>
	Engine stalls on	ECM relay	For ECM relay tests, GO to Pinpoint Test G531330p32.

	overrun	Throttle position (TP) sensors	For TP sensor tests, GO to Pinpoint Test G531330p4. and GO to Pinpoint Test G531330p5.
	Engine stalls at steady speed	ECM relay CKP sensor TP sensors Harness	For ECM relay tests, GO to Pinpoint Test G531330p32. For CKP sensor tests, GO to Pinpoint Test G531330p17. For TP sensor tests, GO to Pinpoint Test G531330p4. and GO to Pinpoint Test G531330p5.
	Engine stalls with speed control enabled	ECM relay Harness	For ECM relay tests, GO to Pinpoint Test G531330p32.
	Engine stalls when maneuvering	ECM relay TP sensors Additional engine loads (PAS, air conditioning, etc) Transmission malfunction Controller area network (CAN) network malfunction	For ECM relay tests, GO to Pinpoint Test G531330p32. For TP sensor tests, GO to Pinpoint Test G531330p4. and GO to Pinpoint Test G531330p5. For accessory drive information, For transmission information, For CAN network tests,
Poor driveability	Engine hesitates/poor acceleration	Fuel pump Fuel pressure Fuel lines Injector leak Air leakage TP sensors Throttle motor Ignition system EGR valve stuck open	Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For injector information, Fuel Charging and Controls - VIN Range: G45704->G99999 For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For TP sensor tests, GO to Pinpoint Test G531330p4.

		<p>HO2 sensors</p> <p>Transmission malfunction</p> <p>Restricted pedal travel (carpet, etc)</p> <p>Accelerator pedal position (APP) sensor</p>	<p>and GO to Pinpoint Test G531330p5.</p> <p>For throttle motor tests, GO to Pinpoint Test G531330p24.</p> <p>For ignition system tests, Engine Ignition - VIN Range: G45704->G99999 For EGR valve tests, Engine Emission Control - VIN Range: G45704->G99999</p> <p>Check for DTCs relating to HO2 sensors. Refer to the DTC index for pinpoint tests for DTC set.</p> <p>For transmission information, Check accelerator pedal travel.</p> <p>For APP sensor tests, GO to Pinpoint Test G531330p22.</p> <p>and GO to Pinpoint Test G531330p23.</p>
	Engine backfires	<p>Fuel pump</p> <p>Fuel lines</p> <p>Air leakage</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Ignition system</p> <p>Sticking variable camshaft timing (VCT) hub</p> <p>APP sensor</p>	<p>For fuel pump and line tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For MAF sensor tests, GO to Pinpoint Test G531330p1.</p> <p>Check for DTCs relating to HO2 sensors. Refer to the DTC index for pinpoint tests for DTC set.</p> <p>For ignition system tests, Engine Ignition - VIN Range: G45704->G99999 For VCT information, Variable Camshaft Timing (VCT) Oil Control Solenoid (18.30.90)</p> <p>For APP sensor tests, GO to Pinpoint Test G531330p22.</p> <p>and GO to Pinpoint Test</p>

			G531330p23.
Engine surges	Fuel pump Fuel lines MAF sensor Harness TP sensors Throttle motor Ignition system	For fuel pump and line tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For MAF sensor tests, GO to Pinpoint Test G531330p1. For TP sensor tests, GO to Pinpoint Test G531330p4. and GO to Pinpoint Test G531330p5. For throttle motor tests, GO to Pinpoint Test G531330p24. For ignition system tests, Engine Ignition - VIN Range: G45704->G99999	
Engine detonates/knocks	Knock sensor (KS)/circuit malfunction Fuel pump Fuel lines Fuel quality FRP sensor MAF sensor HO2 sensors Air leakage Sticking VCT hub BARO sensor malfunction (internal ECM fault)	For KS circuit tests, GO to Pinpoint Test G531330p15. and GO to Pinpoint Test G531330p16. For fuel pump and line tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For FRP sensor tests, GO to Pinpoint Test G531330p21. For MAF sensor tests, GO to Pinpoint Test G531330p1. Check for DTCs relating to HO2 sensors. Refer to the DTC index for pinpoint tests for DTC set. For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check DTCs for VCT range/performance fault. For VCT information, Engine BARO sensor, refer to the warranty policy and	

			procedures manual if an ECM is suspect.
No throttle response	APP sensor malfunction TP sensors Throttle motor	For APP sensor tests, GO to Pinpoint Test G531330p22. , and GO to Pinpoint Test G531330p23. For TP sensor tests, GO to Pinpoint Test G531330p4. and GO to Pinpoint Test G531330p5. For throttle motor tests, GO to Pinpoint Test G531330p24.	
Speed control inhibited or disabled	Default mode enabled Speed control switch TP sensors Brake pedal switch CAN fault	Check the message center for default messages. For speed control switches, Speed Control - VIN Range: G45704->G99999 For TP sensor tests, GO to Pinpoint Test G531330p4. and GO to Pinpoint Test G531330p5. For brake pedal switch tests, GO to Pinpoint Test G531330p25.	
Poor throttle response	APP sensor malfunction TP sensors ECT sensor MAF sensor Transmission malfunction Traction control event Air leakage Breather system disconnected/restricted	For APP sensor tests, GO to Pinpoint Test G531330p22. and GO to Pinpoint Test G531330p23. For TP sensor tests, GO to Pinpoint Test G531330p4. and GO to Pinpoint Test G531330p5. For ECT sensor tests, GO to Pinpoint Test G531330p3. For MAF sensor tests, GO to Pinpoint Test G531330p1. For transmission information, For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For breather system information,	

			Engine Emission Control - VIN Range: G45704->G99999
	Engine defaults, warning light and messages.	Park/Neutral switch TP sensors MAF sensor ECT sensor Harness	For Park/Neutral tests, External Controls For TP sensor tests, GO to Pinpoint Test G531330p4. and GO to Pinpoint Test G531330p5. For MAF sensor tests, GO to Pinpoint Test G531330p1. For ECT sensor tests, GO to Pinpoint Test G531330p3.

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

DTC	Description	Possible causes	Action
C003100	Left front wheel speed sensor	Invalid data received from ABS: left front wheel speed signal	Anti-Lock Control - Stability Assist - VIN Range: G45704->G99999
C003400	Right front wheel speed sensor	Invalid data received from ABS: right front wheel speed signal	Anti-Lock Control - Stability Assist - VIN Range: G45704->G99999
C003700	Left rear wheel speed sensor	Invalid data received from ABS: left rear wheel speed signal	Anti-Lock Control - Stability Assist - VIN Range: G45704->G99999
C003A00	Right rear wheel speed sensor	Invalid data received from ABS: right rear wheel speed signal	Anti-Lock Control - Stability Assist - VIN

			Range: G45704->G99999
P001100	Intake (A) camshaft position timing - over-advanced (right hand bank)	Cam timing has not been set up correctly Timing chain has slipped	Check the engine timing, Timing Drive Components (12.65.13)
P001200	Intake (A) camshaft position timing - over-retarded (right hand bank)	Cam timing has not been set up correctly Timing chain has slipped	Check the engine timing, Timing Drive Components (12.65.13)
P001600	Crankshaft position (CKP)/Camshaft position (CMP) sensor correlation, right hand bank	The relative positions of the CKP and CMP teeth are not correct Sensors incorrectly aligned on rebuild	Reset the sensor positions. Camshaft Position (CMP) Sensor LH (18.31.12) Camshaft Position (CMP) Sensor RH (18.31.11) Crankshaft Position (CKP) Sensor (18.30.12)
P001800	Crankshaft position (CKP)/Camshaft position (CMP) sensor correlation, left hand bank	The relative positions of the CKP and CMP teeth are not correct Sensors incorrectly aligned on rebuild	Reset the sensor positions. Camshaft Position (CMP) Sensor LH (18.31.12) Camshaft Position (CMP) Sensor RH (18.31.11) Crankshaft Position (CKP) Sensor (18.30.12)
P002100	Intake (A) camshaft position timing - over-advanced (left hand bank)	Cam timing has not been set up correctly Timing chain has slipped	Check the engine timing, Timing Drive Components (12.65.13)
P002200	Intake (A) camshaft position timing - over-retarded (left hand bank)	Cam timing has not been set up correctly Timing chain has slipped	Check the engine timing, Timing Drive Components (12.65.13)
P002672	Variable camshaft timing (VCT) control solenoid circuit range/performance (right hand bank) - actuator stuck open	Oil contamination VCT oil flow fault VCT solenoid fault VCT/Camshaft mechanical failure	For right hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531330p29.
P002677	VCT control solenoid circuit range/performance (right	Oil contamination	For right hand bank VCT solenoid circuit tests, GO

	hand bank) - commanded position not reachable	VCT oil flow fault VCT solenoid fault VCT/Camshaft mechanical failure	to Pinpoint Test G531330p29.
P002872	VCT control solenoid circuit range/performance (left hand bank) - actuator stuck open	Oil contamination VCT oil flow fault VCT solenoid fault VCT/Camshaft mechanical failure	For left hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531330p30.
P002877	VCT control solenoid circuit range/performance (left hand bank) - commanded position not reachable	Oil contamination VCT oil flow fault VCT solenoid fault VCT/Camshaft mechanical failure	For left hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531330p30.
P003100	HO2S heater control circuit low (right hand bank)	HO2S heater power supply circuit: high resistance HO2S heater control circuit: high resistance HO2S heater ground circuit(s) fault HO2S heater failure	For right hand bank HO2S heater circuit tests, GO to Pinpoint Test G531330p7.
P003200	HO2S heater control circuit high (right hand bank)	HO2S heater power supply circuit: high resistance HO2S heater control circuit: high resistance HO2S heater ground circuit(s) fault HO2S heater failure	For right hand bank HO2S heater circuit tests, GO to Pinpoint Test G531330p7.
P003600	Catalyst monitor heater control circuit (right hand bank)	Catalyst monitor sensor heater control circuit: short circuit to ground Catalyst monitor sensor heater control circuit:	For right hand bank catalyst monitor heater circuit tests, GO to Pinpoint Test G531330p9.

		high resistance Catalyst monitor sensor heater failure	
P005100	HO2S heater control circuit low (left hand bank)	HO2S heater power supply circuit: high resistance HO2S heater control circuit: high resistance HO2S heater ground circuit(s) fault HO2S heater failure	For left hand bank HO2S heater circuit tests, GO to Pinpoint Test G531330p11.
P005200	HO2S heater control circuit high (left hand bank)	HO2S heater power supply circuit: high resistance HO2S heater control circuit: high resistance HO2S heater ground circuit(s) fault HO2S heater failure	For left hand bank HO2S heater circuit tests, GO to Pinpoint Test G531330p11.
P005600	Catalyst monitor heater control circuit (left hand bank)	Catalyst monitor sensor heater control circuit: short circuit to ground Catalyst monitor sensor heater control circuit: high resistance Catalyst monitor sensor heater failure	For left hand bank catalyst monitor heater circuit tests, GO to Pinpoint Test G531330p12.
P006900	Manifold absolute pressure (MAP) - Barometric pressure correlation	MAP sensor failure BARO sensor failure (internal ECM fault)	For MAP sensor circuit tests, GO to Pinpoint Test G531330p33. Refer to the warranty policy and procedure manual if an ECM is suspect.
P007100	Ambient air temperature sensor range/performance	Ambient temperature value missing from CAN bus	Control Components
P007200	Ambient air temperature sensor circuit low	Ambient air temperature sensor circuit: high	Control Components

		<p>resistance</p> <p>Ambient air temperature sensor circuit: short circuit to ground</p>	
P007300	Ambient air temperature sensor circuit high	Ambient air temperature sensor circuit: short circuit to power	Control Components
P007500	Variable camshaft timing (VCT) control circuit (right hand bank)	<p>VCT solenoid valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit: high resistance</p> <p>VCT solenoid failure</p>	For right hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531330p29.
P007600	Variable camshaft timing (VCT) control circuit low (right hand bank)	<p>VCT solenoid valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit: short circuit to ground</p> <p>VCT solenoid failure</p>	For right hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531330p29.
P007700	Variable camshaft timing (VCT) control circuit high (right hand bank)	<p>VCT solenoid valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit: short circuit to power</p> <p>VCT solenoid failure</p>	For right hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531330p29.
P008100	Variable camshaft timing (VCT) control circuit (left hand bank)	<p>VCT solenoid valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit: high resistance</p> <p>VCT solenoid failure</p>	For left hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531330p30.
P008200	Variable camshaft timing (VCT) control circuit low (left hand bank)	<p>VCT solenoid valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit: short circuit to ground</p> <p>VCT solenoid failure</p>	For left hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531330p30.

P008300	Variable camshaft timing (VCT) control circuit high (left hand bank)	<p>VCT solenoid valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit: short circuit to power</p> <p>VCT solenoid failure</p>	For left hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531330p30.
P008700	Fuel rail/system pressure - too low	<p>Fuel rail pressure (FRP) sensor disconnected</p> <p>FRP sensor to ECM sensing circuit: high resistance or short circuit to ground</p> <p>FRP sensor supply circuit: high resistance</p> <p>FRP sensor failure</p> <p>Fuel pump failure</p> <p>Fuel line leak</p> <p>Restricted fuel line</p>	<p>For FRP sensor circuit tests, GO to Pinpoint Test G531330p21.</p> <p>Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999</p>
P008800	Fuel rail/system pressure - too high	<p>FRP sensor to ECM wiring (supply/sense): short circuit to each other</p> <p>FRP sensor to ECM sense circuit: short circuit to power</p> <p>FRP sensor ground circuit: high resistance</p> <p>FRP sensor failure</p> <p>Restricted fuel line</p> <p>Fuel pump short circuit to battery</p>	<p>For FRP sensor tests, GO to Pinpoint Test G531330p21.</p> <p>For fuel line tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999</p>
P010100	Mass or volume air flow A circuit range/performance	Blocked air cleaner	For intake system information, Intake Air Distribution and

		<p>Air intake leak</p> <p>Engine breather leak</p> <p>Mass air flow (MAF) sensor to ECM sensing circuit: high resistance, intermittent short circuit to ground</p> <p>MAF sensor supply circuit: high resistance</p> <p>Throttle adaption fault (check throttle position voltage at Ignition ON)</p>	<p>Filtering - VIN Range: G45704->G99999 Check the engine breather system,</p> <p>Engine Emission Control - VIN Range: G45704->G99999 For MAF sensor circuit tests, GO to Pinpoint Test G531330p1.</p>
P010200	Mass or volume air flow A circuit low input	<p>MAF sensor supply circuit: high resistance, short circuit to ground</p> <p>MAF sensor failure</p>	<p>For MAF sensor circuit tests, GO to Pinpoint Test G531330p1.</p>
P010300	Mass or volume air flow A circuit high input	<p>MAF sensor to ECM sensing circuit: short circuit to power</p> <p>MAF sensor to ECM sensor ground circuit: high resistance</p> <p>MAF sensor failure</p>	<p>For MAF sensor circuit tests, GO to Pinpoint Test G531330p1.</p>
P010600	Manifold absolute pressure (MAP)/BARO sensor range/performance	<p>Intake manifold air leak (loose or missing component)</p> <p>MAP sensor to ECM circuit(s) fault</p> <p>Throttle adaption fault (check throttle position voltage at Ignition ON)</p> <p>MAP sensor failure</p>	<p>For intake system information,</p> <p>Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For MAP sensor circuit tests, GO to Pinpoint Test G531330p33.</p>
P011123	Intake air temperature (IAT) sensor circuit range/performance - signal stuck low	<p>IAT sensor to ECM wiring: high resistance</p> <p>IAT sensor failure</p>	<p>For IAT sensor circuit tests, GO to Pinpoint Test G531330p2.</p>
P011124	IAT sensor circuit range/performance - signal stuck high	<p>IAT sensor to ECM wiring: high resistance</p> <p>IAT sensor failure</p>	<p>For IAT sensor circuit tests, GO to Pinpoint Test G531330p2.</p>

P011129	IAT sensor circuit range/performance - signal invalid	IAT sensor to ECM wiring: high resistance IAT sensor failure	For IAT sensor circuit tests, GO to Pinpoint Test G531330p2.
P011200	IAT sensor circuit low input	IAT sensor disconnected IAT sensor to ECM wiring: high resistance IAT sensor failure	For IAT sensor circuit tests, GO to Pinpoint Test G531330p2.
P011300	IAT sensor circuit high input	IAT sensor to ECM wiring: short circuit to ground IAT sensor to ECM sensing circuit: short circuit to power IAT sensor failure	For IAT sensor circuit tests, GO to Pinpoint Test G531330p2.
P011623	Engine coolant temperature (ECT) sensor circuit range/performance - signal stuck low	Low coolant level ECT sensor to ECM sensing circuit: intermittent high resistance Engine thermostat failure ECT sensor failure	For ECT sensor circuit tests, GO to Pinpoint Test G531330p3.
P011624	ECT sensor circuit range/performance - signal stuck high	Low coolant level ECT sensor to ECM sensing circuit: intermittent high resistance Engine coolant thermostat failure ECT sensor failure	For ECT sensor circuit tests, GO to Pinpoint Test G531330p3.
P011629	ECT sensor circuit range/performance - signal invalid	Low coolant level ECT sensor to ECM sensing circuit: intermittent high resistance Engine coolant thermostat failure ECT sensor failure	For ECT sensor circuit tests, GO to Pinpoint Test G531330p3.

P011700	ECT sensor circuit low input	ECT sensor disconnected ECT sensor to ECM sensing circuit: high resistance, short circuit to power ECT sensor failure	For ECT sensor circuit tests, GO to Pinpoint Test G531330p3.
P011800	ECT sensor 1 circuit high input	Engine overheat condition/cooling fan failure ECT sensor to ECM wiring: short circuit to ground ECT sensor failure	For cooling fan circuit tests, GO to Pinpoint Test G531330p19. For ECT sensor circuit tests, GO to Pinpoint Test G531330p3.
P012100	Throttle position (TP) sensor circuit range/performance, circuit 1 and 2	TP sensor to ECM wiring: high resistance TP sensor to ECM sensing circuits: (TP 1 or TP 2) short circuit to power TP sensor failure	For TP sensor circuit 1 tests, GO to Pinpoint Test G531330p4. For TP sensor circuit 2 tests, GO to Pinpoint Test G531330p5.
P012200	TP sensor circuit 1 low input	TP sensor to ECM sensing circuit 1: short circuit to ground, high resistance TP sensor failure	For TP sensor circuit 1 tests, GO to Pinpoint Test G531330p4.
P012300	TP sensor circuit 1 low input	TP sensor to ECM sensing circuit (TP1): short circuit to power TP sensor failure	For TP sensor circuit 1 tests, GO to Pinpoint Test G531330p4.
P012500	Insufficient coolant temp for closed loop fuel control	Low coolant level ECT sensor to ECM sensing circuit: intermittent high resistance Engine thermostat failure ECT sensor failure	Check the coolant level. For ECT sensor circuit tests, GO to Pinpoint Test G531330p3.
P012800	Coolant thermostat (coolant temp below thermostat regulating temperature)	Contaminated coolant Engine coolant thermostat failure ECT sensor failure ECT sensor DTC may also be flagged	Check the coolant anti-freeze content and condition. Check the thermostat condition and function. Check for ECT

			sensor DTCs.
P01311A	H02 sensor circuit low voltage (right hand bank)	H02S disconnected H02S to ECM variable current circuit fault ECM to H02S constant current circuit fault H02S failure	For right hand bank H02 sensor circuit tests, GO to Pinpoint Test G531330p6. and GO to Pinpoint Test G531330p7.
P01321B	H02 sensor circuit high voltage (right hand bank)	H02S disconnected H02S to ECM variable current circuit fault ECM to H02S constant current circuit fault H02S failure	For right hand bank H02 sensor circuit tests, GO to Pinpoint Test G531330p6. and GO to Pinpoint Test G531330p7.
P013300	H02 sensor circuit slow response (right hand bank)	H02S to ECM wiring shield high resistance Exhaust leak Fuel control system fault H02 sensor failure	For right hand bank H02 sensor circuit tests, GO to Pinpoint Test G531330p6. and GO to Pinpoint Test G531330p7.
P013400	H02 sensor circuit no activity detected (right hand bank)	H02S slow activation	For right hand bank H02 sensor circuit tests, GO to Pinpoint Test G531330p6. and GO to Pinpoint Test G531330p7.
P013700	Catalyst monitor circuit low voltage (right hand bank)	Catalyst monitor sensor disconnected Catalyst monitor sensor to ECM wiring: high resistance Catalyst monitor sensor: short circuit to ground Catalyst monitor sensor failure	For right hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531330p8. and GO to Pinpoint Test G531330p9.
P013800	Catalyst monitor circuit high	Catalyst monitor sensor sensing circuit: short	For right hand bank catalyst monitor circuit

	voltage (right hand bank)	<p>circuit to power</p> <p>Catalyst monitor sensor ground braided shield: high resistance</p> <p>Catalyst monitor sensor failure</p>	tests, GO to Pinpoint Test G531330p8. and GO to Pinpoint Test G531330p9.
P013900	Catalyst monitor sensor circuit slow response (right hand bank)	Catalyst monitor sensor slow response	For right hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531330p8. and GO to Pinpoint Test G531330p9.
P014000	Catalyst monitor circuit no activity detected (right hand bank)	<p>Catalyst monitor disconnected</p> <p>Catalyst monitor mechanical damage</p> <p>Catalyst monitor to ECM wiring: high resistance</p> <p>Catalyst monitor sensing circuit: short circuit to power</p> <p>Catalyst monitor: short circuit to ground</p> <p>Catalyst monitor ground (BRD braided shield) high resistance</p>	For right hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531330p8. and GO to Pinpoint Test G531330p9.
P014100	Catalyst monitor heater circuit (right hand bank)	<p>Catalyst monitor sensor heater control circuit: high resistance</p> <p>Catalyst monitor sensor heater failure</p>	For right hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531330p8. and GO to Pinpoint Test G531330p9.
P01511A	H02 sensor circuit low voltage (left hand bank) - circuit resistance below threshold	<p>H02 sensing circuit: short circuit to ground, short circuit to power, high resistance</p> <p>H02S failure</p>	For left hand bank HO2S circuit tests, GO to Pinpoint Test G531330p10. and GO to Pinpoint Test G531330p11.

P01521B	H02 sensor circuit low voltage (left hand bank) - circuit resistance above threshold	H02S sensing circuit: short circuit to ground, short circuit to power, high resistance H02S failure	For left hand bank H02S circuit tests, GO to Pinpoint Test G531330p10. and GO to Pinpoint Test G531330p11.
P015300	H02S circuit slow response (left hand bank)	H02S to ECM wiring shield high resistance Exhaust leak Fuel control system fault H02S failure	For left hand bank H02S circuit tests, GO to Pinpoint Test G531330p10. and GO to Pinpoint Test G531330p11.
P015400	H02S circuit no activity detected (left hand bank)	H02S slow activation	For left hand bank H02S circuit tests, GO to Pinpoint Test G531330p10. and GO to Pinpoint Test G531330p11.
P015700	Catalyst monitor sensor circuit low voltage (left hand bank)	Catalyst monitor sensor disconnected Catalyst monitor sensor to ECM wiring high resistance Catalyst monitor sensor short circuit to ground Fuel control system lean fault Catalyst monitor sensor failure	For left hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531330p14. and GO to Pinpoint Test G531330p12.
P015800	Catalyst monitor sensor circuit high voltage (left hand bank)	Catalyst monitor sensor sensing circuit: short circuit to power Catalyst monitor sensor ground (BRD braided shield) high resistance Catalyst monitor sensor failure	For left hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531330p14. and GO to Pinpoint Test G531330p12.
P015900	Catalyst monitor sensor circuit slow response (left	Catalyst monitor sensor slow response	For left hand bank catalyst monitor circuit tests, GO

	hand bank)		to Pinpoint Test G531330p14. and GO to Pinpoint Test G531330p12.
P016000	Catalyst monitor sensor circuit no activity detected (left hand bank)	Catalyst monitor sensor disconnected Catalyst monitor sensor mechanical damage Catalyst monitor sensor to ECM wiring high resistance Catalyst monitor sensor sensing circuit: short circuit to power Catalyst monitor sensor short circuit to ground Catalyst monitor sensor ground (BRD braided shield) high resistance	For left hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531330p14. and GO to Pinpoint Test G531330p12.
P016100	Catalyst monitor sensor heater circuit (left hand bank)	Catalyst monitor sensor heater control circuit malfunction	For left hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531330p14. and GO to Pinpoint Test G531330p12.
P017100	System too lean (right hand bank)	Air intake leak between MAF sensor and cylinder head Fuel filter/system restriction Fuel injector restriction MAF sensor fault (low intake air flow) Exhaust leak (before catalyst)	For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For fuel injector information, Fuel Injectors (18.10.02)

			<p>For MAF sensor circuit tests, GO to Pinpoint Test G531330p1.</p> <p>Check the exhaust system (before catalyst) for condition and security,</p>
P017200	System too rich (right hand bank)	<p>Restricted air filter</p> <p>Leaking fuel injector(s)</p> <p>Oil contaminated with fuel (too many cold starts with vehicle subsequently not getting hot enough for long enough)</p> <p>MAF sensor fault (high intake air flow)</p>	<p>For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For fuel injector information, Fuel Injectors (18.10.02) Check the oil condition, if contamination is present, renew the engine oil and filter. For MAF sensor circuit tests, GO to Pinpoint Test G531330p1.</p>
P017400	System too lean (left hand bank)	<p>Air intake leak between MAF sensor and cylinder head</p> <p>Fuel filter/system restriction</p> <p>Fuel injector restriction</p> <p>MAF sensor fault (low intake air flow)</p> <p>Exhaust leak (before catalyst)</p>	<p>For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the fuel pressure, check the fuel lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For fuel injector information, Fuel Injectors (18.10.02) For MAF sensor circuit tests, GO to Pinpoint Test G531330p1.</p> <p>Check the exhaust system (before catalyst) for condition and security,</p>

P017500	System too rich (left hand bank)	<p>Restricted air filter</p> <p>Leaking fuel injector(s)</p> <p>Oil contaminated with fuel (too many cold starts with vehicle subsequently not getting hot enough for long enough)</p> <p>MAF sensor fault (high intake air flow)</p>	<p>For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For fuel injector information, Fuel Injectors (18.10.02) Check the oil condition, if contamination is present, renew the engine oil and filter. For MAF sensor circuit tests, GO to Pinpoint Test G531330p1.</p>
P018123	Engine fuel temperature (EFT) sensor A circuit range/performance - signal stuck low	<p>EFT sensor to ECM sensing circuit: high resistance, short circuit to ground, short circuit to power</p> <p>EFT sensor ground circuit: high resistance</p> <p>EFT sensor failure</p>	<p>For EFT sensor circuit tests, GO to Pinpoint Test G531330p34.</p>
P018124	EFT sensor circuit range/performance - signal stuck high	<p>EFT sensor to ECM sensing circuit: high resistance, short circuit to ground, short circuit to power</p> <p>EFT sensor ground circuit: high resistance</p> <p>EFT sensor failure</p>	<p>For EFT sensor circuit tests, GO to Pinpoint Test G531330p34.</p>
P018129	EFT sensor A circuit range/performance - signal invalid	<p>EFT sensor to ECM sensing circuit: high resistance, short circuit to ground, short circuit to power</p> <p>EFT sensor ground circuit: high resistance</p> <p>EFT sensor failure</p>	<p>For EFT sensor circuit tests, GO to Pinpoint Test G531330p34.</p>
P018200	EFT sensor circuit low input	<p>EFT sensor to ECM sensing circuit: short circuit to ground</p> <p>EFT sensor to splice sensor ground circuit: short</p>	<p>For EFT sensor circuit tests, GO to Pinpoint Test G531330p34.</p>

		circuit EFT sensor failure	
P018300	EFT sensor circuit high input	EFT sensor disconnected EFT sensor to ECM sensing circuit: high resistance, short circuit to power EFT sensor to splice sensor ground circuit: high resistance EFT sensor failure	For EFT sensor circuit tests, GO to Pinpoint Test G531330p34.
P019100	FRP sensor circuit range/performance	FRP sensor range and performance	For FRP sensor circuit tests, GO to Pinpoint Test G531330p21.
P019200	FRP sensor circuit low input	FRP sensor disconnected FRP sensor to ECM sensing circuit: high resistance or short circuit to ground FRP sensor to supply circuit: high resistance FRP sensor failure	For FRP sensor circuit tests, GO to Pinpoint Test G531330p21.
P019300	FRP sensor circuit high input	FRP sensor to ECM wiring (supply, sense): short circuit to each other FRP sensor to ECM sense circuit: short circuit to power FRP sensor ground circuit: high resistance FRP sensor failure	For FRP sensor circuit tests, GO to Pinpoint Test G531330p21.
P019623	Engine oil temperature (EOT) sensor circuit range/performance - signal stuck low	EOT sensor to ECM sensing circuit: intermittent high resistance EOT sensor failure	For EOT sensor circuit tests, GO to Pinpoint Test G531330p13.
P019624	EOT sensor circuit range/performance - signal	EOT sensor to ECM sensing circuit: intermittent high	For EOT sensor circuit tests, GO to Pinpoint Test

	stuck high	resistance EOT sensor failure	G531330p13.
P019629	EOT sensor circuit range/performance - signal invalid	EOT sensor to ECM sensing circuit: intermittent high resistance EOT sensor failure	For EOT sensor circuit tests, GO to Pinpoint Test G531330p13.
P019700	EOT sensor circuit low input	EOT sensor to ECM sensing circuit: short circuit to ground EOT sensor failure	For EOT sensor circuit tests, GO to Pinpoint Test G531330p13.
P019800	EOT sensor circuit high input	EOT sensor disconnected EOT sensor to ECM sensing circuit: high resistance, short circuit to power EOT sensor failure	For EOT sensor circuit tests, GO to Pinpoint Test G531330p13.
P020100	Cylinder 1 injector circuit/open	Injector disconnected Injector harness wiring: high resistance, short circuit to ground Injector failure	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999
P020200	Cylinder 2 injector circuit/open	Injector disconnected Injector harness wiring: high resistance, short circuit to ground Injector failure	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999
P020300	Cylinder 3 injector circuit/open	Injector disconnected Injector harness wiring: high resistance, short circuit to ground Injector failure	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999
P020400	Cylinder 4 injector circuit/open	Injector disconnected Injector harness wiring: high resistance, short circuit to ground Injector failure	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999

P020500	Cylinder 5 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: high resistance, short circuit to ground</p> <p>Injector failure</p>	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999
P020600	Cylinder 6 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: high resistance, short circuit to ground</p> <p>Injector failure</p>	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999
P022200	TP sensor circuit 2 low input	<p>TP sensor circuit 2: short circuit to ground</p> <p>TP sensor circuit 2: high resistance</p>	For TP sensor circuit 2 tests, GO to Pinpoint Test G531330p5.
P022300	TP sensor circuit 2 high input	TP sensor circuit 2: short circuit to power	For TP sensor circuit 2 tests, GO to Pinpoint Test G531330p5.
P022700	Accelerator pedal position (APP) sensor circuit 1 low input	<p>APP sensor circuit 1: short circuit to ground</p> <p>Accelerator pedal position (APP) sensor circuit 1: high resistance</p>	For APP sensor circuit 1 tests, GO to Pinpoint Test G531330p22.
P022800	APP sensor circuit 1 high input	APP sensor circuit 1: short circuit to power	For APP sensor circuit 1 tests, GO to Pinpoint Test G531330p22.
P030000	Random/multiple cylinder misfire detected	<p>ECM to ignition coil primary circuit faults (cylinder misfire detected DTCs also logged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Cylinder compression low</p> <p>Fuel delivery pressure</p>	<p>For ignition coil and spark plug tests,</p> <p>Engine Ignition - VIN Range: G45704->G99999</p> <p>Check the cylinder compressions,</p> <p>Engine Check the fuel pressure,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8,</p> <p>VIN Range: G45704-</p>

		<p>(low/high)</p> <p>Fuel injector circuit fault(s) (injector DTCs also logged)</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Worn camshaft/broken valve springs</p> <p>Valve clearance adjustment</p>	<p>>G99999 For fuel injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999 For injector information, Fuel Injectors (18.10.02) Check the fuel for contamination, grade and quality. For camshaft and valve information, Engine - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8</p>
P030100	Cylinder 1 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P030200	Cylinder 2 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P030300	Cylinder 3 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P030400	Cylinder 4 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P030500	Cylinder 5 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P030600	Cylinder 6 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P031300	Misfire detected with low fuel	Misfire detected during low fuel level condition	Check for fuel level sensor codes, add fuel. Clear the DTC and test for normal operation.
P031600	Engine misfire detected on startup	<p>Misfire detected on first 1000 revs</p> <p>Refer to P030000 possible sources</p>	Carry out the tests indicated for a normal misfire code, but on a cold engine.

P032700	Knock sensor (KS) 1 circuit low input (right hand bank)	<p>Poor sensor contact with the cylinder block</p> <p>KS to ECM sense circuit: short circuit to ground</p> <p>KS failure</p>	For right hand bank KS circuit tests, GO to Pinpoint Test G531330p15.
P032800	KS 1 circuit high input (right hand bank)	<p>Poor sensor contact with the cylinder block</p> <p>KS to ECM sense circuit: high resistance, short circuit to power</p> <p>KS failure</p>	For right hand bank KS circuit tests, GO to Pinpoint Test G531330p15.
P033200	KS 2 circuit low input (left hand bank)	<p>Poor sensor contact with the cylinder block</p> <p>KS to ECM sense circuit: short circuit to ground</p> <p>KS failure</p>	For left hand bank KS circuit tests, GO to Pinpoint Test G531330p16.
P033300	KS 2 circuit high input (left hand bank)	<p>Poor sensor contact with the cylinder block</p> <p>KS to ECM sense circuit: high resistance, short circuit to power</p> <p>KS failure</p>	For left hand bank KS circuit tests, GO to Pinpoint Test G531330p16.
P033592	Crankshaft position (CKP) sensor A circuit - performance or incorrect operation	<p>CKP sensor disconnected</p> <p>CKP Sensor gap incorrect/ foreign matter on sensor face /damaged teeth on rotor</p> <p>CKP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power</p> <p>CKP sensor failure</p>	For CKP sensor circuit tests, GO to Pinpoint Test G531330p17.
P033594	CKP sensor A circuit - unexpected operation	<p>CKP sensor disconnected</p> <p>CKP sensor gap incorrect/ foreign matter on sensor face /damaged teeth on</p>	For CKP sensor circuit tests, GO to Pinpoint Test G531330p17.

		<p>rotor</p> <p>CKP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power</p> <p>CKP sensor failure</p>	
P033600	CKP sensor A circuit range/performance	<p>CKP sensor gap incorrect/ foreign matter on sensor face /damaged teeth on rotor</p> <p>CKP sensor sensing circuit: intermittent high resistance, short circuit to ground, short circuit to power</p> <p>CKP sensor failure</p>	For CKP sensor circuit tests, GO to Pinpoint Test G531330p17.
P034092	Camshaft position (CMP) sensor A circuit (right hand bank or single sensor) - performance or incorrect operation	<p>CMP sensor disconnected</p> <p>CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor</p> <p>CMP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power</p> <p>CMP sensor 1 failure</p>	For right hand bank CMP circuit tests, GO to Pinpoint Test G531330p18.
P034094	CMP sensor A circuit (right hand bank or single sensor) - unexpected operation	<p>CMP sensor disconnected</p> <p>CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor</p> <p>CMP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power</p> <p>CMP sensor 1 failure</p>	For right hand bank CMP circuit tests, GO to Pinpoint Test G531330p18.
P034100	CMP sensor A circuit range/performance (right hand bank or single sensor)	<p>CMP sensor disconnected</p> <p>CMP sensor gap incorrect/ foreign matter on sensor</p>	For right hand bank CMP circuit tests, GO to Pinpoint Test G531330p18.

		<p>face /damaged rotor</p> <p>CMP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power</p> <p>CMP sensor 1 failure</p>	
P034592	CMP sensor A circuit (left hand bank) - performance or incorrect operation	<p>CMP sensor disconnected</p> <p>CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor</p> <p>CMP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power</p> <p>CMP sensor 2 failure</p>	For left hand bank CMP circuit tests, GO to Pinpoint Test G531330p28.
P034594	CMP sensor A circuit (left hand bank) - unexpected operation	<p>CMP sensor disconnected</p> <p>CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor</p> <p>CMP sensor sensing circuit: high resistance short circuit to ground, short circuit to power</p> <p>CMP sensor 2 failure</p>	For left hand bank CMP circuit tests, GO to Pinpoint Test G531330p28.
P034600	CMP sensor A circuit range/performance (left hand bank)	<p>CMP sensor disconnected</p> <p>CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor</p> <p>CMP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power</p> <p>CMP sensor 2 failure</p>	For left hand bank CMP circuit tests, GO to Pinpoint Test G531330p28.
P035100	Ignition coil 1 primary/secondary circuit	ECM to ignition module/coil drive circuit: high resistance, short circuit to ground	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999

		<p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil power supply circuit: high resistance (including relay, if fitted)</p>	
P035200	Ignition coil 2 primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil power supply circuit: high resistance (including relay, if fitted)</p>	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999
P035300	Ignition coil 3 primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil power supply circuit: high resistance (including relay, if fitted)</p>	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999
P035400	Ignition coil 4 primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil power supply circuit: high resistance (including relay, if fitted)</p>	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999
P035500	Ignition coil 5 primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil power supply circuit: high</p>	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999

		resistance (including relay, if fitted)	
P035600	Ignition coil 6 primary/secondary circuit	ECM to ignition module/coil drive circuit: short circuit to ground, high resistance Ignition module/coil ground circuit: high resistance Ignition module/coil power supply circuit: high resistance (including relay, if fitted)	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999
P041300	Secondary air injection switching valve A circuit open	Secondary air check valve control circuit high	For secondary air injection tests, Engine Emission Control - VIN Range: G45704->G99999
P041400	Secondary air injection switching valve A circuit shorted	Secondary air check valve control circuit low	For secondary air injection tests, Engine Emission Control - VIN Range: G45704->G99999
P042000	Catalyst system efficiency below threshold (right hand bank)	Catalyst failure due to: overheating damage caused by misfire and/or lean combustion Catalyst failure due to: poisoning caused by excessive oil consumption and/or contaminated fuel	Check the oil and fuel condition/level. Check the catalysts for damage.
P043000	Catalyst system efficiency below threshold (left hand bank)	Catalyst failure due to: overheating damage caused by misfire and/or lean combustion Catalyst failure due to: poisoning caused by excessive oil consumption and/or contaminated fuel	Check the oil and fuel condition/level. Check the catalysts for damage.
P044100	Evaporative emission system incorrect purge flow	Purge valve range performance	For evaporative emission tests, Evaporative Emissions - VIN Range: G45704-

			>G99999
P044700	Diagnostic monitoring of fuel tank leakage (DMTL) system change-over valve (COV) control circuit open	DMTL COV circuit ground short	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P044800	DMTL system COV control circuit shorted	DMTL COV power supply circuit: high resistance, short circuit DMTL COV to ECM drive circuit: high resistance, short circuit to power DMTL COV failure	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P045600	Evaporative emission system leak detected (very small leak)	DMTL system has detected a leak	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P045800	Evaporative emission system purge control valve circuit low	Purge valve control circuit: short circuit to ground Purge valve control circuit: high resistance Purge valve failure	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P045900	Evaporative emission system purge control valve circuit high	Purge valve control circuit: short circuit to power	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P046129	Fuel level sensor A circuit range/performance - signal invalid	Fuel level sensor to rear electronic module (REM) circuits; intermittent short circuit or high resistance Fuel level sensor failure REM fault (incorrect fuel level data)	For fuel level sensor circuit tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999

P04612F	Fuel level sensor A circuit range/performance - signal erratic	Fuel level sensor to rear electronic module (REM) circuits; intermittent short circuit or high resistance Fuel level sensor failure REM fault (incorrect fuel level data)	For fuel level sensor circuit tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999
P046200	Fuel level sensor A circuit low input	Fuel level sensor to rear electronic module (REM) circuits; intermittent short circuit to ground or high resistance Fuel level sensor failure REM fault (incorrect fuel level data)	For fuel level sensor circuit tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999
P046300	Fuel level sensor A circuit high input	Fuel level sensor to rear electronic module (REM) circuits; intermittent short circuit to power Fuel level sensor failure REM fault (incorrect fuel level data)	For fuel level sensor circuit tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999
P048023	Fan 1 control circuit low	Electric fan control circuit: short circuit to ground Electric fan control circuit: high resistance	For cooling fan circuit tests, GO to Pinpoint Test G531330p19.
P048024	Fan 1 control circuit high	Electric fan control circuit: short circuit to battery	For cooling fan circuit tests, GO to Pinpoint Test G531330p19.
P048309	Fan rationality check	Cooling fan difficult to turn Fan/Motor damaged	Clear any obstruction, replace the fan as necessary.
P048316	Fan rationality check	Fan control module reports battery voltage less than 9 volts	Check the battery condition. Check the charging system and fan circuits.

P048317	Fan rationality check	Fan control module reports battery voltage greater than 18 volts	Check the charging system and fan circuits.
P048397	Fan rationality check	Cooling fan jammed	Clear any obstruction, replace the fan as necessary.
P050082	Vehicle speed sensor malfunction vehicle speed invalid signal received over CAN	Vehicle speed: invalid signal received over CAN	Check for ABS DTCs.
P050086	Vehicle speed sensor malfunction vehicle speed invalid signal received over CAN	Vehicle speed: invalid signal received over CAN	Check for TCM DTCs.
P050162	Vehicle speed sensor A range/performance - signal plausibility failure	Vehicle speed: range performance	Check for ABS/TCM DTCs.
P050400	Brake switch A/B correlation	The brake pressure reading does not agree with the brake light switch value	Anti-Lock Control - Stability Assist - VIN Range: G45704->G99999
P050401	Brake switch A/B correlation	Brake switch high fault: Brake lights stuck on Gearshift interlock inoperative Speed control inoperative Brake switch low fault: Brake lights inoperative Gearshift stuck in Park Reduced engine braking	For brake switch and circuit tests, GO to Pinpoint Test G531330p25.
P050600	Idle air control system RPM lower than expected	Air intake restriction Accessory drive overload (defective/seized component)	Check the air intake system. Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the accessory drive belt and components. Accessory Drive Belt - 3.0L NA V6 - AJ27, VIN Range: G45704->G99999

			(12.10.40)
P050624	Idle control system RPM lower than expected cold start emission strategy ISC system lower than expected	Air intake restriction Accessory drive overload (defective/seized component)	Check the air intake system. Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the accessory drive belt and components. Accessory Drive Belt - 3.0L NA V6 - AJ27, VIN Range: G45704->G99999 (12.10.40)
P050700	Idle air control system RPM higher than expected	Intake air leak between MAF sensor and throttle Intake air leak between throttle and engine Engine crankcase breather leak	Check the air intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Inspect the engine breather system, Engine Emission Control - VIN Range: G45704->G99999
P050723	Idle control system RPM higher than expected cold start emission strategy ISC system higher than expected	Intake air leak between MAF sensor and throttle Intake air leak between throttle and engine Engine crankcase breather leak	Check the air intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Inspect the engine breather system, Engine Emission Control - VIN Range: G45704->G99999
P050B84	Cold start ignition timing performance	Cold start emission reduction strategy engine spark timing too retarded	Check for engine ignition related codes. Engine Ignition - VIN Range: G45704->G99999
P050B85	Cold start ignition timing performance	Cold start emission reduction strategy engine spark timing too advanced	Check for engine ignition related codes. Engine Ignition - VIN

			Range: G45704->G99999
P05120C	Starter request circuit - circuit voltage above threshold	Starter relay coil to ECM/ignition switch circuit: short circuit to power Ignition switch failure	For starter request circuit tests, GO to Pinpoint Test G531330p27.
P05120E	Starter request circuit - circuit voltage below threshold	Starter relay coil to ECM/ignition switch circuit: short circuit to ground Starter relay coil to ECM/ignition switch circuit: high resistance Ignition switch failure	For starter request circuit tests, GO to Pinpoint Test G531330p27.
P051300	Incorrect immobilizer key	Security key invalid	Programme keys using the Jaguar approved diagnostic system.
P053200	Air conditioning (A/C) refrigerant pressure sensor A circuit low input	A/C refrigerant pressure sensor circuit low input	For A/C pressure sensor tests, GO to Pinpoint Test G531330p35.
P053300	A/C refrigerant pressure sensor A circuit high input	A/C Refrigerant pressure sensor circuit high input	For A/C pressure sensor tests, GO to Pinpoint Test G531330p35.
P056013	System voltage	Battery back-up malfunction	For battery back-up tests, GO to Pinpoint Test G531330p20.
P056100	System voltage unstable	System voltage comparison	For FRP sensor tests, GO to Pinpoint Test G531330p21. For MAP sensor tests, GO to Pinpoint Test G531330p33. For TP sensor tests, GO to Pinpoint Test G531330p4. and GO to Pinpoint Test G531330p5.
P056200	System voltage low	ECM to sensors sensor supply	For FRP sensor tests, GO

		voltage circuit(s): short circuit to ground	to Pinpoint Test G531330p21. For MAP sensor tests, GO to Pinpoint Test G531330p33. For TP sensor tests, GO to Pinpoint Test G531330p4. and GO to Pinpoint Test G531330p5.
P056300	System voltage high	ECM to sensors supply voltage circuit(s): high resistance, short circuit to power	For FRP sensor tests, GO to Pinpoint Test G531330p21. For MAP sensor tests, GO to Pinpoint Test G531330p33. For TP sensor tests, GO to Pinpoint Test G531330p4. and GO to Pinpoint Test G531330p5.
P057616	Speed control input circuit low	Speed control low input	For speed control, Speed Control - VIN Range: G45704->G99999
P057717	Speed control input circuit high	Speed control high input	For speed control, Speed Control - VIN Range: G45704->G99999
P057800	Speed control multi-function input A circuit stuck	Speed switch stuck fault	For speed control, Speed Control - VIN Range: G45704->G99999
P05791C	Speed control multi-function input A circuit range/performance	Speed control switch deadband detection	For speed control, Speed Control - VIN Range: G45704->G99999
P059000	Speed control multi-function input B circuit stuck	Active speed limiter fault	For speed control, Speed Control - VIN Range: G45704->G99999
P060143	Internal control module memory check sum error - special memory failure	CPU communication. - sub	Refer to the warranty policy and procedures manual if an ECM is

			suspect.
P060145	Internal control module memory check sum error - program memory failure	CPU communication	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060442	Internal control module random access memory (RAM) error - general memory failure	Initial RAM test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060443	Internal control module random access memory (RAM) error - special memory failure	Shut off RAM test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060444	Internal control module random access memory (RAM) error - data memory failure	RAM check sum	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060445	Internal control module random access memory (RAM) error - program memory failure	ECM failure	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060500	Internal Control Module Read Only Memory (ROM) Error	EEPROM/flash checksum error	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060529	Internal Control Module Read Only Memory (ROM) Error ROM Error	ROM error	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060542	Internal control module read only memory (ROM) error - general memory failure	ROM check sum	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060543	Internal control module read only memory (ROM) error - special memory	Shut off ROM test	Refer to the warranty policy and procedures manual if an ECM is

	failure		suspect.
P060544	Internal control module read only memory (ROM) error - data memory failure	Initial ROM test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060545	Internal control module read only memory (ROM) error - program memory failure	Continuous ROM test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060546	Internal control module read only memory (ROM) error	Continuous ROM test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060548	Internal control module read only memory (ROM) error - supervision software failure	Shut off ROM test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060564	Internal control module read only memory (ROM) error	ROM error - sub	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060600	PCM processor fault	Watchdog error	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060601	ECM/PCM processor - general electrical failure	Controller test - sub	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060604	ECM/PCM processor	System internal failures	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060605	ECM/PCM processor - system programming	Throttle return spring failure (throttle body failure)	Refer to the warranty policy and procedures manual if an ECM is

	failures		suspect.
P060641	ECM/PCM processor - general checksum failure	Watch dog timer fault - sub	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060642	ECM/PCM processor - general memory failure	Error Capturing instructions (ECI)	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060643	ECM/PCM processor - special memory failure	Duplication memory fault	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060644	ECM/PCM processor - data memory failure	Duplication memory fault - sub	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060645	ECM/PCM processor - program memory failure	Detection of write to internal ROM	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060646	ECM/PCM processor - calibration/parameter memory failure	Detection of write to internal ROM - sub	Configure the module using the Jaguar approved diagnostic system.
P060647	ECM/PCM processor fault	Watch dog timer fault	Configure the module using the Jaguar approved diagnostic system.
P060648	ECM/PCM processor - supervision software failure	Scheduling sequence check	Configure the module using the Jaguar approved diagnostic system.
P060649	ECM/PCM processor - internal electronic failure	Controller test	Refer to the warranty policy and procedures manual if an ECM is suspect.

P060700	Control module performance	Sub - CPU watch dog	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060A64	Internal control module monitoring processor performance	Internal control module monitoring processor performance	Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P060A67	Internal control module monitoring processor performance	Internal control module monitoring processor performance	Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P060D00	Internal control module accelerator pedal position performance	APP sensor communication	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060E62	Internal control module throttle position performance - signal compare failure	Throttle motor amplifier failure for valve sensor malfunction	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060E64	Internal control module throttle position performance - signal plausibility failure	TPS Communication	Refer to the warranty policy and procedures manual if an ECM is suspect.
P061043	Control module vehicle options error	VID block fault	Configure the module using the Jaguar approved diagnostic system.
P06160E	Starter relay circuit low	Starter relay drive circuit: short circuit to ground Starter relay drive circuit: high resistance Starter relay failure	For starter relay tests, GO to Pinpoint Test G531330p27.
P06170C	Starter relay circuit high	Starter relay drive circuit: short circuit to power	For starter relay tests, GO to Pinpoint Test

		Starter relay failure	G531330p27.
P061A00	Internal control module torque performance	Pedal follower error	Refer to the warranty policy and procedures manual if an ECM is suspect.
P061A29	Internal control module torque performance - signal invalid	Absolute engine torque calculation failure - sub-processor	Refer to the warranty policy and procedures manual if an ECM is suspect.
P061A64	Internal control module torque performance - signal plausibility failure	Absolute engine torque calculation failure	Refer to the warranty policy and procedures manual if an ECM is suspect.
P061B29	Internal control module torque calculation performance - signal invalid	Absolute and dynamic engine torque calculation failure	Refer to the warranty policy and procedures manual if an ECM is suspect.
P061B64	Internal control module torque calculation performance - signal plausibility failure	Absolute and dynamic engine torque calculation failure	Refer to the warranty policy and procedures manual if an ECM is suspect.
P062700	Fuel pump A control circuit/open	Invalid fuel pump duty requested by the ECM	For fuel pump tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999
P063000	VIN Not programmed or incompatible - ECM/PCM	CCF to CAN VIN mismatch	Configure the module using the Jaguar approved diagnostic system.
P066100	Intake manifold tuning (IMT) valve control circuit low, right hand bank	IMT circuit(s): short circuit to ground IMT circuit(s): high resistance	For IMT tests, GO to Pinpoint Test G531330p38.
P066200	IMT valve control circuit	IMT circuit(s): short circuit to power	For IMT tests, GO to Pinpoint Test

	high, right hand bank		G531330p38.
P066400	IMT valve control circuit low, left hand bank	IMT circuit(s): short circuit to ground IMT circuit(s): high resistance	For IMT tests, GO to Pinpoint Test G531330p37.
P066500	IMT valve control circuit high, left hand bank	IMT circuit(s): short circuit to power	For IMT tests, GO to Pinpoint Test G531330p37.
P068773	ECM/PCM power relay control circuit high	EMS control relay malfunction	For EMS relay tests, GO to Pinpoint Test G531330p32.
P072186	Output speed sensor circuit range/performance	TCM output shaft speed sensor error received	
P08510E	Park/Neutral switch input circuit low	Park/Neutral switch input circuit low	For Park/Neutral switch tests,
P08520C	Park/Neutral switch input circuit high	Park/Neutral switch input circuit high	For Park/Neutral switch tests,
P114600	Generator load low	Generator - C line circuit low	For generator tests,
P124400	Generator load high input (see P062600)	Generator - C line circuit high	For generator tests,
P125900	Immobilizer to PCM signal error	Incorrect ID received from instrument pack	Configure the system using the Jaguar approved diagnostic system.
P131500	Persistent misfire	ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged) Fuel delivery pressure low Fuel injector circuit fault(s) (injector DTCs also flagged)	For ignition coil circuit tests, Engine Ignition - VIN Range: G45704->G99999 Check the fuel pressure, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704-

		<p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Cylinder compression low</p>	<p>>G99999 For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999 For ignition coil circuit and spark plug tests, Engine Ignition - VIN Range: G45704->G99999 Check the cylinder compressions. Engine - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8</p>
P131600	Injector driver misfire - emissions damage	Injector driver module codes detected	Check for associated DTCs and refer to the DTC index.
P136700	Ignition amplifier group A	<p>Ignition monitoring circuit to ECM: high resistance, short circuit to ground, short circuit to power</p> <p>Ignition module/coils ground circuit fault, right hand bank</p>	For ignition system tests, Engine Ignition - VIN Range: G45704->G99999
P136800	Ignition amplifier group B	<p>Ignition monitoring circuit to ECM: high resistance, short circuit to ground, short circuit to power</p> <p>Ignition module/coils ground circuit fault left hand bank</p>	For ignition system tests, Engine Ignition - VIN Range: G45704->G99999
P160300	EEPROM error	ECM fault	Refer to the warranty policy and procedure manual if an ECM is suspect.
P162600	Dynamic torque monitoring error	ECM electronic throttle monitoring / self test - torque monitoring problem	Refer to the warranty policy and procedure manual if an ECM is suspect.

P162900	Internal voltage regulator	Generator - F line failure	For generator tests,
P163200	Smart alternator faults sensor/circuit	Generator - L line failure	For generator tests,
P209600	Fuel trim too lean, right hand bank	HO2S fuel adaption - lean	Check for HO2 sensor codes. Check for air intake faults
P209700	Fuel trim too rich, right hand bank	HO2S fuel adaption - rich	Check for HO2 sensor codes. Check for air intake faults
P209800	Fuel trim too lean, left hand bank	HO2S fuel adaption - lean	Check for HO2 sensor codes. Check for air intake faults
P209900	Fuel trim too rich, left hand bank	HO2S fuel adaption - rich	Check for HO2 sensor codes. Check for air intake faults
P210129	Throttle range/performance - sub-processor	Jammed throttle blade, gearing or motor	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - VIN Range: G45704->G99999 (19.70.04)
P210162	Throttle actuator control motor circuit range/performance	Jammed throttle blade, gearing or motor	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - VIN Range: G45704->G99999 (19.70.04)
P210164	Throttle range/performance	Jammed throttle blade, gearing or motor	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - VIN Range: G45704->G99999 (19.70.04)
P210177	Throttle actuator motor control circuit	Throttle blade stuck open	Check for throttle related DTCs. Check the intake

	range/performance (commanded position not reachable)	Intake air system leak	system for leaks. Intake Air Distribution and Filtering - VIN Range: G45704->G99999
P210329	Throttle actuator motor control circuit high	Control circuit: short circuit to power ECM fault	For throttle actuator motor circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999 Refer to the warranty policy and procedures manual if an ECM is suspect.
P210364	Throttle actuator motor control circuit high - signal plausibility failure	Control circuit: short circuit to power ECM fault	For throttle actuator motor circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999 Refer to the warranty policy and procedures manual if an ECM is suspect.
P210500	Throttle actuator control system - forced engine shutdown	Throttle MIL request due to fuel cut	Check for DTCs indicating the reason for the fuel cut. Follow the action indicated for those DTCs.
P210629	Throttle actuator control system - forced limited power	Signal invalid	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - VIN Range: G45704->G99999 (19.70.04)
P210664	Throttle actuator control system - forced limited power	Signal plausibility failure	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - VIN Range: G45704->G99999 (19.70.04)
P211800	Throttle actuator motor control current	Control circuit: short circuit to power, short circuit to	For throttle actuator motor circuit tests, Fuel Charging and

	range/performance	ground, high resistance ECM fault	Controls - VIN Range: G45704->G99999 Refer to the warranty policy and procedures manual if an ECM is suspect.
P211900	Throttle actuator control throttle body range/performance	Throttle spring faulty	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - VIN Range: G45704->G99999 (19.70.04)
P212200	Accelerator pedal position (APP) sensor D circuit low input	APP sensor: circuit 2 low input	For APP sensor tests. GO to Pinpoint Test G531330p22. and GO to Pinpoint Test G531330p23.
P212300	Accelerator pedal position (APP) sensor D circuit high input	APP sensor: circuit 2 high input	For APP sensor tests. GO to Pinpoint Test G531330p22. and GO to Pinpoint Test G531330p23.
P213528	Accelerator pedal position (APP) sensor A/B voltage correlation	APP sensor: incorrect start value (not zero)	Check connections, etc, clear the DTCs and retest. If the code resets, replace the APP sensor.
P213529	Accelerator pedal position (APP) sensor voltage correlation	APP sensor: excessive difference between raw values of circuit 1 and 2 - sub-processor	Check connections, etc, clear the DTCs and retest. If the code resets, replace the APP sensor.
P213562	Accelerator pedal position (APP) sensor 1 and 2 voltage correlation	APP sensor: incorrect start value (not zero) sub- processor	Check connections, etc, clear the DTCs and retest. If the code resets, replace the APP sensor.
P213564	Accelerator pedal position (APP) sensor voltage correlation	APP sensor: excessive difference between raw values of circuit 1 and 2	Check connections, etc, clear the DTCs and retest. If the code resets, replace the APP sensor.

P222800	Barometric pressure circuit low input	BARO sensor failure (internal ECM fault)	Refer to the warranty policy and procedures manual if an ECM is suspect.
P222900	Barometric pressure circuit high input	BARO sensor failure (internal ECM fault)	Refer to the warranty policy and procedures manual if an ECM is suspect.
P240100	Evaporative emission system diagnostic monitoring of tank leakage (DMTL) pump control circuit low	DMTL pump circuit(s): short circuit to ground	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P240200	Evaporative emission system DMTL pump control circuit high	DMTL pump circuit(s): short circuit to power	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P240429	Evaporative emission system DMTL pump sense circuit range/performance - signal invalid	DMTL reference leak DMTL pump circuit: short circuit, high resistance DMTL pipework blocked/leaking	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P24042F	Evaporative emission system DMTL pump sense circuit range/performance - signal erratic	DMTL reference leak DMTL pump circuit: short circuit, high resistance DMTL pipework blocked/leaking	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P240500	Evaporative emission system DMTL pump sense circuit low	DMTL pump circuit: short circuit, high resistance	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P240600	Evaporative emission system DMTL pump sense circuit high	DMTL pump circuit: short circuit, high resistance	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704-

			>G99999
P240B00	Evaporative emission system DMTL pump heater circuit low	DMTL heater control circuit low	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P240C00	Evaporative emission system DMTL pump heater circuit high	DMTL heater control circuit high	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P243100	Secondary air injection system air flow/pressure sensor circuit range/performance, right hand bank	Secondary air injection pump/valve/pipework leaks Secondary air injection pump Secondary air injection valve	For secondary air injection tests, Engine Emission Control - VIN Range: G45704->G99999
P243200	Secondary air injection system air flow/pressure sensor circuit low input, right hand bank	Secondary air injection system MAP sensor circuit low	For secondary air injection tests, Engine Emission Control - VIN Range: G45704->G99999
P243300	Secondary air injection system air flow/pressure sensor circuit high input, right hand bank	Secondary air injection system MAP sensor circuit high	For secondary air injection tests, Engine Emission Control - VIN Range: G45704->G99999
P244400	Secondary air injection system pump stuck ON , right hand bank	Secondary air injection system pump control circuit low	For secondary air injection tests, Engine Emission Control - VIN Range: G45704->G99999
P244500	Secondary air injection system pump stuck OFF , right hand bank	Secondary air pump control circuit high	For secondary air injection pump circuit tests, Engine Emission Control - VIN Range: G45704->G99999

P245000	Evaporative emission (EVAP) system change-over valve (COV) performance/stuck open	DMTL pump circuit: short circuit, high resistance	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P245100	Evaporative emission control system COV stuck closed	DMTL pump circuit: short circuit, high resistance	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P250300	Charging system voltage low	Generator - range/performance - output voltage low when high requested	For charging system tests,
P250400	Charging system voltage high	Generator - range/performance - output voltage high when low requested	For charging system tests,
P261064	ECM/PCM Internal engine off timer performance	ECT sensor fault Ambient temperature sensor fault Body processor module fault (time) CAN error	Check for DTCs indicating a fault with any of the components listed. Follow the action listed for those DTCs.
P261087	ECM/PCM Internal engine off timer performance	ECT sensor fault Ambient temperature sensor fault Body processor module fault (time) CAN error	Check for DTCs indicating a fault with any of the components listed. Follow the action listed for those DTCs.
P263500	Fuel pump A low flow/performance (fuel pump not activated when requested by ECM)	ECM to rear electronic module (REM) drive circuit; short circuit, high resistance Fuel pump module failure REM failure	For REM to fuel pump module circuit tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999

U007300	Control module communication bus off	CAN Link circuit malfunction	For network tests,
U010100	Lost communication with transmission control module	CAN Link ECM/TCM network malfunction	For network tests,
U010300	Lost communication with gear shift control module	CAN Link ECM/gear shift network malfunction	For network tests,
U010400	Lost communication with speed control module	CAN Link ECM/ACC module network malfunction	For network tests,
U012100	Lost communication with anti-lock brake system (ABS) control module	CAN Link ECM/ABSCM network malfunction	For network tests,
U012800	Lost communication with park brake control module	CAN Link ECM/Electric park brake signal missing network malfunction	For network tests,
U013200	Lost communication with suspension control module	CAN Link ECM/suspension control module network malfunction	For network tests,
U015100	Lost communication with restraints control module	Lost comms - CAN or hardwired	For network tests,
U015500	Lost communication with instrument panel cluster (IPC) control module	CAN Link ECM/INSTCM network malfunction	For network tests,
U016400	Lost communication with heating ventilation and air conditioning control module	CAN Link ECM/HEVAC network malfunction	For network tests,
U016700	Lost communication with vehicle immobilizer control module	Security challenge response timeout	Programme the keys using the Jaguar approved diagnostic system.
U023500	Lost communication with speed control front distance range sensor	Adaptive speed control fault	For network tests,
U040264	Invalid data received From transmission control	Actual gear position status	For transmission tests.

	module		
U040267	Invalid data received from transmission control module	Gear shift position status	For transmission tests.
U040281	Invalid data received from TCM	Output shaft speed	For transmission tests.
U041500	Invalid data received from anti-lock brake system control module	BPS CAN node	For network tests,
U041564	Invalid data received from anti-lock brake system control module	MSR monitoring - plausibility	For network tests,
U041567	Invalid data received from anti-lock brake system control module	MSR monitoring - rationality	For network tests,
U042386	Invalid data received from instrument panel control module - signal invalid	Battery voltage level	For network tests,
U042481	Invalid data received from instrument pack control module	External ambient temp	For network tests,
U042600	Invalid data received from vehicle immobilizer control module	Security code mismatch	Configure the module using the Jaguar approved diagnostic system.
U206400	Warning indicator requested by another control module	Crash event has occurred	For network tests,

Pinpoint Tests

PINPOINT TEST G531330p1 : MASS AIR FLOW (MAF) SENSOR CIRCUIT

G531330t4 : CHECK THE MAF SENSOR SUPPLY CIRCUIT VOLTAGE

1. Disconnect the MAF sensor electrical connector, PI14. 2. Key on, engine off. 3. Measure the voltage between:

MAF sensor connector PI14, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G531330t3.

-> No

REPAIR the circuit between the MAF sensor electrical connector and the battery. This circuit includes the EMS control relay and fuse 14 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

G531330t3 : CHECK THE MAF SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

MAF sensor connector PI14, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t2.

G531330t2 : CHECK THE MAF SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

MAF sensor connector PI14, harness side	Battery
Pin 03	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t82.

G531330t82 : CHECK THE MAF SENSOR GROUND CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

MAF sensor connector PI14, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t1.

G531330t1 : CHECK THE MAF SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

MAF sensor connector PI14, harness side	ECM connector PI300, harness side
Pin 03	Pin 70

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t81.

G531330t81 : CHECK THE MAF SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

MAF sensor connector PI14, harness side	ECM connector PI300, harness side
Pin 02	Pin 18

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new MAF sensor.

Mass Air Flow (MAF) Sensor (18.30.15) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p2 : INTAKE AIR TEMPERATURE (IAT) SENSOR CIRCUIT

G531330t7 : CHECK THE IAT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the MAF sensor electrical connector, PI14. 2. Measure the resistance between:

MAF sensor connector PI14, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t6.

G531330t6 : CHECK THE IAT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

MAF sensor connector PI14, harness side	Battery
Pin 04	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t5.

G531330t5 : CHECK THE IAT SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

MAF sensor connector PI14, harness side	ECM connector PI300, harness side
Pin 04	Pin 66

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t99.

G531330t99 : CHECK THE IAT SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

MAF sensor connector PI14, harness side	ECM connector PI300, harness side
Pin 05	Pin 12

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new MAF sensor.

Mass Air Flow (MAF) Sensor (18.30.15) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p3 : ENGINE COOLANT TEMPERATURE (ECT) SENSOR CIRCUIT

G531330t10 : CHECK THE ECT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the ECT sensor electrical connector, PI25. 2. Measure the resistance between:

ECT sensor connector PI25, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t9.

G531330t9 : CHECK THE ECT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

ECT sensor connector PI25, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t8.

G531330t8 : CHECK THE ECT SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

ECT sensor connector PI25, harness side	ECM connector PI300, harness side
Pin 02	Pin 68

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t121.

G531330t121 : CHECK THE ECT SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

ECT sensor connector PI25, harness side	ECM connector PI300, harness side
Pin 01	Pin 12

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new ECT sensor.

Engine Coolant Temperature (ECT) Sensor - VIN Range: G00442->G45703 (18.30.10) CLEAR the DTC.

TEST the system for normal operation.

PINPOINT TEST G531330p4 : THROTTLE POSITION (TP) SENSOR 1 CIRCUIT

G531330t95 : CHECK THE TP SENSOR SUPPLY CIRCUIT VOLTAGE

1. Disconnect the TP sensor electrical connector, PI26. 2. Key on, engine off. 3. Measure the voltage between:

TP sensor connector PI26, harness side	Battery
Pin 05	Negative terminal

Is the voltage less than 4 volts?

-> Yes

REPAIR the 5 volt supply circuit between the TP sensor and the ECM. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t96.

G531330t96 : CHECK THE TP SENSOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key off. 2. Measure the resistance between:

TP sensor connector PI26, harness side	Battery
Pin 05	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t13.

G531330t13 : CHECK THE TP SENSOR SENSING CIRCUIT TP1 FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

TP sensor connector PI26, harness side	Battery
Pin 06	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t12.

G531330t12 : CHECK THE TP SENSOR SENSING CIRCUIT TP1 FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

TP sensor connector PI26, harness side	Battery
---	----------------

Pin 06	Positive terminal
--------	-------------------

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t11.

G531330t11 : CHECK THE TP SENSOR SENSING CIRCUIT TP1 FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

TP sensor connector PI26, harness side	ECM connector PI300, harness side
Pin 06	Pin 65

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t97.

G531330t97 : CHECK THE TP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

TP sensor connector PI26, harness side	ECM connector PI300, harness side
Pin 03	Pin 11

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new TP sensor.

Throttle Body - VIN Range: G45704->G99999 (19.70.04) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p5 : THROTTLE POSITION (TP) SENSOR 2 CIRCUIT

G531330t98 : CHECK THE TP SENSOR SUPPLY CIRCUIT VOLTAGE

1. Disconnect the TP sensor electrical connector, PI26. 2. Key on, engine off. 3. Measure the voltage between:

TP sensor connector PI26, harness side	Battery
Pin 05	Negative terminal

Is the voltage less than 4 volts?

-> **Yes**

REPAIR the 5 volt supply circuit between the TP sensor and the ECM. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t177.

G531330t177 : CHECK THE TP SENSOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key off. 2. Measure the resistance between:

TP sensor connector PI26, harness side	Battery
Pin 05	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t14.

G531330t14 : CHECK THE TP SENSOR SENSING CIRCUIT TP2 FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

TP sensor connector PI26, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t15.

G531330t15 : CHECK THE TP SENSOR SENSING CIRCUIT TP2 FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

TP sensor connector PI26, harness side	Battery
Pin 04	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t16.

G531330t16 : CHECK THE TP SENSOR SENSING CIRCUIT TP2 FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

TP sensor connector PI26, harness side	ECM connector PI300, harness side
Pin 04	Pin 67

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t180.

G531330t180 : CHECK THE TP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

TP sensor connector PI26, harness side	ECM connector PI300, harness side
Pin 03	Pin 11

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new TP sensor.

Throttle Body - VIN Range: G45704->G99999 (19.70.04) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p6 : RIGHT-HAND H02S VARIABLE AND CONSTANT CIRCUITS

G531330t19 : CHECK THE H02S VARIABLE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the H02S electrical connector, PI10. 2. Measure the resistance between:

H02S connector PI10, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t18.

G531330t18 : CHECK THE H02S VARIABLE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

H02S connector PI10, harness side	Battery
Pin 04	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t22.

G531330t22 : CHECK THE H02S CONSTANT CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

H02S connector PI10, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t21.

G531330t21 : CHECK THE H02S CONSTANT CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

H02S connector PI10, harness side	Battery
Pin 03	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t17.

G531330t17 : CHECK THE H02S VARIABLE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

H02S connector PI10, harness side	ECM connector PI300, harness side
--	--

Pin 04	Pin 28
--------	--------

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t20.

G531330t20 : CHECK THE H02S CONSTANT CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

H02S connector PI10, harness side	ECM connector PI300, harness side
Pin 03	Pin 29

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new H02S.

Heated Oxygen Sensor (H02S) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p7 : RIGHT-HAND H02S HEATER SUPPLY AND CONTROL CIRCUITS

G531330t23 : CHECK H02S HEATER POWER SUPPLY CIRCUIT

1. Disconnect the H02S electrical connector, PI10. 2. Key on, engine off. 3. Make sure the O2S heater relay is engaged. 4. Measure the voltage between:

H02S connector PI10, harness side	Battery
--	----------------

Pin 01	Negative terminal
--------	-------------------

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G531330t26.

-> No

REPAIR the power supply circuit to the H02S heater. This circuit includes the O2S heater relay and fuse 33 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

G531330t26 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

H02S connector PI10, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t25.

G531330t25 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

H02S connector PI10, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t24.

G531330t24 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

H02S connector PI10, harness side	ECM connector PI300, harness side
Pin 02	Pin 76

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new H02S.

Heated Oxygen Sensor (H02S) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p8 : RIGHT-HAND CATALYST MONITOR SENSOR SENSING AND GROUND CIRCUITS

G531330t29 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the catalyst monitor electrical connector, PI11. 2. Measure the resistance between:

Catalyst monitor connector PI11, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t28.

G531330t28 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Catalyst monitor connector PI11, harness side	Battery
Pin 04	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t27.

G531330t27 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

Catalyst monitor connector PI11, harness side	ECM connector PI300, harness side
Pin 04	Pin 40

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t30.

G531330t30 : CHECK THE CATALYST MONITOR SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Catalyst monitor connector PI11, harness side	ECM connector PI300, harness side
Pin 03	Pin 22

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new catalyst monitor sensor.

Catalyst Monitor Sensor (18.30.66) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p9 : RIGHT-HAND CATALYST MONITOR SENSOR SUPPLY AND HEATER CONTROL CIRCUITS

G531330t31 : CHECK THE CATALYST MONITOR HEATER POWER SUPPLY CIRCUIT

1. Disconnect the catalyst monitor sensor electrical connector, PI11. 2. Key on, engine off. 3. Make sure the O2S heater relay is energized. 4. Measure the voltage between:

Catalyst monitor connector PI11, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G531330t170.

-> **No**

REPAIR the power supply circuit to the catalyst monitor heater. This circuit includes the O2S heater relay and fuse 33 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

G531330t170 : CHECK THE CATALYST MONITOR HEATER CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Catalyst monitor connector PI11, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t171.

G531330t171 : CHECK THE CATALYST MONITOR HEATER CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Catalyst monitor connector PI11, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t32.

G531330t32 : CHECK THE CATALYST MONITOR HEATER CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

Catalyst monitor connector PI11, harness side	ECM connector PI300, harness side
Pin 02	Pin 88

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new catalyst monitor sensor.

Catalyst Monitor Sensor (18.30.66) CLEAR the DTC and test the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531330p10 : LEFT-HAND H02S VARIABLE AND CONSTANT CIRCUITS

G531330t35 : CHECK THE H02S VARIABLE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the H02S electrical connector, PI12. 2. Measure the resistance between:

H02S connector PI12, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t34.

G531330t34 : CHECK THE H02S VARIABLE CIRCUIT FOR SHORT TO CIRCUIT TO POWER

1. Measure the resistance between:

H02S connector PI12, harness side	Battery
Pin 04	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t38.

G531330t38 : CHECK THE H02S CONSTANT CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

H02S connector PI12, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t37.

G531330t37 : CHECK THE H02S CONSTANT CIRCUIT FOR SHORT TO CIRCUIT TO POWER

1. Measure the resistance between:

H02S connector PI12, harness side	Battery
Pin 03	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t33.

G531330t33 : CHECK THE H02S VARIABLE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

H02S connector PI12, harness side	ECM connector PI300, harness side
Pin 04	Pin 26

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t36.

G531330t36 : CHECK THE H02S CONSTANT CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

H02S connector PI12, harness side	ECM connector PI300, harness side
Pin 03	Pin 27

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new H02S.

Heated Oxygen Sensor (H02S) CLEAR the DTC and test the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531330p11 : LEFT-HAND H02S HEATER SUPPLY AND CONTROL CIRCUITS

G531330t39 : CHECK H02S HEATER POWER SUPPLY CIRCUIT

1. Disconnect the H02S electrical connector, PI12. 2. Key on, engine off. 3. Measure the voltage between:

H02S connector PI12, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G531330t42.

-> **No**

REPAIR the power supply circuit to the H02S heater. This circuit includes the O2S heater relay and fuse 34 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

G531330t42 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

H02S connector PI12, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t41.

G531330t41 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

H02S connector PI12, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t40.

G531330t40 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

H02S connector PI12, harness side	ECM connector PI300, harness side
Pin 02	Pin 77

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new H02S.

Heated Oxygen Sensor (HO2S) CLEAR the DTC and test the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531330p14 : LEFT-HAND CATALYST MONITOR SENSOR SENSING AND GROUND CIRCUITS

G531330t51 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the catalyst monitor electrical connector, PI13. 2. Measure the resistance between:

Catalyst monitor connector PI13, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t50.

G531330t50 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Catalyst monitor connector PI13, harness side	Battery
Pin 04	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t49.

G531330t49 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

Catalyst monitor connector PI13, harness side	ECM connector PI300, harness side
Pin 04	Pin 41

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t52.

G531330t52 : CHECK THE CATALYST MONITOR SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Catalyst monitor connector PI13, harness side	ECM connector PI300, harness side
Pin 03	Pin 45

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new catalyst monitor sensor.

Catalyst Monitor Sensor (18.30.66) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p12 : LEFT-HAND CATALYST MONITOR SENSOR SUPPLY AND HEATER CONTROL CIRCUITS

G531330t43 : CHECK THE CATALYST MONITOR HEATER POWER SUPPLY CIRCUIT

1. Disconnect the catalyst monitor sensor electrical connector, PI13. 2. Key on, engine off. 3. Make sure the O2S heater relay is engaged. 4. Measure the voltage between:

Catalyst monitor connector PI13, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G531330t172.

-> **No**

REPAIR the power supply circuit to the catalyst monitor heater. This circuit includes the O2S heater relay and fuse 34 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

G531330t172 : CHECK THE CATALYST MONITOR HEATER CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Catalyst monitor connector PI13, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t173.

G531330t173 : CHECK THE CATALYST MONITOR HEATER CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Catalyst monitor connector PI13, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t44.

G531330t44 : CHECK THE CATALYST MONITOR SENSOR HEATER CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

Catalyst monitor connector PI13, harness side	ECM connector PI300, harness side
Pin 02	Pin 89

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new catalyst monitor sensor.

Catalyst Monitor Sensor (18.30.66) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p13 : ENGINE OIL TEMPERATURE (EOT) SENSOR CIRCUIT

G531330t47 : CHECK THE EOT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the EOT sensor electrical connector, PI24. 2. Measure the resistance between:

EOT sensor connector PI24, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t46.

G531330t46 : CHECK THE EOT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

EOT sensor connector PI24, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t45.

G531330t45 : CHECK THE EOT SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

EOT sensor connector PI24, harness side	ECM connector PI300, harness side
Pin 02	Pin 23

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t48.

G531330t48 : CHECK THE EOT SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

EOT sensor connector PI24, harness side	ECM connector PI300, harness side
Pin 01	Pin 10

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. This circuit includes harness splice, PIS49. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new EOT sensor.

Oil Temperature Sensor (18.31.01) CLEAR the DTC and test the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531330p15 : RIGHT-HAND KNOCK SENSOR (KS) CIRCUIT

G531330t55 : CHECK KS SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the KS electrical connector, PI60. 2. Measure the resistance between:

KS connector PI60, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t54.

G531330t54 : CHECK KS SENSING CIRCUIT FOR SHORT TO CIRCUIT TO POWER

1. Measure the resistance between:

KS connector PI60, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t53.

G531330t53 : CHECK KS SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

KS connector PI60, harness side	ECM connector PI300, harness side
Pin 01	Pin 42

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t56.

G531330t56 : CHECK KS GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

KS connector PI60, harness side	ECM connector PI300, harness side
Pin 02	Pin 19

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new KS.

Knock Sensor (KS) RH (18.30.93) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p16 : LEFT-HAND KNOCK SENSOR (KS) CIRCUIT

G531330t59 : CHECK KS SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the KS electrical connector, PI61. 2. Measure the resistance between:

KS connector PI61, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t58.

G531330t58 : CHECK KS SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

KS connector PI61, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t57.

G531330t57 : CHECK KS SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

KS connector PI61, harness side	ECM connector PI300, harness side
Pin 01	Pin 43

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t60.

G531330t60 : CHECK KS GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

KS connector PI61, harness side	ECM connector PI300, harness side
Pin 02	Pin 20

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new KS.

Knock Sensor (KS) LH (18.30.92) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p17 : CRANKSHAFT POSITION (CKP) SENSOR CIRCUIT

G531330t61 : CHECK THE CKP SENSOR FOR CORRECT INSTALLATION

1. Check the CKP sensor for correct installation.

Is the CKP sensor correctly installed?

-> Yes

GO to Pinpoint Test G531330t62.

-> No

INSTALL the CKP sensor correctly.

Crankshaft Position (CKP) Sensor (18.30.12) Reconnect the sensor. CLEAR the DTCs and test the system for normal operation.

G531330t62 : CHECK THE CKP SENSOR FOR DEBRIS

1. Remove the CKP sensor and inspect for debris.

Is the CKP sensor free of debris?

-> Yes

GO to Pinpoint Test G531330t65.

-> **No**

CLEAN the sensor and wheel. INSTALL the sensor.

Crankshaft Position (CKP) Sensor (18.30.12) Reconnect the sensor. CLEAR the DTCs and test the system for normal operation.

G531330t65 : CHECK THE CKP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the CKP sensor electrical connector, PI21. 2. Measure the resistance between:

CKP sensor connector PI21, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t64.

G531330t64 : CHECK THE CKP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CKP sensor connector PI21, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t63.

G531330t63 : CHECK THE CKP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

CKP sensor connector PI21, harness side	ECM connector PI300, harness side
Pin 02	Pin 30

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t66.

G531330t66 : CHECK THE CKP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

CKP sensor connector PI21, harness side	ECM connector PI300, harness side
Pin 01	Pin 06

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new CKP sensor.

Crankshaft Position (CKP) Sensor (18.30.12) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p18 : RIGHT-HAND CAMSHAFT POSITION (CMP) SENSOR CIRCUIT

G531330t67 : CHECK THE CMP SENSOR FOR CORRECT INSTALLATION

1. Check the CMP sensor for correct installation.

Is the CMP sensor correctly installed?

-> **Yes**

GO to Pinpoint Test G531330t68.

-> **No**

INSTALL the CMP sensor correctly.

Camshaft Position (CMP) Sensor RH (18.31.11) CLEAR the DTCs and test the system for normal operation.

G531330t68 : CHECK THE CMP SENSOR FOR FOREIGN DEBRIS

1. Remove the CMP sensor and inspect for foreign debris.

Is the CMP sensor free of foreign debris?

-> **Yes**

GO to Pinpoint Test G531330t71.

-> **No**

CLEAN the sensor and wheel. INSTALL the sensor.

Camshaft Position (CMP) Sensor RH (18.31.11) CLEAR the DTCs and test the system for normal operation.

G531330t71 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the CMP sensor electrical connector, PI23. 2. Measure the resistance between:

CMP sensor connector PI23, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t70.

G531330t70 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CMP sensor connector PI23, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t69.

G531330t69 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

CMP sensor connector PI23, harness side	ECM connector PI300, harness side
Pin 02	Pin 34

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t72.

G531330t72 : CHECK THE CMP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

CMP sensor connector PI23, harness side	ECM connector PI300, harness side
Pin 01	Pin 07

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new CMP sensor.

Camshaft Position (CMP) Sensor RH (18.31.11) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p28 : LEFT-HAND CAMSHAFT POSITION (CMP) SENSOR CIRCUIT

G531330t135 : CHECK THE CMP SENSOR FOR CORRECT INSTALLATION

1. Check the CMP sensor for correct installation.

Is the CMP sensor correctly installed?

-> Yes

GO to Pinpoint Test G531330t136.

-> No

INSTALL the CMP sensor correctly.

Camshaft Position (CMP) Sensor LH (18.31.12) CLEAR the DTCs and test the system for normal operation.

G531330t136 : CHECK THE CMP SENSOR FOR FOREIGN DEBRIS

1. Remove the CMP sensor and inspect for foreign debris.

Is the CMP sensor free of foreign debris?

-> Yes

GO to Pinpoint Test G531330t139.

-> No

CLEAN the sensor and wheel. INSTALL the sensor.

Camshaft Position (CMP) Sensor LH (18.31.12) CLEAR the DTCs and test the system for normal operation.

G531330t139 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the CMP sensor electrical connector, PI22. 2. Measure the resistance between:

CMP sensor connector PI22, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t138.

G531330t138 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CMP sensor connector PI22, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t137.

G531330t137 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

CMP sensor connector PI22, harness side	ECM connector PI300, harness side
Pin 01	Pin 33

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t174.

G531330t174 : CHECK THE CMP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

CMP sensor connector PI22, harness side	ECM connector PI300, harness side
Pin 02	Pin 08

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new CMP sensor.

Camshaft Position (CMP) Sensor LH (18.31.12) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p19 : RADIATOR COOLING FAN MODULE DRIVE CIRCUIT

G531330t73 : CHECK THE RADIATOR FAN MODULE PERMANENT SUPPLY

1. Disconnect the fan module electrical connector, EC20. 2. Measure the voltage between:

Fan module connector EC20, harness side	Battery
Pin 01	Negative terminal

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the cooling fan module and battery. This circuit includes fuse 35 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t75.

G531330t75 : CHECK THE RADIATOR FAN MODULE EMS SWITCHED SUPPLY

1. Disconnect the fan module electrical connector, GC01. 2. Key on, engine off. 3. Make sure the EMS relay is engaged. 4. Measure the voltage between:

Fan module connector GC01, harness side	Battery
Pin 02	Negative terminal

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the cooling fan module and battery. This circuit includes fuse 14 of the front power distribution box and the EMS control relay. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t78.

G531330t78 : CHECK THE RADIATOR FAN MODULE CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Fan module connector GC01, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t77.

G531330t77 : CHECK THE RADIATOR FAN MODULE CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Fan module connector GC01, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t76.

G531330t76 : CHECK THE RADIATOR FAN MODULE CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

Fan module connector GC01, harness side	ECM connector EC300, harness side
--	--

Pin 01	Pin 49
--------	--------

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t74.

G531330t74 : CHECK THE RADIATOR FAN MODULE GROUND FOR HIGH RESISTANCE

1. Measure the resistance between:

Fan module connector EC20, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new radiator cooling fan module. CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p20 : BATTERY POWER SUPPLY VOLTAGE

G531330t79 : CHECK THE BATTERY POWER SUPPLY TO THE ECM

1. Disconnect the ECM electrical connector, EC300. 2. Measure the voltage between:

ECM connector EC300, harness side	Battery
Pin 54	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

Recheck the DTCs.

-> No

REPAIR the battery power supply circuit. This circuit includes fuse 17 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p22 : ACCELERATOR PEDAL POSITION (APP) SENSOR CIRCUIT 1

G531330t86 : CHECK THE APP SENSOR SUPPLY VOLTAGE AT THE SENSOR

1. Disconnect the APP sensor electrical connector, CR14. 2. Key on, engine off. 3. Measure the voltage between:

APP sensor connector CR14, harness side	Battery
Pin 02	Negative terminal

Is the voltage less than 4 volts?

-> Yes

REPAIR the 5 volt supply circuit between the APP sensor and the ECM. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t163.

G531330t163 : CHECK THE APP SENSOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key off. 2. Measure the resistance between:

APP sensor connector CR14, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t85.

G531330t85 : CHECK THE APP SENSOR SENSING CIRCUIT 1 FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

APP sensor connector CR14, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t84.

G531330t84 : CHECK THE APP SENSOR SENSING CIRCUIT 1 FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

APP sensor connector CR14, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t83.

G531330t83 : CHECK THE APP SENSOR SENSING CIRCUIT 1 FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

APP sensor connector CR14, harness side	ECM connector EC300, harness side
Pin 01	Pin 24

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t164.

G531330t164 : CHECK THE APP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

APP sensor connector CR14, harness side	ECM connector EC300, harness side
Pin 06	Pin 08

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new APP sensor.

Accelerator Pedal (19.20.01) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p23 :

ACCELERATOR PEDAL POSITION (APP) SENSOR CIRCUIT 2

G531330t91 : CHECK THE APP SENSOR SUPPLY VOLTAGE AT THE SENSOR

1. Disconnect the APP sensor electrical connector, CR14. 2. Key on, engine off. 3. Measure the voltage between:

APP sensor connector CR14, harness side	Battery
Pin 05	Negative terminal

Is the voltage less than 4 volts?

-> Yes

REPAIR the 5 volt supply circuit between the APP sensor and the ECM. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t165.

G531330t165 : CHECK THE APP SENSOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key off. 2. Measure the resistance between:

APP sensor connector CR14, harness side	Battery
Pin 05	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t90.

G531330t90 : CHECK THE APP SENSOR SENSING CIRCUIT 2 FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

APP sensor connector CR14, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t89.

G531330t89 : CHECK THE APP SENSOR SENSING CIRCUIT 2 FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

APP sensor connector CR14, harness side	Battery
Pin 04	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t88.

G531330t88 : CHECK THE APP SENSOR SENSING CIRCUIT 2 FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

APP sensor connector CR14, harness side	ECM connector EC300, harness side
--	--

Pin 04	Pin 38
--------	--------

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t166.

G531330t166 : CHECK THE APP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

APP sensor connector CR14, harness side	ECM connector EC300, harness side
Pin 03	Pin 07

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new APP sensor.

Accelerator Pedal (19.20.01) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p24 : THROTTLE MOTOR CONTROL CIRCUIT

G531330t93 : CHECK THE THROTTLE MOTOR TO ECM NEGATIVE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the throttle motor electrical connector, PI26. 2. Disconnect the ECM electrical connector, PI300. 3. Measure the resistance between:

Throttle motor connector PI26, harness side	ECM connector PI300, harness side
Pin 01	Pin 74

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t94.

G531330t94 : CHECK THE THROTTLE MOTOR TO ECM POSITIVE CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Throttle motor connector PI26, harness side	ECM connector PI300, harness side
Pin 02	Pin 75

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new throttle body.

Throttle Body - VIN Range: G45704->G99999 (19.70.04) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p21 : FUEL RAIL PRESSURE (FRP) SENSOR CIRCUIT

G531330t100 : CHECK THE FRP SENSOR SUPPLY CIRCUIT VOLTAGE

1. Disconnect the FRP sensor electrical connector, IL12. 2. Key on, engine off. 3. Measure the voltage between:

FRP sensor connector IL12, harness side	Battery
Pin 01	Negative terminal

Is the voltage less than 4 volts?

-> Yes

REPAIR the 5 volt supply circuit between the FRP sensor and the ECM. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t101.

G531330t101 : CHECK THE FRP SENSOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key off. 2. Measure the resistance between:

FRP sensor connector IL12, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t102.

G531330t102 : CHECK THE FRP SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

FRP sensor connector IL12, harness side	Battery

Pin 03	Negative terminal
--------	-------------------

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t107.

G531330t107 : CHECK THE FRP SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

FRP sensor connector IL12, harness side	Battery
Pin 03	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t108.

G531330t108 : CHECK THE FRP SENSOR SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM sensor electrical connector, PI300. 2. Measure the resistance between:

FRP sensor connector IL12, harness side	ECM connector PI300, harness side
Pin 03	Pin 71

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t110.

G531330t110 : CHECK THE FRP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

FRP sensor connector IL12, harness side	ECM connector PI300, harness side
Pin 02	Pin 10

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new FRP sensor.

Fuel Rail Pressure (FRP) Sensor (18.30.98) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p27 : STARTER RELAY SIGNAL

G531330t87 : CHECK THE STARTER RELAY TO ECM CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Remove the starter relay. 3. Measure the resistance between:

Starter relay base	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t134.

G531330t134 : CHECK THE STARTER RELAY TO ECM CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Starter relay base	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t133.

G531330t133 : CHECK THE STARTER RELAY TO ECM CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

Starter relay base	ECM connector EC300, harness side
Pin 02	Pin 51

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new starter relay. Clear the DTC and test the system for normal operation. If the DTC resets, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531330p29 : RIGHT-HAND VARIABLE CAMSHAFT TIMING (VCT) OIL CONTROL SOLENOID CIRCUIT

G531330t140 : CHECK ECM TO VCT SOLENOID SUPPLY CIRCUIT VOLTAGE

1. Disconnect the VCT solenoid electrical connector, PI16. 2. Key on, engine off. 3. Measure the voltage between:

VCT solenoid connector PI16, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G531330t143.

-> No

REPAIR the circuit between the VCT solenoid electrical connector and battery. This circuit includes fuse 12 of the front power distribution box and the EMS control relay. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

G531330t143 : CHECK VCT SOLENOID CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Measure the resistance between:

VCT solenoid connector PI16, harness side	ECM connector PI300, harness side
Pin 01	Pin 86

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the

DTC and test the system for normal operation.

-> **No**

INSTALL a new VCT oil control solenoid.

Variable Camshaft Timing (VCT) Oil Control Solenoid (18.30.90) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p30 : LEFT-HAND VARIABLE CAMSHAFT TIMING (VCT) OIL CONTROL SOLENOID CIRCUIT

G531330t142 : CHECK ECM TO VCT SOLENOID SUPPLY CIRCUIT VOLTAGE

1. Disconnect the VCT solenoid electrical connector, PI17. 2. Key on, engine off. 3. Measure the voltage between:

VCT solenoid connector PI17, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G531330t147.

-> **No**

REPAIR the circuit between the VCT solenoid electrical connector and battery. This circuit includes fuse 12 of the front power distribution box and the EMS control relay. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

G531330t147 : CHECK VCT SOLENOID CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Measure the resistance between:

VCT solenoid connector PI17, harness side	ECM connector PI300, harness side
Pin 01	Pin 87

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new VCT oil control solenoid.

Variable Camshaft Timing (VCT) Oil Control Solenoid (18.30.90) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p32 : EMS CONTROL RELAY CIRCUITS

G531330t149 : CHECK THE EMS RELAY PERMANENT SUPPLY VOLTAGES

1. Remove the EMS relay. 2. Measure the voltage between:

EMS relay base, harness side	Battery
Pin 01	Negative terminal
Pin 03	Negative terminal

Are both voltages greater than 10 volts?

-> Yes

GO to Pinpoint Test G531330t92.

-> No

REPAIR the circuit between the relay base and battery. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

G531330t92 : CHECK THE ECM TO EMS RELAY CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

EMS relay base, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t111.

G531330t111 : CHECK THE ECM TO EMS RELAY CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

EMS relay base, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t151.

G531330t151 : CHECK THE ECM TO EMS RELAY CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

EMS relay base, harness side	ECM connector EC300, harness side
Pin 02	Pin 16

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t150.

G531330t150 : CHECK THE EMS RELAY TO ECM IGNITION CIRCUITS FOR HIGH RESISTANCE

1. Measure the resistance between:

EMS relay base, harness side	ECM connector EC300, harness side
Pin 05	Pin 04
Pin 05	Pin 06

Is either resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. These circuits include fuses 2 and 12 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new EMS control relay. CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p33 : MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT

G531330t80 : CHECK THE MAP SENSOR SUPPLY CIRCUIT VOLTAGE

1. Disconnect the MAP sensor electrical connector, PI29. 2. Key on, engine off. 3. Measure the voltage between:

MAP sensor connector PI29, harness side	Battery
Pin 02	Negative terminal

Is the voltage less than 4 volts?

-> **Yes**

REPAIR the 5 volt supply circuit between the MAP sensor and the ECM. For additional information,

refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t109.

G531330t109 : CHECK THE MAP SENSOR SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key off. 2. Measure the resistance between:

MAP sensor connector PI29, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t154.

G531330t154 : CHECK THE MAP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

MAP sensor connector PI29, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t153.

G531330t153 : CHECK THE MAP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

MAP sensor connector PI29, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t152.

G531330t152 : CHECK THE MAP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

MAP sensor connector PI29, harness side	ECM connector PI300, harness side
Pin 01	Pin 69

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t124.

G531330t124 : CHECK THE MAP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

MAP sensor connector PI29, harness side	ECM connector PI300, harness side
--	--

Pin 04	Pin 10
--------	--------

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new MAP sensor.

Manifold Absolute Pressure (MAP) Sensor (18.30.86) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p34 : ENGINE FUEL TEMPERATURE (EFT) SENSOR CIRCUIT

G531330t157 : CHECK THE EFT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the EFT sensor electrical connector, IL09. 2. Measure the resistance between:

EFT sensor connector IL09, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t156.

G531330t156 : CHECK THE EFT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

EFT sensor connector IL09, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t155.

G531330t155 : CHECK THE EFT SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

EFT sensor connector IL09, harness side	ECM connector PI300, harness side
Pin 02	Pin 46

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t126.

G531330t126 : CHECK THE EFT SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

EFT sensor connector IL09, harness side	ECM connector PI300, harness side
Pin 01	Pin 15

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new EFT sensor.

Fuel Temperature Sensor (18.30.99) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p35 : AIR CONDITIONING (A/C) PRESSURE SENSOR CIRCUIT

G531330t146 : CHECK THE A/C PRESSURE SENSOR POWER SUPPLY CIRCUIT VOLTAGE

1. Disconnect the A/C pressure sensor electrical connector, EC11. 2. Key on, engine off. 3. Measure the voltage between:

A/C pressure sensor connector EC11, harness side	Battery
Pin 03	Negative terminal

Is the voltage less than 4 volts?

-> Yes

REPAIR the 5 volt supply circuit between the A/C pressure sensor and the ECM. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t161.

G531330t161 : CHECK THE A/C PRESSURE SENSOR POWER SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key off. 2. Measure the resistance between:

A/C pressure sensor connector EC11, harness side	Battery
Pin 03	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t160.

G531330t160 : CHECK THE A/C PRESSURE SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

A/C pressure sensor connector EC11, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t159.

G531330t159 : CHECK THE A/C PRESSURE SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

A/C pressure sensor connector EC11, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t158.

G531330t158 : CHECK THE A/C PRESSURE SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

A/C pressure sensor connector EC11, harness side	ECM connector EC300, harness side
Pin 02	Pin 12

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t162.

G531330t162 : CHECK THE A/C PRESSURE SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

A/C pressure sensor connector EC11, harness side	ECM connector EC300, harness side
Pin 01	Pin 08

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

INSTALL a new A/C pressure sensor.

Pressure Cutoff Switch - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (82.10.32) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p38 : INTAKE MANIFOLD TUNING (IMT) VALVE 1 (TOP) CIRCUIT

G531330t168 : CHECK THE IMT VALVE POWER SUPPLY CIRCUIT VOLTAGE

1. Disconnect the IMT valve electrical connector, PI30. 2. Key on, engine off. 3. Measure the voltage between:

IMT valve connector PI30, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G531330t148.

-> No

REPAIR the circuit between the IMT valve electrical connector and battery. This circuit includes fuse 14 of the front power distribution box and the EMS control relay. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

G531330t148 : CHECK THE IMT VALVE DRIVE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

IMT valve connector PI30, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t175.

G531330t175 : CHECK THE IMT VALVE DRIVE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

IMT valve connector PI30, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t169.

G531330t169 : CHECK THE IMT VALVE DRIVE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

IMT valve connector PI30, harness side	ECM connector PI300, harness side
Pin 02	Pin 84

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new IMT valve,

Intake Manifold Tuning (IMT) Valve LH (19.70.30) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p37 : INTAKE MANIFOLD TUNING (IMT) VALVE 2 (BOTTOM) CIRCUIT

G531330t176 : CHECK THE IMT VALVE POWER SUPPLY CIRCUIT VOLTAGE

1. Disconnect the IMT valve electrical connector, PI31. 2. Key on, engine off. 3. Measure the voltage between:

IMT valve connector PI31, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G531330t178.

-> No

REPAIR the circuit between the IMT valve electrical connector and battery. This circuit includes fuse 14 of the front power distribution box and the EMS control relay. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

G531330t178 : CHECK THE IMT VALVE DRIVE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

IMT valve connector PI31, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t179.

G531330t179 : CHECK THE IMT VALVE DRIVE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

IMT valve connector PI31, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531330t167.

G531330t167 : CHECK THE IMT VALVE DRIVE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Measure the resistance between:

IMT valve connector PI31, harness side	ECM connector PI300, harness side
Pin 02	Pin 90

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new IMT valve,

Intake Manifold Tuning (IMT) Valve LH (19.70.30) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531330p25 : BRAKE SWITCH

G531330t103 : CHECK THE OPERATION OF THE BRAKE SWITCH (PEDAL RELEASED)

1. Key off. 2. Disconnect the brake switch electrical connector, CR78. 3. Make sure the brake pedal is not pressed. 4. Measure the resistance between:

Brake switch connector CR78, component side	Brake switch connector CR78, component side
Pin 01	Pin 02

Is the resistance greater than 10 ohms?

-> Yes

GO to Pinpoint Test G531330t104.

-> No

INSTALL a new brake switch. CLEAR the DTC, test the system for normal operation.

G531330t104 : CHECK THE OPERATION OF THE BRAKE SWITCH (PEDAL PRESSED)

1. Press the brake pedal. 2. Measure the resistance between:

Brake switch connector CR78, component side	Brake switch connector CR78, component side
Pin 01	Pin 02

Is the resistance greater than 10 ohms?

-> Yes

INSTALL a new brake switch. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G531330t105.

G531330t105 : CHECK THE POWER SUPPLY TO THE BRAKE PEDAL SWITCH

1. Key on, engine off. 2. Measure the voltage between:

Brake switch connector CR78, harness side	Battery
Pin 01	Negative terminal

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the brake switch and battery. This circuit includes fuse 44 of the primary junction box. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G531330t106.

G531330t106 : CHECK THE BRAKE SWITCH SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Brake switch connector CR78, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G531330t112.

G531330t112 : CHECK THE BRAKE SWITCH SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Brake switch connector CR78, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G531330t113.

G531330t113 : CHECK THE BRAKE SWITCH SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

Brake switch connector CR78, harness side	ECM connector EC300, harness side
Pin 02	Pin 41

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

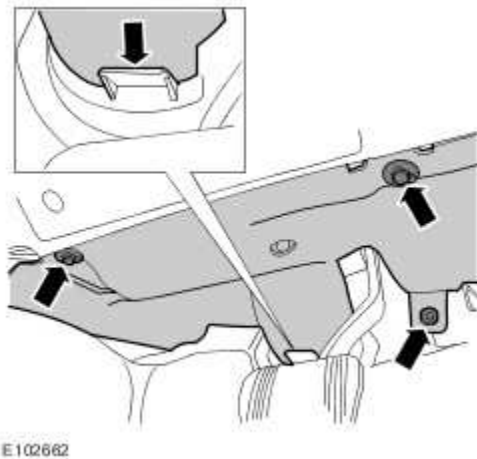
REFER to the warranty policy and procedures manual if an ECM is suspect.

Brake Pedal Position (BPP) Switch

Removal

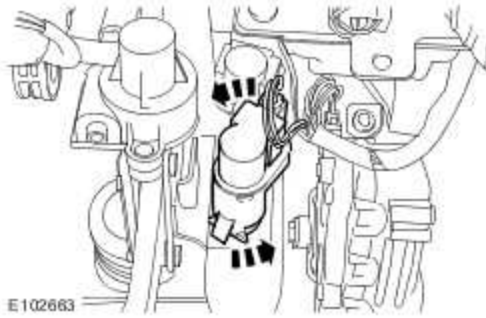
- 1 . Switch the ignition on.
- 2 . Position the front seat fully rearwards.
- 3 . Switch the ignition off.
- 4 . Remove the driver's side footwell trim panel.

▶ Release the 3 clips.



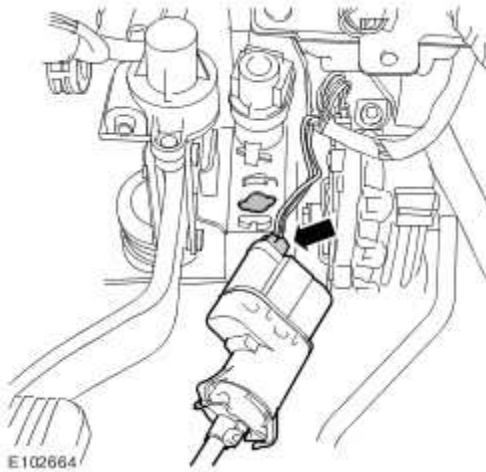
- 5 . Release the brake pedal position (BPP) switch.

▶ Rotate the BPP switch 45 degrees counter-clockwise.



6 . Remove the BPP switch.

▶ Disconnect the electrical connector.



Installation

1



CAUTION: Make sure that the brake pedal remains in the rest position during this procedure.



CAUTION: The bracket is keyed to avoid incorrect orientation. Failure to correctly align the switch may result in damage to the vehicle.



CAUTION: Make sure that the pedal box, booster-to-brake pedal assembly and switch bracket are all installed correctly before installing the switch.

Install the BPP switch.

- ▶ Locate the BPP switch in the bracket.
- ▶ Rotate the BPP switch 45 degrees clockwise.

2 . Connect the electrical connector.

3 . Install the driver's side footwell trim panel.

- ▶ Align the trim panel with the guide.
- ▶ Install the 3 clips.

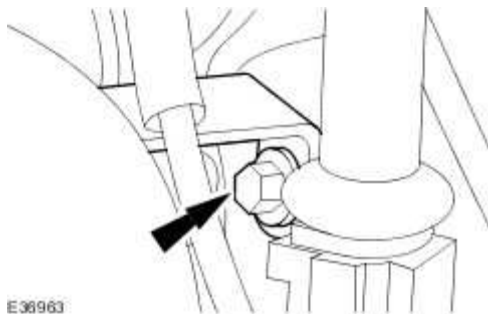
Camshaft Position (CMP) Sensor LH (18.31.12)

Removal

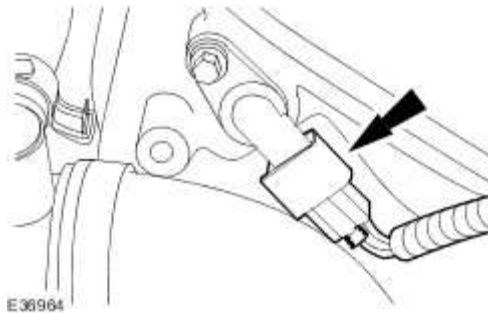
1 . Disconnect the battery ground cable. <<414-01>>

2 . Remove the air cleaner outlet pipe. <<303-12A>>

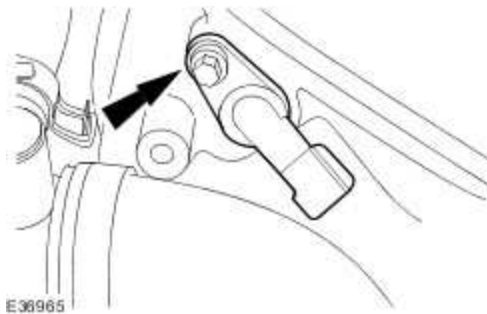
3 . Detach the fuel injection supply manifold.



4 . Disconnect the camshaft position (CMP) sensor electrical connector.



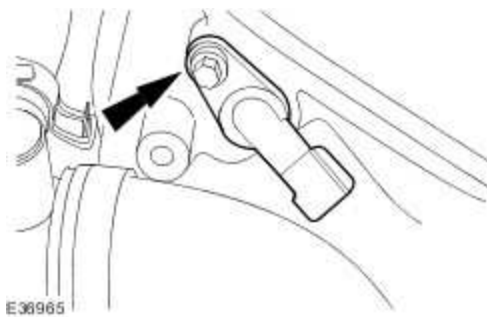
5 . Remove the CMP sensor.



Installation

- 1 . To install, reverse the removal procedure.

▶ Tighten to 7 Nm.

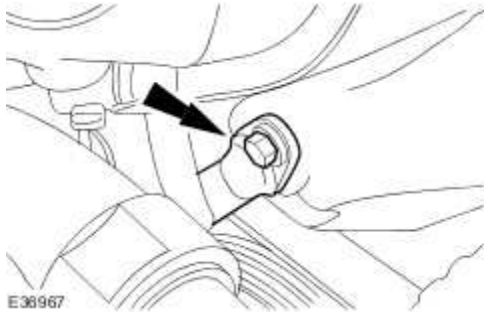


Camshaft Position (CMP) Sensor RH (18.31.11)

Installation

- 1 . To install, reverse the removal procedure.

▶ Tighten to 7 Nm.



Catalyst Monitor Sensor (18.30.66)

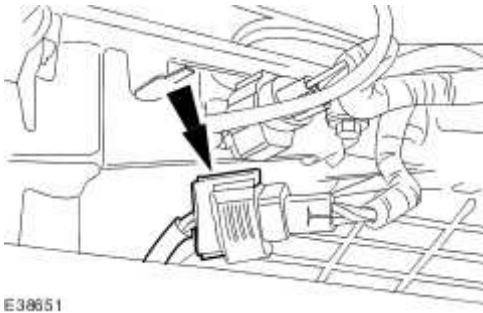
Removal

- 1 . Raise and support the vehicle.
For additional information, refer to

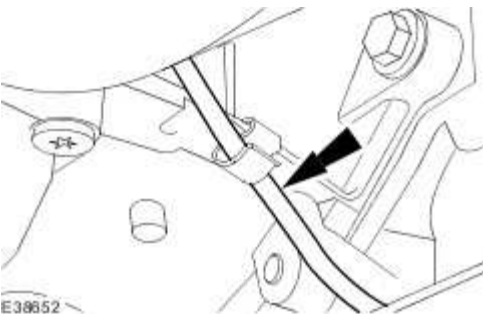
- 2 . Detach the catalyst monitor sensor electrical connector.



- 3 . Disconnect the catalyst monitor sensor electrical connector.



- 4 Detach the catalyst monitor sensor wiring harness from the retaining clip on the automatic transmission.

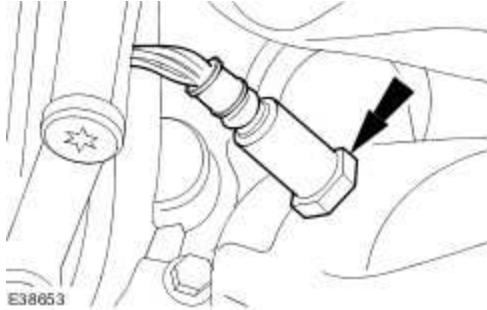


5



- **CAUTION:** Do not twist the catalyst monitor sensor wiring harness on removal. Failure to follow this instruction may result in damage to the component.

Remove the catalyst monitor sensor.



Installation

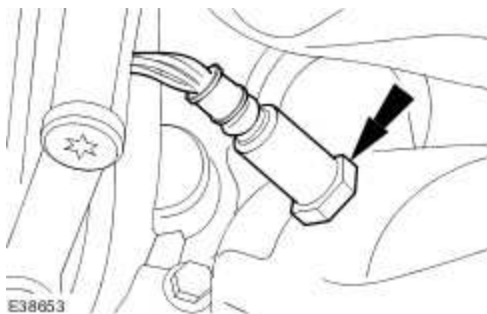
1



- **CAUTION:** Do not twist the catalyst monitor sensor wiring harness on installation. Failure to follow this instruction may result in damage to the component.

To install, reverse the removal procedure.

► Tighten to 40 Nm.



2 **NOTE:**

- For NAS vehicles only.

If required, carry out a long drive cycle.

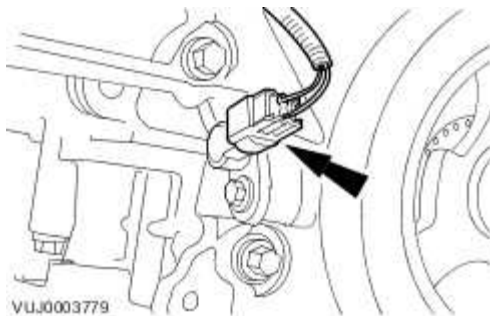
For additional information, refer to Powertrain Control Module (PCM) Long Drive Cycle Self-

Test

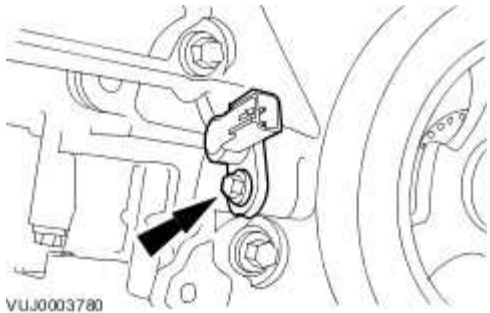
Crankshaft Position (CKP) Sensor (18.30.12)

Removal

- 1 . Disconnect the battery ground cable. <<414-01>>
- 2 . Remove the air deflector. <<501-02>>
- 3 . Disconnect the crankshaft position (CKP) sensor electrical connector.




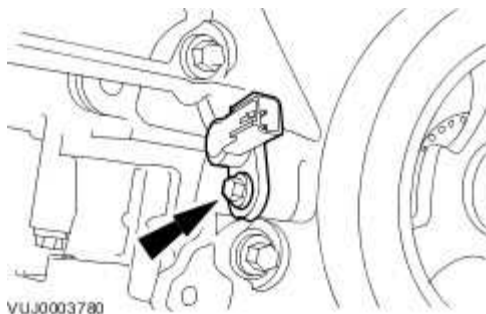
- 4 . Remove the CKP sensor.



Installation

- 1 . To install, reverse the removal procedure.

 Tighten to 7 Nm.



Engine Control Module (ECM) (18.30.01)

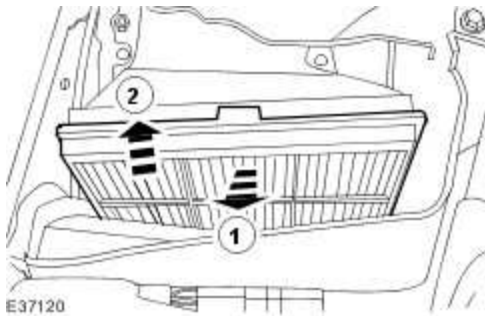
Special Service Tools



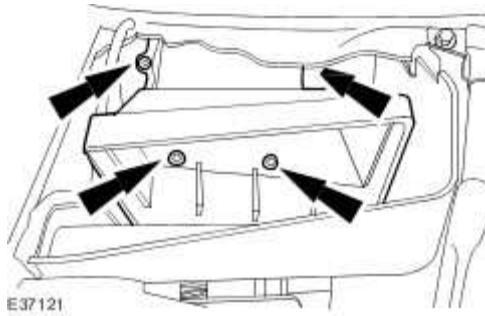
5 Point Security Torx Bit
418-535

Removal

- 1 . Disconnect the battery ground cable. <<414-01>>
- 2 . Remove the cowl vent screen. <<501-02>>
- 3 . Remove the cabin air filter.
 - 1) Detach the cabin air filter.
 - 2) Remove the cabin air filter.



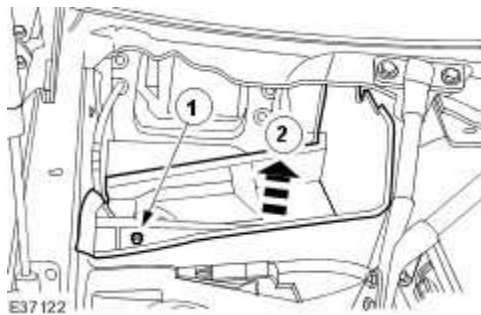
- 4 . Remove the cabin air filter housing.



5 . Remove the engine compartment panel.

1) Remove the engine compartment panel retaining bolt.

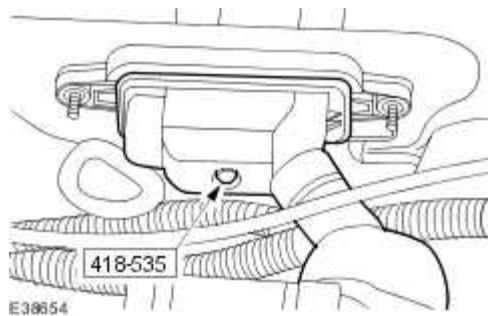
2) Remove the engine compartment panel.



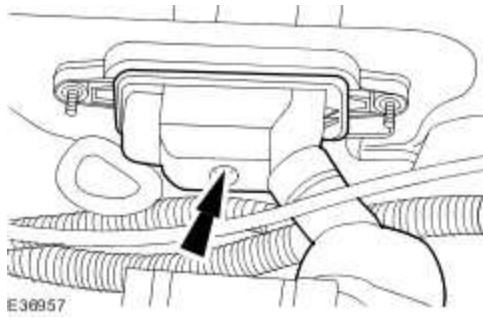
6 **NOTE:**

The engine control module (ECM) electrical connector retaining bolt remains captive in the electrical connector.

Using the special tool, loosen the ECM electrical connector retaining bolt.



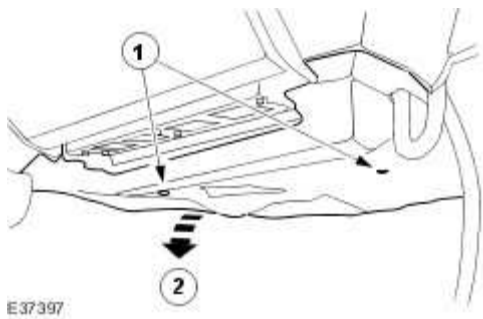
7 . Disconnect the ECM electrical connector.



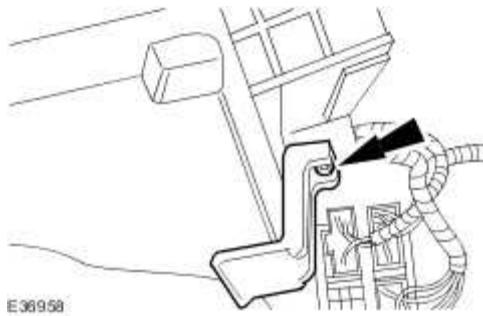
8 . Remove the instrument panel lower trim panel.

1) Remove the retaining clips.

2) Remove the instrument panel lower trim panel.



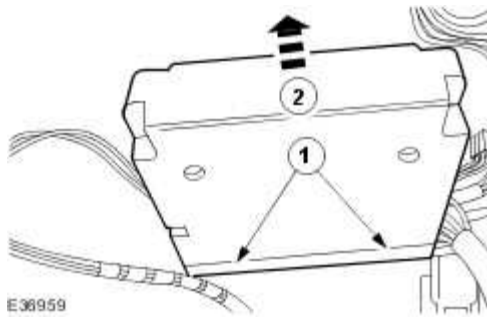
9 . Remove the ECM retaining bracket.



10 . Remove the ECM.

1) Detach the retaining clips.

2) Remove the ECM.



Installation

1



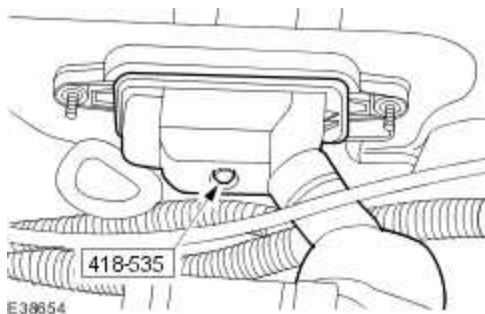
- CAUTION: Make sure that the electrical connector is located correctly in the ECM. Do not force or overtighten the electrical connector. Failure to follow this instruction may result in damage to the component.



CAUTION: Make sure the ECM support bracket is located correctly.

To install, reverse the removal procedure.

▶ Tighten to 5 Nm.



Engine Coolant Temperature (ECT) Sensor

- VIN Range: G00442->G45703 (18.30.10)

Removal

1



WARNING: Never remove the coolant expansion tank pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury.



WARNING: To avoid hot coolant or steam blowing out of the cooling system, use extreme care when removing the coolant expansion tank pressure cap. Wait until the engine has cooled down, then insulate the coolant pressure cap with a suitable cloth and slowly loosen the coolant expansion tank pressure cap until the cooling system pressure is released. Do not remove the coolant expansion tank pressure cap. Step back while the pressure is released from the system. When all of the pressure has been released slowly remove the coolant expansion tank pressure cap (still with the suitable cloth in position) from the coolant expansion tank. Failure to follow this instruction may result in personal injury.

Release the cooling system pressure.



Remove the coolant expansion tank pressure cap.

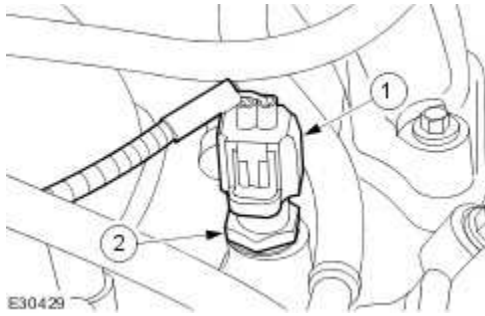
2 . Remove the engine coolant temperature (ECT) sensor.

1) Disconnect the ECT electrical connector.

2) Remove the ECT sensor.



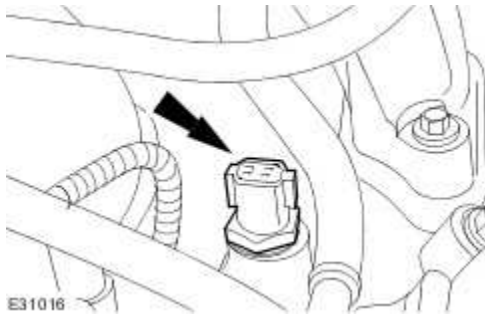
Remove and discard the ECT sensor sealing washer.



Installation

1 . To install, reverse the removal procedure.

- ▶ Install a new ECT sensor sealing washer.
- ▶ Tighten the ECT sensor to 17 Nm.
- ▶ Fill the cooling system up to the MAX mark on the coolant expansion tank.



Engine Coolant Temperature (ECT) Sensor

- VIN Range: G45704->G99999 (18.30.10)

Removal

1



WARNING: Never remove the coolant expansion tank pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury.



WARNING: To avoid hot coolant or steam blowing out of the cooling system, use extreme care when removing the coolant expansion tank pressure cap. Wait until the engine has cooled down, then insulate the coolant pressure cap with a suitable cloth and slowly loosen the coolant expansion tank pressure cap until the cooling system pressure is released. Do not remove the coolant expansion tank pressure cap. Step back while the pressure is released from the system. When all of the pressure has been released slowly remove the coolant expansion tank pressure cap (still with the suitable cloth in position) from the coolant expansion tank. Failure to follow this instruction may result in personal injury.

Release the cooling system pressure.

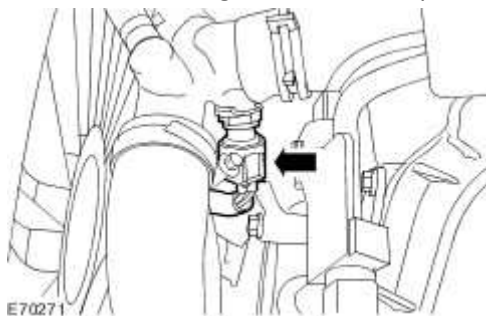


Remove the coolant expansion tank pressure cap.

2 . Remove the air cleaner outlet pipe.

For additional information, refer to

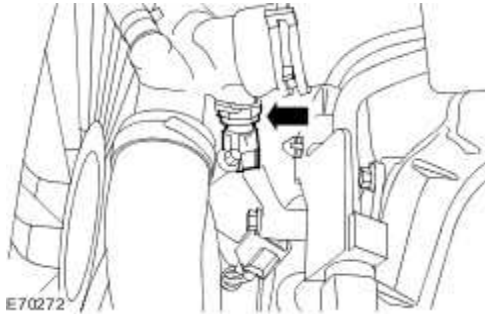
3 . Disconnect the engine coolant temperature (ECT) sensor electrical connector.



4 . Remove the ECT sensor.

▶ Remove the ECT sensor retaining clip.

▶ Remove and discard the ECT sensor sealing washer.



Installation

1 . To install, reverse the removal procedure.

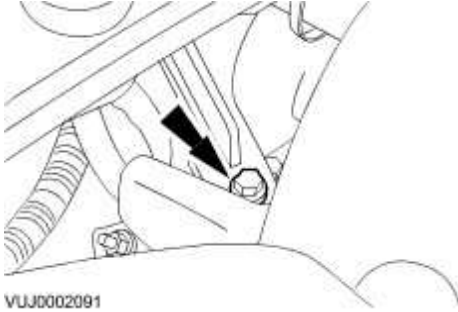
▶ Install a new ECT sensor sealing washer.

2 . Fill the cooling system up to the MAX mark on the coolant expansion tank.

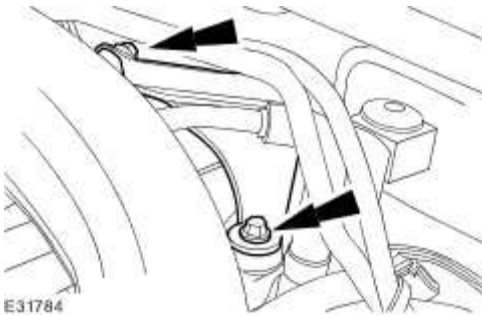
Fuel Rail Pressure (FRP) Sensor (18.30.98)

Removal

- 1 . Depressurize the fuel system. <<310-00>>
- 2 . Remove the fuel rail pressure (FRP) sensor bracket retaining bolt.



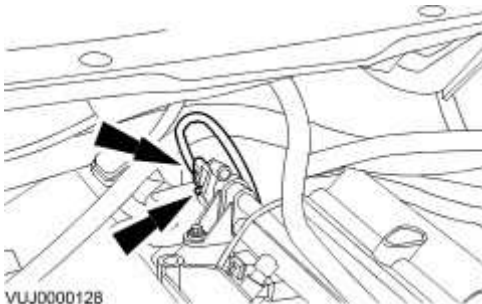
- 3 . Remove the FRP sensor bracket.



- 4 . **NOTE:**

Intake manifold shown removed for clarity.

Disconnect the FRP sensor electrical connector and vacuum hose.



5 . NOTE:

Intake manifold shown removed for clarity.

Remove the FRP sensor.

▶ Remove and discard the O-ring seals.



Installation

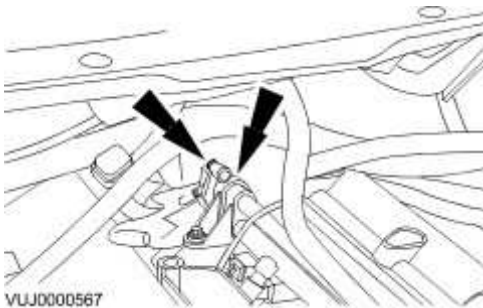
1 . NOTE:

Intake manifold shown removed for clarity.

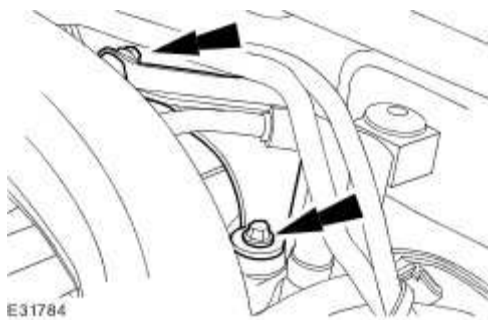
To install, reverse the removal procedure.

▶ Install a new O-ring seals.

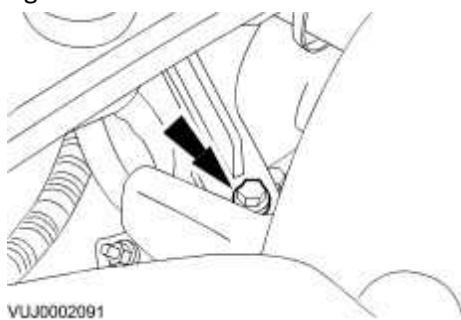
▶ Tighten to 10 Nm.



2 . Tighten to 6 Nm.



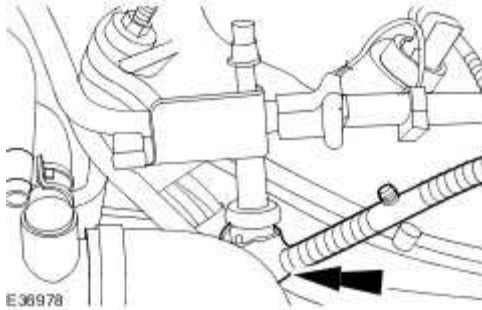
3 . Tighten to 10 Nm.



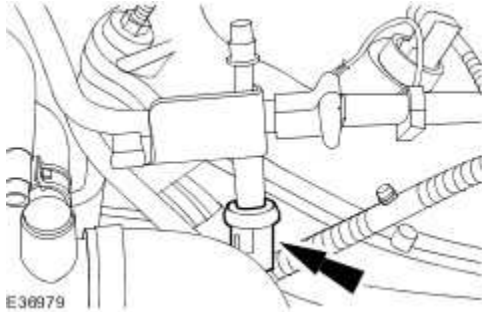
Fuel Temperature Sensor (18.30.99)

Removal

- 1 . Disconnect the battery ground cable. <<414-01>>
- 2 . Remove the air outlet tube. <<303-12A>>
- 3 . Disconnect the fuel temperature sensor electrical connector.



- 4 . Remove the fuel temperature sensor. <<310-00>>



Installation

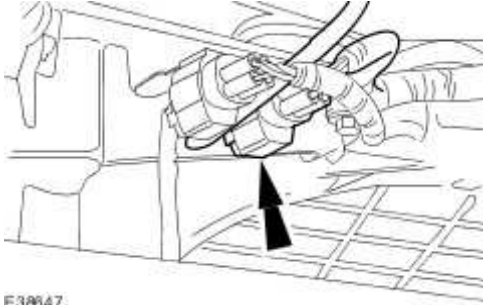
- 1 . To install, reverse removal procedure.

Heated Oxygen Sensor (HO2S)

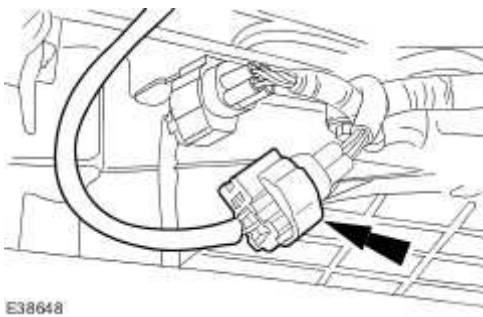
Removal


1 . Raise and support the vehicle. <<100-02>>

2 . Detach the heated oxygen sensor (HO2S) electrical connector.

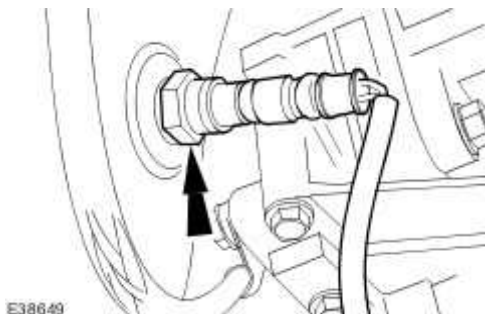


3 . Disconnect the HO2S electrical connector.



4  **CAUTION:** Do not twist the HO2S wiring harness on removal. Failure to follow this instruction may result in damage to the component.

Remove the HO2S.



Installation

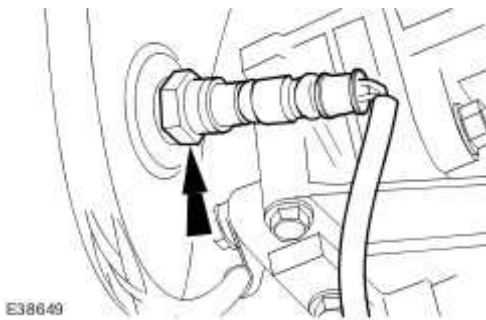
1



- CAUTION: Do not twist the H02S wiring harness on installation. Failure to follow this instruction may result in damage to the component.

To install, reverse the removal procedure.

▶ Tighten to 40 Nm.

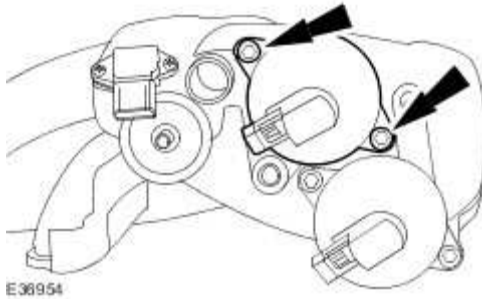


E38649

Intake Manifold Tuning (IMT) Valve LH (19.70.30)

Removal

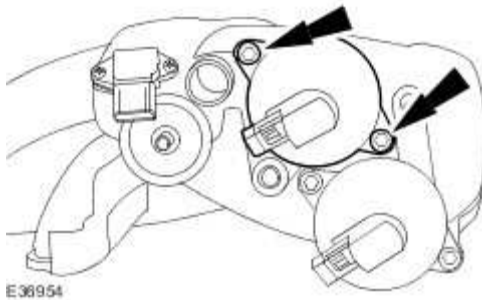
- 1 . Remove the intake manifold. <<303-01A>>
- 2 . Remove the intake manifold tuning (IMT) valve.



Installation

- 1 . To install, reverse the removal procedure.

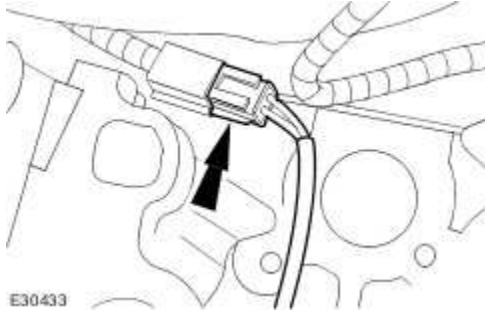
► Tighten to 10 Nm.



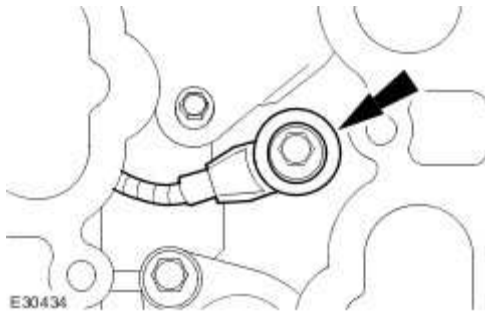
Knock Sensor (KS) LH (18.30.92)

Removal

- 1 . Remove the fuel supply manifold. <<303-04A>>
- 2 . Disconnect the knock sensor electrical connector.



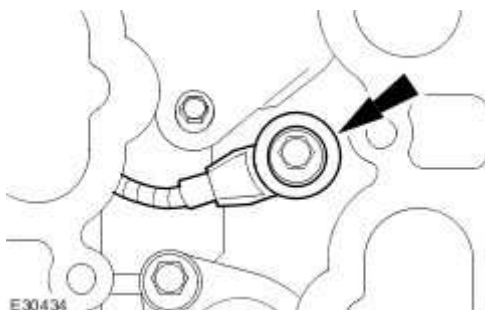
- 3 . Remove the knock sensor.



Installation

- 1 . To install, reverse the removal procedure.

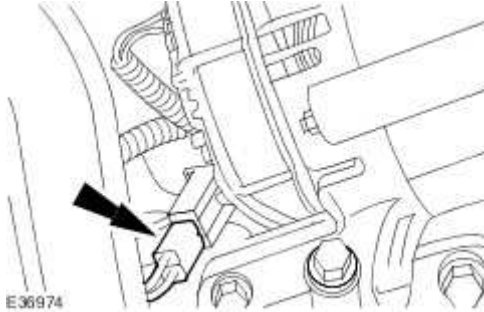
▶ Tighten to 25 Nm.



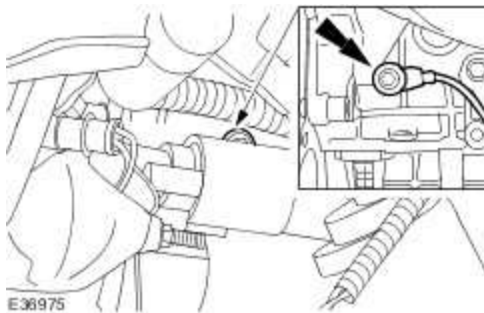
Knock Sensor (KS) RH (18.30.93)

Removal

- 1 . Remove the air deflector. <<501-02>>
- 2 . Disconnect the knock sensor electrical connector.



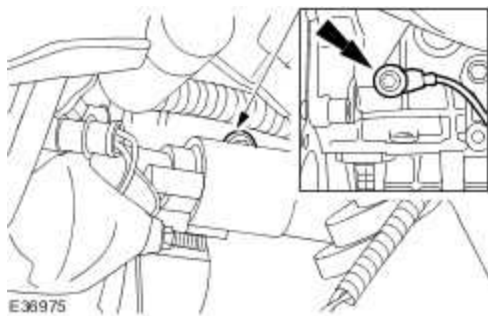
- 3 . Remove the knock sensor.



Installation

- 1 . To install, reverse the removal procedure.

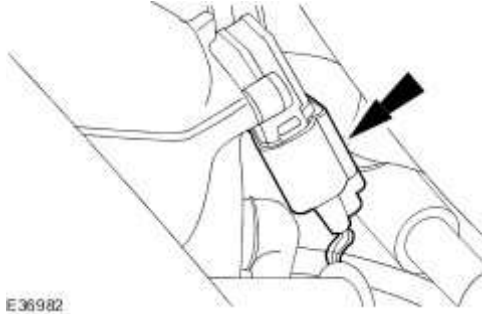
► Tighten to 25 Nm.



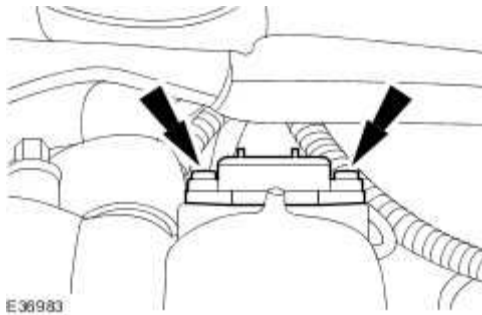
Manifold Absolute Pressure (MAP) Sensor (18.30.86)

Removal

- 1 . Disconnect the manifold absolute pressure (MAP) sensor electrical connector.




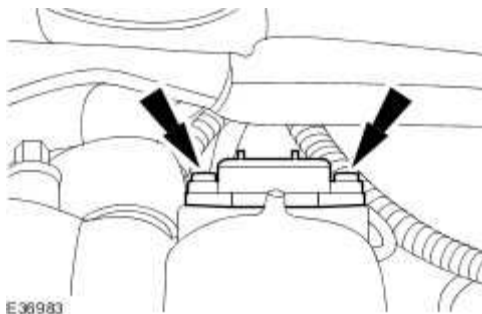
- 2 . Remove the MAP sensor.



Installation

- 1 . To install, reverse the removal procedure.

 Tighten to 10 Nm.



Mass Air Flow (MAF) Sensor (18.30.15)

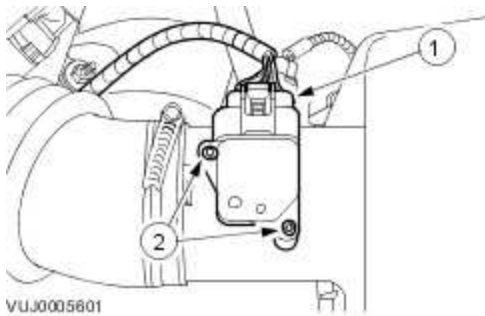
Removal

1 . Remove the mass airflow (MAF) sensor.

1) Disconnect the MAF sensor electrical connector.

2) Remove the mass airflow MAF sensor.

▶ Remove and discard the MAF sensor O-ring seal.



Installation

1 . To install, reverse the removal procedure.

▶ Install a new MAF sensor O-ring seal.

2 NOTE:

For NAS vehicles only.

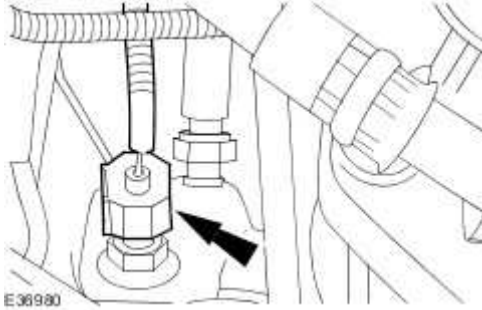
If required, carry out a short drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Short Drive Cycle Self-Test

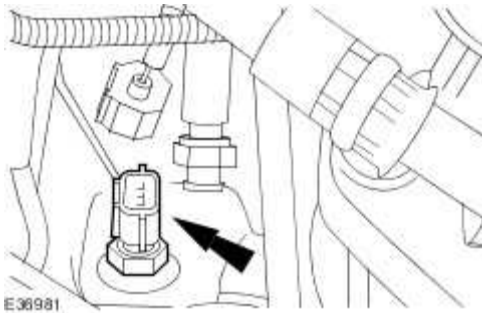
Oil Temperature Sensor (18.31.01)

Removal

- 1 . Remove the air conditioning compressor. <<412-03>>
- 2 . Disconnect the oil temperature sensor electrical connector.



- 3 . Remove the oil temperature sensor.



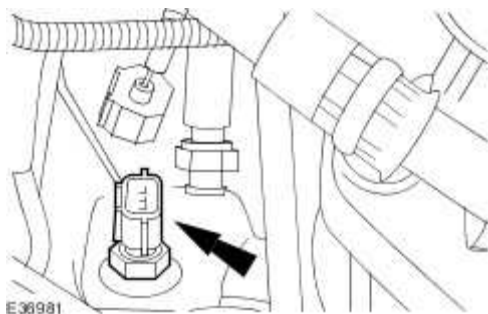
Installation

1 NOTE:

If the oil temperature sensor is to be re-used apply a small bead of sealant meeting Jaguar specification on the first three threads of the oil temperature sensor.

To install, reverse the removal procedure

► Tighten to 15 Nm.



E36981

Variable Camshaft Timing (VCT) Oil Control Solenoid (18.30.90)

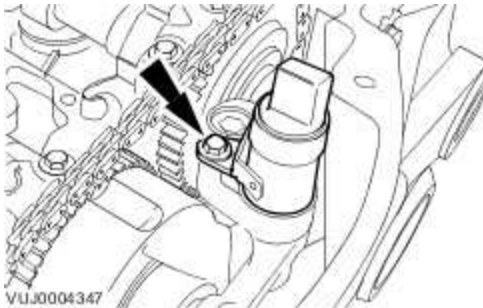
Removal

- 1 . Remove the valve cover.

For additional information, refer to

For additional information, refer to

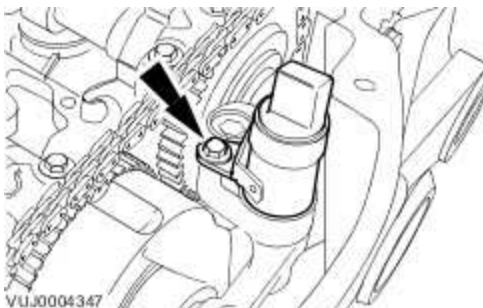
- 2 . Remove the variable camshaft timing oil control solenoid.



Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 10 Nm.



- 2 **NOTE:**

.

For NAS vehicles only.

If required, carry out a short drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Short Drive Cycle Self-Test

303-14B : Electronic Engine Controls – 4.2L NA V8 – AJV8/4.2L SC V8 – AJV8/3.5L NA V8 – AJV8

Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Camshaft position (CMP) sensor retaining bolt	7	-	62
Heated oxygen sensor (H02S)	40	30	-
Catalyst monitor sensor	40	30	-
Crankshaft position (CKP) sensor retaining bolt	7	-	62
Knock sensor retaining nut	25	18	-
Fuel temperature sensor	7	-	62
Fuel rail pressure (FRP) sensor retaining bolts	5	-	44
Intake air temperature (IAT) sensor	35	26	-
Engine coolant temperature (ECT) sensor	17	13	-
Manifold absolute pressure (MAP) sensor	10	-	89
Oil temperature sensor	15	11	-
Mass air flow (MAF) sensor retaining screws	2	-	18
Engine compartment support retaining bolts	25	18	-
Engine control module (ECM) electrical connector retaining bolt	5	-	44
Variable camshaft timing oil control solenoid retaining bolt	10	-	89

Lubricants, fluids, sealers and adhesives

Description	Specification
Sealant	WSK-M4G-328-A3

Brake Pedal Position (BPP) Switch Adjustment

No Data Available

Powertrain Control Module (PCM) Long Drive Cycle Self-Test



WARNING: Where possible, all road tests should be on well surfaced and dry roads. Always comply with speed limits and local traffic regulations.

NOTE:

This procedure is an overcheck only. If fault codes are found, interrogation of the relevant system must be carried out and claimed against.

NOTE:

The vehicle must exceed 50mph (80 km/h) during the road test.

1. Connect the diagnostic equipment to the vehicle.
2. Follow on screen prompts and check for engine management fault codes.
3. Clear the fault codes following the on screen procedure.
4. Disconnect the diagnostic equipment from the vehicle.

5. **NOTE:**

Make sure cruise control is not engaged.

Carry out a road test and perform the following operations.

- Accelerate to 55 mph (88 km/h) in 5th gear and cruise for 2 minutes with the engine speed at or above 1800rpm.
- Lift off the throttle and allow the vehicle to decelerate until the engine speed is less than 1000 rpm.
- Stop the vehicle.
- Release brake, allow the vehicle to move with no throttle for 1 minute.
- Road test is now complete.

6. Connect the diagnostic equipment to the vehicle.

7. **NOTE:**

If fault codes are found, interrogation of the relevant system must be carried out and claimed against.

Follow on screen prompts and check for engine management fault codes.

8. Disconnect the diagnostic equipment from the vehicle.

Powertrain Control Module (PCM) Short Drive Cycle Self-Test

NOTE:

This procedure is an overcheck only. If fault codes are found, interrogation of the relevant system must be carried out and claimed against.

1. Connect the diagnostic equipment to the vehicle.
2. Follow on screen prompts and check for engine management fault codes.
3. Clear the fault codes following the on screen procedure.
4. Start the engine.
 - Allow the engine to idle for 30 seconds.
 - Raise the engine speed to 1500 rpm and hold for 3 minutes until a temperature of 70°C (158 °F) is achieved.
 - Allow the engine to idle for 30 seconds.
 - Switch off the engine.

5. **NOTE:**

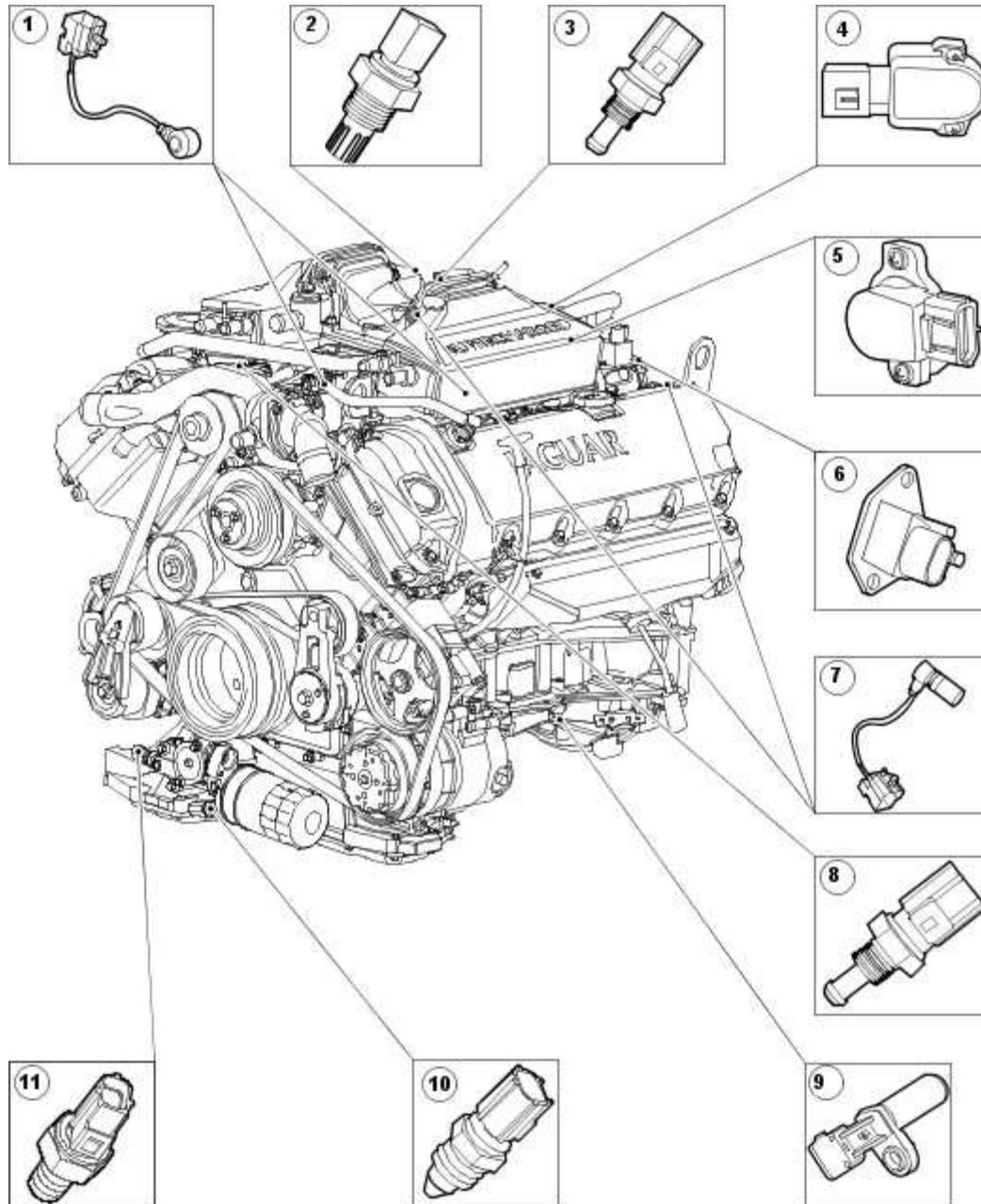
If fault codes are found, interrogation of the relevant system must be carried out and claimed against.

Follow on screen prompts and check for engine management fault codes.

6. Disconnect the diagnostic equipment from the vehicle.

Electronic Engine Controls

Vehicles with supercharger

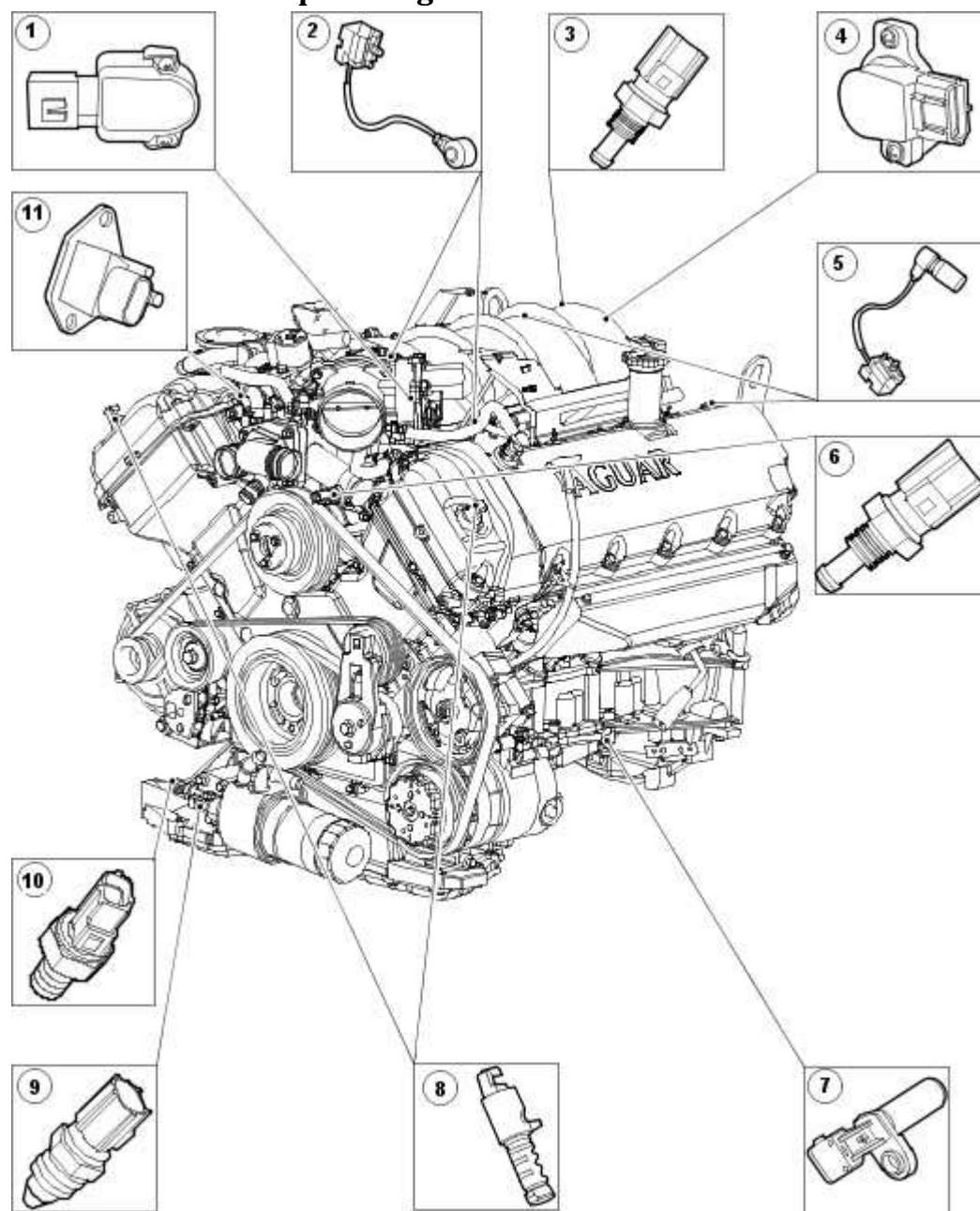


E38669

Item	Part Number	Description
1	—	Knock sensor (KS)

2	—	Intake air temperature (IAT) sensor
3	—	Fuel temperature sensor
4	—	Throttle position sensor
5	—	Manifold absolute pressure (MAP) sensor
6	—	Fuel rail pressure (FRP) sensor
7	—	Camshaft position (CMP) sensor
8	—	Engine coolant temperature (ECT) sensor
9	—	Crankshaft position (CPK) sensor
10	—	Oil temperature sensor
11	—	Oil pressure sensor

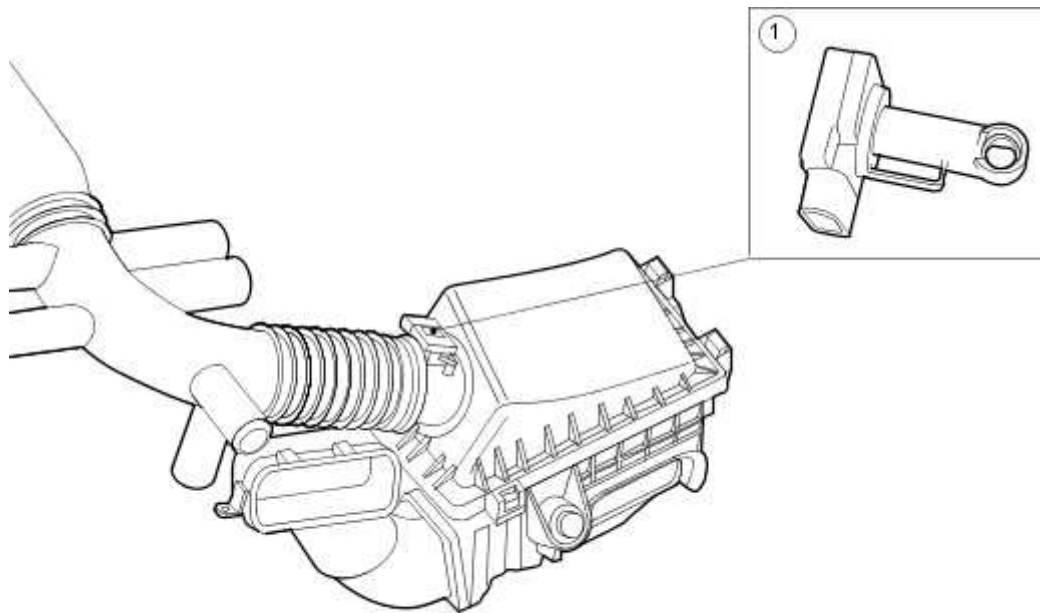
Vehicles without supercharger



E38670

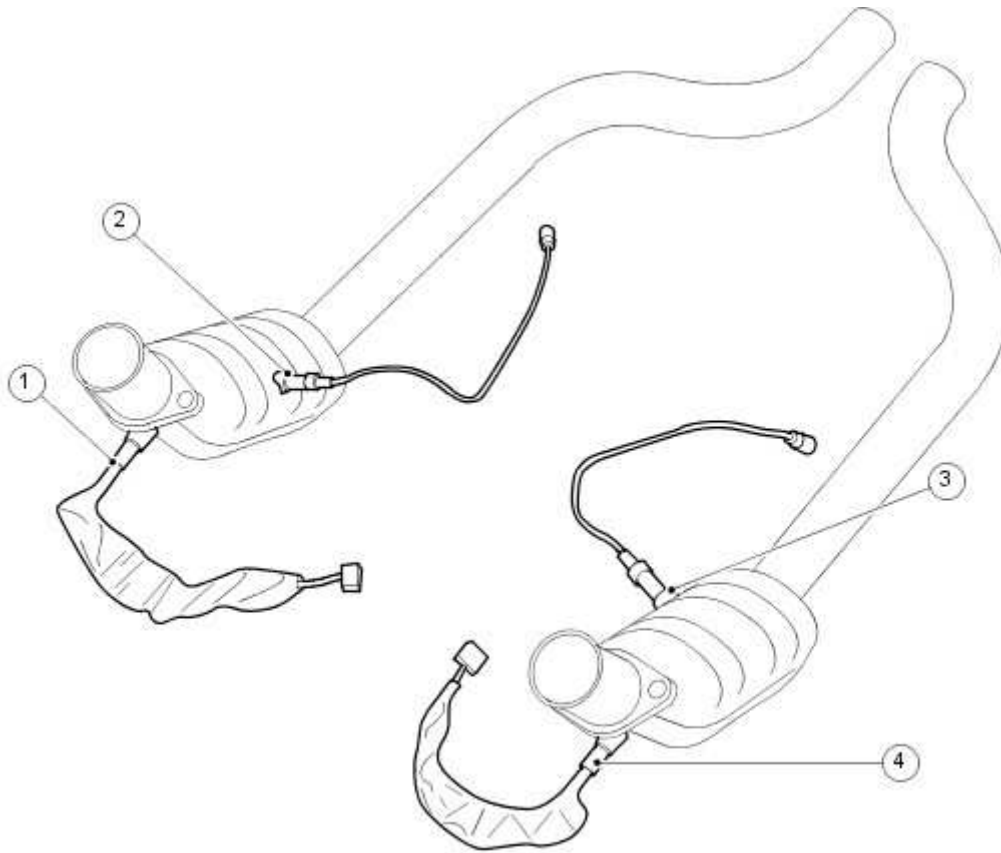
Item	Part Number	Description
1	—	Throttle position sensor
2	—	Knock sensor (KS)
3	—	Fuel temperature sensor
4	—	Manifold absolute pressure (MAP) sensor

5	—	Camshaft position (CMP) sensor
6	—	Engine coolant temperature (ECT) sensor
7	—	Crankshaft position (CPK) sensor
8	—	Variable camshaft timing oil control solenoid
9	—	Oil temperature sensor
10	—	Oil pressure sensor
11	—	Fuel rail pressure (FRP) sensor



E30344

Item	Part Number	Description
1	—	Mass air flow (MAF) sensor



E30438

Item	Part Number	Description
1	—	Heated oxygen sensor - RH
2	—	Catalyst monitor sensor - RH
3	—	Catalyst monitor sensor - LH
4	—	Heated oxygen sensor (HO2S) - LH

Engine Control Module (ECM)

The electronic engine control system consists of a engine control module (ECM), located behind the glove compartment, and a number of sensing and actuating devices. The sensors supply the ECM with input signals which relate to the engine operating conditions and driver requirements. The sensor information is evaluated by the ECM using the results to activate the appropriate response from the actuating devices. The system provides the necessary engine control accuracy and adaptability to:

minimize exhaust emissions and fuel consumption.

provide optimum driver control under all conditions.

minimize evaporative emissions.

provide system diagnostics.

In addition to these functions the ECM also interfaces with other vehicle systems through the controller area network (CAN).

Camshaft Position (CMP) Sensor

The camshaft position (CMP) sensors monitor the position of both camshafts to allow the ECM to control the phase of the inlet camshafts relative to the position of the crankshaft.

Variable Camshaft Timing Oil Control Solenoid

The variable camshaft timing oil control solenoid is a hydraulic actuator, which advances and retards the inlet camshaft timing, thereby altering the camshaft to crankshaft phasing for optimum engine performance.

Knock Sensors (KS)

The knock sensors (KS) detect combustion knock within the engine cylinders and sends a signal to the ECM. The ECM uses this information to gradually adjust the ignition timing until the combustion knock is eliminated.

Mass Air flow (MAF) Sensor

The mass air flow (MAF) sensor informs the ECM of the rate of air flow entering the engine by producing a voltage which is proportional to the rate of air flow into the engine. The voltage produced by the MAF sensor increases as the rate of air flow increases. The ECM takes into account the density of the air entering the air intake system so that it is possible to maintain the required air to fuel ratio, and to compensate for variations in atmospheric pressure.

Integral to the MAF sensor is the intake air temperature sensor (IAT) which measures the temperature of the air entering the air intake system. The ECM uses this information to compensate for higher than normal air intake temperatures.

Throttle Position (TP) Sensor

The ECM monitors the angle of the throttle blade within the throttle housing through the throttle position (TP) sensor. The TP sends a voltage to the ECM which is proportional to the angle of the throttle plate. The voltage from the TP increases with the angle of the throttle plate. There are two sensor tracks within the TP sensor.

Crankshaft Position (CKP) Sensor

The crankshaft position (CKP) sensor is an inductive pulse generator, which scans protrusions on a pulse ring fitted to the flywheel to inform the ECM of the crankshaft's position and speed. The CKP sensor produces an alternating voltage. The frequency of this voltage increases proportional to engine speed.

Fuel Rail Pressure (FRP) Sensor

The fuel rail pressure (FRP) sensor is a pressure transducer device. A vacuum pipe connects to the intake manifold for manifold pressure. The ECM receives a voltage from the FRP sensor which is proportional to the fuel pressure in the fuel injection supply manifold.

Engine Coolant Temperature (ECT) Sensor

The engine coolant temperature (ECT) sensor is a thermistor type sensor that provides an input signal to the ECM which is proportional to the engine coolant temperature. The ECT sensor is a negative temperature coefficient (NTC) sensor and its resistance decreases with a proportional increase in engine coolant temperature.

Oil Temperature Sensor

The oil temperature sensor is a thermistor type sensor that provides an input signal to the ECM which is proportional to the engine oil temperature.

Oil Pressure Switch

The oil pressure switch is connected to the instrument cluster and is not directly part of the electronic engine control system.

Heated Oxygen Sensor (HO2S)

The heated oxygen sensor (HO2S) is a linear characteristic type sensor, fitted forward of the exhaust system's catalytic converter. The ECM uses this as its primary sensor to measure the oxygen content of the exhaust gasses within the exhaust system to provide closed-loop fuelling control.

Catalyst Monitor Sensor

The catalyst monitor sensor is a non-linear characteristic type sensor fitted to the exhaust system's catalytic converter. The ECM uses this as its secondary sensor to measure the oxygen content of the exhaust gasses within the exhaust after they have passed through the catalytic converter. As well as providing additional closed-loop fuelling control the ECM uses this information to determine the efficiency of the catalytic converter.

Intake Air Temperature (IAT) Sensor. Vehicles with supercharger.

Vehicles with supercharger have an additional intake air temperature sensor located on the right-hand charge air cooler. The IAT measures the temperature of the air entering the charge air cooler. The ECM uses this information to compensate for higher than normal air intake temperatures.

Electronic Engine Controls - VIN Range: G00442->G45703

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Confirm which, if any, warning lights and/or messages were displayed on the instrument cluster.

NOTE:

If any warning lights and/or messages were displayed when the fault occurred, refer to the driver information table for diagnostic trouble codes (DTCs) associated with the display, then to the DTC index table for possible sources and actions. Some warnings will appear to clear when the ignition is cycled. This is often because the warning has flagged as a result of one of the vehicle's on-board diagnostic routines having run to detect the fault. If the same routine is not run when the ignition is switched **ON**, the warning will not reflag until the routine does run. See the DTC summaries for drive cycle routines.

- 3 . Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Engine oil level	Fuses
Cooling system coolant level	Wiring harness
Fuel level	Electrical connector(s)
Fuel contamination/grade/quality	Sensor(s)
Throttle body	Engine control module (ECM)
Poly-vee belt	Transmission control module

- 1 . Verify the following systems are working correctly:

Air intake system

Cooling system

Charging system

Fuel charging system

Ignition system

2 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step

3 . Where the Jaguar approved diagnostic system is available, complete the S93 report before clearing any or all fault codes from the vehicle.

NOTE:

If a DTC cannot be cleared, then there is a permanent fault present that flags again as soon as it is cleared. (The exception to this is P1260, which will only clear following an ignition OFF/ON cycle after rectification).

4 . If the cause is not visually evident and the Jaguar approved diagnostic system is not available, use a fault code reader to retrieve the fault codes before proceeding to the DTC index, or the symptom chart if no DTCs are set.

5 . Using the Jaguar approved diagnostic system where available, and a scan tool where not, check the freeze frame data for information on the conditions applicable when the fault was flagged. The format of this will vary, depending on the tool used, but can provide information useful to the technician in diagnosing the fault.



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

Symptom	Symptom (specific)	Possible source	Action
---------	--------------------	-----------------	--------

(general)			
Non-Start	Engine does not crank	Security system /Immobilizer engaged Engine in shut-down mode ECM relay Battery Park/Neutral switch Starting system Harness Engine seized	Check for DTCS. Contact dealer technical support for information on security system. For starting system, For ECM relay tests, GO to Pinpoint Test G258127p32. For battery information, Battery For Park/Neutral tests, External Controls For engine information, Engine
	Engine cranks, but does not fire	Engine breather system disconnected/restricted Ignition system Fuel system Harness CKP sensor ECM fault	Check engine breather system, Engine Emission Control - VIN Range: G00442->G45703 For ignition system, Engine Ignition - VIN Range: G00442->G45703 For fuel system, Fuel Charging and Controls - VIN Range: G00442->G45703 For CKP tests, GO to Pinpoint Test G258127p17. Contact dealer technical support for advice on possible ECM failure.
	Engine cranks and fires, but will not start	Purge valve Fuel pump Coolant temperature sensor Spark plugs Check for water ingress into spark plug wells HT short to ground (tracking) check rubber boots for	For evaporative emissions components, Evaporative Emissions - VIN Range: G00442->G45703 For fuel system, Fuel Charging and Controls - VIN Range: G45704->G99999 For ECT sensor tests, GO to Pinpoint Test G258127p3. For ignition system, Engine Ignition - VIN Range: G00442->G45703

		cracks/damage Ignition coil failure(s) Harness	
Difficult to start	Difficult to start cold	Check coolant anti-freeze content Battery CKP sensor EGR valve stuck open Fuel pump Coolant temperature sensor Purge valve	For battery information, Battery For CKP sensor tests, GO to Pinpoint Test G258127p17. For EGR system information, Engine Emission Control - VIN Range: G00442->G45703 For fuel system, Fuel Charging and Controls - VIN Range: G00442->G45703 For ECT sensor tests, GO to Pinpoint Test G258127p3. For evaporative emissions components, Evaporative Emissions - VIN Range: G00442->G45703
	Difficult to start hot	Injector leak Fuel temperature sensor IAT sensor MAF sensor Purge valve Fuel pump Ignition system Coolant temperature sensor	For fuel system, Fuel Charging and Controls - VIN Range: G00442->G45703 For fuel temperature sensor tests, GO to Pinpoint Test G258127p34. For IAT sensor tests, GO to Pinpoint Test G258127p2. For MAF sensor tests, GO to Pinpoint Test G258127p1. For evaporative emissions components, Evaporative Emissions - VIN Range: G00442->G45703 For ECT sensor tests, GO to Pinpoint Test G258127p3.
	Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)	Injector leak Fuel temperature sensor IAT sensor	For fuel system, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G45704->G99999 For fuel temperature sensor

		<p>MAF sensor</p> <p>Purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>Coolant temperature sensor</p>	<p>tests, GO to Pinpoint Test G258127p34.</p> <p>For IAT sensor tests, GO to Pinpoint Test G258127p2.</p> <p>For MAF sensor tests, GO to Pinpoint Test G258127p1.</p> <p>For evaporative emissions components, Evaporative Emissions - VIN Range: G00442->G45703 For ECT sensor tests, GO to Pinpoint Test G258127p3.</p>
	Engine cranks too fast/slow	<p>Compressions high/low</p> <p>Battery</p> <p>Starting system</p>	<p>Check compressions, Engine For battery information, Battery For starting system,</p>
Engine stalls	Engine stalls soon after start	<p>Breather system disconnected/restricted</p> <p>ECM relay</p> <p>Harness</p> <p>MAF sensor</p> <p>Coolant temperature sensor</p> <p>Ignition system</p> <p>Air filter restricted</p> <p>Fuel lines</p> <p>Fuel pressure sensor</p> <p>Air leakage</p>	<p>For breather system, Engine Emission Control - VIN Range: G00442->G45703 For ECM relay tests, GO to Pinpoint Test G258127p32.</p> <p>For MAF sensor tests, GO to Pinpoint Test G258127p1.</p> <p>For ECT sensor tests, GO to Pinpoint Test G258127p3.</p> <p>For ignition system, Engine Ignition - VIN Range: G00442->G45703 For air filter information, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For fuel system, fuel pressure sensor tests, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G45704->G99999 For intake system information, Intake Air Distribution and Filtering - VIN Range: G00442->G45703</p>

	Engine stalls on overrun	ECM relay Throttle sensors	For ECM relay tests, GO to Pinpoint Test G258127p32. For throttle sensor tests, GO to Pinpoint Test G258127p4. For fuel system, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G45704->G99999
	Engine stalls at steady speed	ECM relay CKP sensor Throttle sensors Harness	For ECM relay tests, GO to Pinpoint Test G258127p32. For fuel system, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G45704->G99999 For CKP sensor tests, GO to Pinpoint Test G258127p17. For throttle sensor tests, GO to Pinpoint Test G258127p4.
	Engine stalls with speed control enabled	ECM relay Harness	For ECM relay tests, GO to Pinpoint Test G258127p32.
	Engine stalls when maneuvering	ECM relay Throttle sensors Additional engine loads (PAS, air conditioning, etc) Transmission malfunction CAN network malfunction	For ECM relay tests, GO to Pinpoint Test G258127p32. For throttle position sensor tests, GO to Pinpoint Test G258127p4. For accessory drive information, For transmission information, For CAN network tests, Communications Network
Poor driveability	Engine hesitates/poor acceleration	Fuel pump Injector leak Fuel pressure Fuel lines Air leakage	For fuel pump, fuel pressure sensor, fuel line and injector tests, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G45704->G99999 For intake system, Intake Air Distribution and

		<p>Throttle sensors</p> <p>Throttle motor</p> <p>Ignition system</p> <p>Exhaust gas recirculation</p> <p>HO2 sensors</p> <p>Transmission malfunction</p> <p>Restricted pedal travel (carpet, etc)</p> <p>APP sensor</p>	<p>Filtering - VIN Range: G00442->G45703 For throttle position sensor tests, GO to Pinpoint Test G258127p4.</p> <p>For throttle motor tests, GO to Pinpoint Test G258127p24.</p> <p>For ignition system, Engine Ignition - VIN Range: G00442->G45703 For exhaust gas recirculation, Engine Emission Control - VIN Range: G00442->G45703 Check for DTCs relating to HO2 sensors. Refer to the DTC index for pinpoint tests for DTC set.</p> <p>For transmission information, Check accelerator pedal travel.</p> <p>For APP sensor tests, GO to Pinpoint Test G258127p22. and GO to Pinpoint Test G258127p23.</p>
	Engine backfires	<p>Fuel pump</p> <p>Fuel lines</p> <p>Air leakage</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Ignition system</p> <p>Sticking VCT hub</p> <p>APP sensor</p>	<p>For fuel pump and lines tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 For intake system, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For MAF sensor tests, GO to Pinpoint Test G258127p1.</p> <p>Check for DTCs relating to HO2 sensors. Refer to the DTC index for pinpoint tests for DTC set.</p> <p>For ignition system, Engine Ignition - VIN Range: G00442->G45703 For VCT information, Engine For APP sensor tests, GO to Pinpoint Test G258127p22. and GO to Pinpoint Test</p>

			G258127p23.
	Engine surges	<p>Fuel pump</p> <p>Fuel lines</p> <p>MAF sensor</p> <p>Harness</p> <p>Throttle sensors</p> <p>Throttle motor</p> <p>Ignition system</p>	<p>Check fuel pressure. For fuel line information,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 For MAF sensor, throttle sensor, and throttle motor relay tests,</p> <p>Electronic Engine Controls - VIN Range: G00442->G45703 For ignition system,</p> <p>Engine Ignition - VIN Range: G00442->G45703</p>
	Engine detonates/knocks	<p>KS/circuit malfunction</p> <p>Fuel pump</p> <p>Fuel lines</p> <p>Fuel pressure sensor</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Air leakage</p> <p>Sticking VCT hub</p> <p>BARO sensor malfunction</p>	<p>For KS circuit tests, GO to Pinpoint Test G258127p15. and GO to Pinpoint Test G258127p16.</p> <p>Check fuel pressure. For fuel line information,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 For fuel pressure sensor,</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p> <p>Fuel Charging and Controls - VIN Range: G45704->G99999</p> <p>For MAF sensor tests, GO to Pinpoint Test G258127p1.</p> <p>Check for DTCs relating to HO2 sensors. Refer to the DTC index for pinpoint tests for DTC set.</p> <p>For intake system,</p> <p>Intake Air Distribution and Filtering - VIN Range: G00442->G45703 Check DTCs for VCT range/performance fault. For VCT information,</p> <p>Engine For BARO sensor,</p>

			contact dealer technical support for advice on possible ECM failure
	No throttle response	APP sensor malfunction Throttle sensors Throttle motor	For APP sensor tests, GO to Pinpoint Test G258127p22. and GO to Pinpoint Test G258127p23. For throttle position sensor tests, GO to Pinpoint Test G258127p4. For throttle motor tests, GO to Pinpoint Test G258127p24.
	Speed control inhibited or disabled	Default mode enabled Speed control switch Throttle sensors Stop light switch	Check message center for default message. For speed control switches, Speed Control - VIN Range: G00442->G45703 For throttle position sensor tests, GO to Pinpoint Test G258127p4. Check electrical guides for stop light switch information.
	Poor throttle response	APP sensor malfunction Throttle sensors Coolant temperature sensor MAF sensor Transmission malfunction Traction control event Air leakage Breather system disconnected/restricted	For APP sensor tests, GO to Pinpoint Test G258127p22. and GO to Pinpoint Test G258127p23. For throttle position sensor tests, GO to Pinpoint Test G258127p4. For ECT sensor tests, GO to Pinpoint Test G258127p3. For MAF sensor tests, GO to Pinpoint Test G258127p1. For transmission information, For intake system, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For breather system information, Engine Emission Control - VIN Range: G00442->G45703

	Engine defaults, warning light and messages. Refer to the driver information table	Park/Neutral switch Throttle sensors MAF sensor Coolant temperature sensor Harness	For Park/Neutral tests, External Controls For throttle position sensor tests, GO to Pinpoint Test G258127p4. For MAF sensor tests, GO to Pinpoint Test G258127p1. For ECT sensor tests, GO to Pinpoint Test G258127p3.
--	--	--	--

Driver Information Chart

Warning light	Message	Default Mode	DTC
Red	Engine systems fault	Engine shut-down (all cylinders fuel cut)	P1224
Red	Engine systems fault	Limp-Home	P1229
Red	Engine systems fault	Limp-Home	P0121, P0122, P0123, P0222, P0223
Red	Engine systems fault	Limp-Home	P1251, P1631
Red	Engine systems fault	Limp-Home	P1611
Red	Engine systems fault	Limp-Home	P1633
Red	Engine systems fault	High idle	P1344, P1122, P1123, P1215, P1216
Red	Restricted Performance	Limp-Home unavailable	P1254
Red	Restricted Performance	Limp-Home unavailable	P1250
Red	Restricted Performance	Safety redundancy	P1657, P1658
Red	Restricted Performance	Safety redundancy	P1634
Amber	Restricted Performance	Engine speed limited	P0116, P0117, P0118, P0125
Amber	Restricted Performance	Engine speed limited	P0101, P0102, P0103, P0104
Amber	Restricted Performance	Engine speed limited	P0300, P0301, P0302, P0303,

			P0304, P0305, P0306, P0307, P0308, P1313, P1314
Amber	Restricted Performance	Engine speed limited	P0327, P0328, P0332, P0333, P1648
Amber	Restricted Performance	Engine speed limited	P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358, P1367, P1368
Amber	Restricted Performance	Engine speed limited	P0171, P0172, P0174, P0175
Amber	Restricted Performance	Engine speed limited	P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208
Amber	Restricted Performance	Engine speed limited	P0335, P0336
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P1642
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P1643
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P0096, P0097, P0098
Amber	Restricted Performance	Engine speed limited, Reverse throttle progression enabled	P1474
Amber	Restricted Performance	Engine speed limited	P1234, P1236, P1338
Amber	None	None	P0506, P0507
Amber	None	None	P1656
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0725
Amber	Gearbox fault/Restricted	Gearbox default to set gear	P1796

	performance		
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0701
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P1603
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0605
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P1719
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0720
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0715
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0705
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0610
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0606
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0750
Amber	Gearbox fault/Restricted	Gearbox default to set gear	P0753

	performance		
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0755
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0758
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0760
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0763
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0765
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0768
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0770
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0773
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0740
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0743
Amber	Gearbox fault/Restricted	Gearbox default to set gear	P0787

	performance		
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0788
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0730
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0731
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0732
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0733
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0734
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0735
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0729
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0781
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0782
Amber	Gearbox fault/Restricted	Gearbox default to set gear	P0783

	performance		
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0784
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0829
Amber	Gearbox fault/Restricted performance	Engine speed limited, reverse throttle progression enabled	P1797
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0641
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0651
Amber	Gearbox fault/Restricted performance	Gearbox default to set gear	P0860
Amber	Gearbox fault/Restricted performance	Limp-home	P1783

Default mode Definitions

LIMP-HOME MODE

Throttle motor off

Throttle motor relay off

Throttle motor circuit off

Fuel intervention

Speed control inhibited

LIMP-HOME UNAVAILABLE

Power limitation

Vehicle speed limited to 120 kph

Reverse throttle progression enabled

Speed control inhibited

REVERSE THROTTLE PROGRESSION

Throttle opening limited to maximum 30%

NOTE:

The throttle operation uses the same map as for reverse gear.

ENGINE SPEED LIMITED

Engine runs normally, up to 3000 rpm

Engine speed restricted to 3000 rpm maximum, by fuel cut-off

HIGH IDLE

Throttle valve kept in fixed position by motor

Speed control inhibited

SAFETY REDUNDANCY

Power limitation

Vehicle speed limited to 120 kph

Reverse throttle progression enabled

Speed control inhibited

DTC index

DTC	Description	Possible Source	Action
P0010	Right-hand variable camshaft timing (VCT) circuit malfunction	VCT solenoid control valve disconnected VCT solenoid valve to ECM PWM drive circuit; open circuit, short circuit, high resistance	For right-hand VCT tests, GO to Pinpoint Test G258127p29.

		VCT solenoid failure	
P0020	Left-hand variable camshaft timing (VCT) circuit malfunction	<p>VCT solenoid control valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit; open circuit, short circuit, high resistance</p> <p>VCT solenoid failure</p>	For left-hand VCT tests, GO to Pinpoint Test G258127p30.
P0031	Right-hand HO2S heater control circuit, low current	<p>HO2S heater power supply circuit open circuit</p> <p>HO2S heater control circuit open circuit, high resistance</p> <p>HO2S heater ground circuit fault (EM80, pin 29; EM80, pin 30)</p> <p>HO2S heater failure</p> <p>HO2S connections</p>	For HO2S tests, GO to Pinpoint Test G258127p7.
P0032	Right-hand HO2S heater control circuit, high current	<p>HO2S heater control circuit short circuit to ground</p> <p>HO2S heater ground circuit fault (EM80, pin 29; EM80, pin 30)</p> <p>HO2S heater failure</p> <p>HO2S connections</p>	For HO2S tests, GO to Pinpoint Test G258127p7.
P0037	Right-hand catalyst monitor sensor heater control circuit, low resistance	<p>Catalyst monitor sensor heater control circuit short circuit to ground</p> <p>Catalyst monitor sensor heater failure</p> <p>Catalyst monitor sensor connections</p>	For catalyst monitor sensor tests, GO to Pinpoint Test G258127p9.
P0038	Right-hand catalyst monitor sensor heater control circuit, high resistance	<p>Catalyst monitor sensor heater control circuit open circuit, high resistance</p> <p>Catalyst monitor sensor</p>	For catalyst monitor sensor tests, GO to Pinpoint Test G258127p9.

		<p>heater failure</p> <p>Catalyst monitor sensor connections</p>	
P0051	Left-hand HO2S heater control circuit low current	<p>HO2S heater power supply circuit open circuit</p> <p>HO2S heater control circuit open circuit, high resistance</p> <p>HO2S heater ground circuit fault (EM80, pin 81; EM80, pin 82)</p> <p>HO2S connections</p> <p>HO2S heater failure</p>	For heater control tests, GO to Pinpoint Test G258127p11.
P0052	Left-hand HO2S heater control circuit, high current	<p>HO2S heater control circuit short circuit to ground</p> <p>HO2S heater ground circuit fault (EM80, pin 81; EM80, pin 82)</p> <p>HO2S heater failure</p>	For heater control tests, GO to Pinpoint Test G258127p11.
P0057	Left-hand catalyst monitor sensor heater control circuit, low resistance	<p>Catalyst monitor sensor heater control circuit short circuit to ground</p> <p>Catalyst monitor sensor heater failure</p>	For heater control circuit tests, GO to Pinpoint Test G258127p12.
P0058	Left-hand catalyst monitor sensor heater control circuit, high resistance	<p>Catalyst monitor sensor heater control circuit open circuit, high resistance</p> <p>Catalyst monitor sensor heater failure</p>	For heater control circuit tests, GO to Pinpoint Test G258127p12.
P0096	Intake Air Temperature 2 (IAT2) sensor circuit range/performance	<p>IAT2 sensor disconnected</p> <p>IAT2 sensor to ECM sensing circuit; open circuit</p> <p>IAT2 sensor failure</p>	For IAT2 sensor circuit tests, GO to Pinpoint Test G258127p37.
P0097	Intake Air Temperature 2 (IAT2) sensor circuit high voltage (low air	<p>IAT2 sensor disconnected</p> <p>IAT2 sensor to ECM wiring; open circuit, high</p>	For IAT2 sensor circuit tests, GO to Pinpoint Test G258127p37.

	temperature)	<p>resistance</p> <p>IAT2 sensor to ECM sensing circuit; short circuit to B+</p> <p>IAT2 sensor failure</p>	
P0098	Intake Air Temperature 2 (IAT2) sensor circuit low voltage (high air temperature)	<p>IAT2 sensor to ECM wiring; short circuit to ground</p> <p>IAT2 sensor failure</p>	For IAT2 sensor circuit tests, GO to Pinpoint Test G258127p37.
P0101	Mass air flow (MAF) sensor circuit range/performance	<p>Blocked air filter</p> <p>Air intake leak</p> <p>Engine breather leak</p> <p>Throttle control malfunction</p> <p>MAF sensor to ECM sensing circuit; high resistance, intermittent short circuit to ground</p> <p>MAF sensor supply circuit; high resistance</p> <p>MAF sensor failure</p> <p>Throttle adaptation fault (check throttle position voltage at ignition ON)</p>	<p>Check air filter element, air intake system for leaks. For further information, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 Check engine breather system. For further information, Engine Emission Control - VIN Range: G00442->G45703 Check for associated codes related to throttle control. For MAF sensor tests, GO to Pinpoint Test G258127p1.</p> <p>Throttle adaptation is automatic at key on.</p>
P0102	Mass air flow (MAF) sensor circuit low voltage	<p>Blocked air filter</p> <p>Air intake leak between MAF sensor and throttle</p> <p>MAF sensor to ECM sensing circuit; high resistance, open circuit, intermittent short circuit to ground</p> <p>MAF sensor supply circuit; open circuit, short circuit to ground</p> <p>MAF sensor failure</p>	<p>Check air filter element, air intake system for leaks. For further information, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For MAF sensor tests, GO to Pinpoint Test G258127p1.</p>

P0103	Mass air flow (MAF) sensor sensing circuit high voltage	MAF sensor to ECM sensing circuit; short circuit to B+ voltage MAF sensor to ECM ground circuit; open circuit MAF sensor failure	For MAF sensor tests, GO to Pinpoint Test G258127p1.
P0105	Manifold absolute pressure (MAP) sensor range/performance	Intake manifold air leak (loose or missing component) MAP sensor to ECM circuit(s) fault MAP sensor failure Throttle adaptation fault (check throttle position voltage at ignition ON)	Check air intake system. For further information, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For MAP sensor circuit tests, GO to Pinpoint Test G258127p33. Throttle adaptation is automatic at key on.
P0106	BARO sensor circuit range/performance	BARO failure (internal ECM fault)	Contact dealer technical support for advice on possible ECM failure.
P0107	BARO sensor circuit, low voltage	BARO failure (internal ECM fault)	Contact dealer technical support for advice on possible ECM failure.
P0108	BARO circuit, high voltage	BARO failure (internal ECM fault)	Contact dealer technical support for advice on possible ECM failure.
P0111	Intake air temperature (IAT) sensor range/performance	Blocked air filter Air intake leak Engine breather leak IAT sensor to ECM wiring; open circuit or high resistance IAT sensor to ECM sensing circuit; short circuit to high voltage IAT sensor failure	Check air filter element, air intake system for leaks. For further information, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 Check engine breather system. For further information, Engine Emission Control - VIN Range: G00442->G45703 For IAT sensor tests, GO to Pinpoint Test G258127p2.

P0112	Intake air temperature (IAT) sensor circuit high voltage (low air temperature)	<p>IAT sensor disconnected</p> <p>IAT sensor to ECM wiring; open circuit or high resistance</p> <p>IAT sensor to ECM sensing circuit short circuit to B+ voltage</p> <p>IAT sensor failure</p>	For IAT sensor tests, GO to Pinpoint Test G258127p2.
P0113	Intake air temperature (IAT) sensor circuit low voltage (high air temperature)	<p>IAT sensor to ECM wiring short circuit to ground</p> <p>IAT sensor failure</p>	For IAT sensor tests, GO to Pinpoint Test G258127p2.
P0116	Engine coolant temperature (ECT) sensor circuit range/performance	<p>ECT sensor disconnected</p> <p>Low coolant level</p> <p>Contaminated coolant</p> <p>Thermostat failure</p> <p>ECT sensor to ECM sensing circuit; open circuit, high resistance when hot, intermittent high resistance</p> <p>ECT sensor failure</p> <p>Engine cooling fan stuck on high speed</p> <p>Above normal air flow through engine compartment, due to accident damage and/or missing panels</p>	<p>Refer to visual inspection table in this section, check sensor connections, coolant level and condition, thermostat operation.</p> <p>For ECT sensor tests, GO to Pinpoint Test G258127p3.</p>
P0117	Engine coolant temperature (ECT) sensor sensing circuit high voltage (low coolant temperature)	<p>ECT sensor disconnected</p> <p>ECT sensor to ECM sensing circuit; high resistance, open circuit, short circuit to B+ voltage</p> <p>ECT sensor failure</p>	For ECT sensor tests, GO to Pinpoint Test G258127p3.

P0118	Engine coolant temperature (ECT) sensor sensing circuit low voltage (high coolant temperature)	Engine overheat condition ECT sensor to ECM wiring short circuit to ground ECT sensor failure	Check for overheating, for further information, Engine Cooling For ECT sensor tests, GO to Pinpoint Test G258127p3.
P0121	Throttle position (TP) sensor circuit range/performance (TP1 compared to TP2)	TP sensor to ECM wiring; open circuit, high resistance TP sensor to ECM sensing circuits; (TP 1 or TP 2) short circuit to B+ voltage TP sensor failure	For TP sensor tests, GO to Pinpoint Test G258127p4.
P0122	Throttle position (TP) sensor circuit 1 low voltage	TP sensor to ECM sensing circuit (TP1); open circuit, short circuit to ground, high resistance TP sensor failure	For TP sensor tests, GO to Pinpoint Test G258127p4.
P0123	Throttle position (TP) sensor circuit 1 high voltage	TP sensor to ECM sensing circuit (TP1); short circuit to high voltage TP sensor failure	For TP sensor tests, GO to Pinpoint Test G258127p4.
P0125	Engine coolant temperature (ECT) sensor response (for closed loop fuel control) (coolant thermostat monitor)	ECT sensor disconnected Low coolant level Contaminated coolant Thermostat failure ECT sensor to ECM sensing circuit; high resistance, open circuit or short circuit to high voltage Engine cooling fan stuck on high speed Above normal air flow through engine compartment, due to accident damage and/or missing panels	Refer to visual inspection table in this section, check sensor connections, coolant level and condition, thermostat operation. For ECT sensor tests, GO to Pinpoint Test G258127p3. Check for associated codes related to cooling fan. Check the vehicle for panel damage.

P0128	Coolant thermostat range/performance	<p>Contaminated coolant</p> <p>Engine coolant thermostat failure</p> <p>ECT sensor failure</p> <p>ECT sensor DTC may also be flagged</p>	<p>Check coolant level and condition, check thermostat operation,</p> <p>Engine Cooling Check for associated codes related to ECT sensor.</p>
P0131	Right-hand HO2S sensing circuit low current (universal oxygen sensor; lean condition at ECM - high current at sensor)	<p>HO2S disconnected</p> <p>HO2S to ECM variable current circuit fault (HO2S pin 3)</p> <p>ECM to HO2S constant current circuit fault (HO2S pin 4)</p> <p>HO2S failure</p>	<p>For HO2S tests, GO to Pinpoint Test G258127p6.</p>
P0132	Right-hand HO2S sensing circuit high current (universal oxygen sensor; rich condition at ECM - low current at sensor)	<p>HO2S disconnected</p> <p>HO2S to ECM variable current circuit fault (HO2S pin 3)</p> <p>ECM to HO2S constant current circuit fault (HO2S pin 4)</p> <p>HO2S failure</p>	<p>For HO2S tests, GO to Pinpoint Test G258127p6.</p>
P0133	Right-hand HO2S sensing circuit slow response	<p>Engine misfire</p> <p>HO2S disconnected</p> <p>HO2S mechanical damage</p> <p>HO2S to ECM wiring fault</p> <p>HO2S short circuit to ground</p> <p>HO2S to ECM wiring shield open circuit</p> <p>HO2S heater circuit fault</p> <p>HO2S failure</p>	<p>Check for associated codes related to misfire, (P0300 to P0308) inspect the HO2S for connection/damage. For HO2S diagnosis, GO to Pinpoint Test G258127p6.</p> <p>For HO2S heater diagnosis, GO to Pinpoint Test G258127p9.</p> <p>Check for exhaust leak, for further information, Exhaust temperature will be low if misfire/poor fuel supply condition exists. Catalytic converter efficiency will be poor until it reaches "light-off".</p>

		<p>Exhaust leak</p> <p>Catalyst efficiency decrease</p> <p>Low exhaust temperature</p> <p>Injector flow partially blocked</p>	
P0137	Right-hand catalyst monitor sensor sensing circuit low voltage	<p>Catalyst monitor sensor disconnected</p> <p>Catalyst monitor sensor to ECM wiring open circuit</p> <p>Catalyst monitor sensor short circuit to ground</p> <p>Catalyst monitor sensor failure</p>	For catalyst monitor sensor tests, GO to Pinpoint Test G258127p8.
P0138	Right-hand catalyst monitor sensor sensing circuit high voltage	<p>Catalyst monitor sensor sensing circuit short circuit to high voltage</p> <p>Catalyst monitor sensor ground braided shield open circuit</p> <p>Catalyst monitor sensor failure</p>	For catalyst monitor sensor tests, GO to Pinpoint Test G258127p8.
P0140	Right-hand catalyst monitor sensor sensing circuit no activity	<p>Catalyst monitor sensor disconnected</p> <p>Catalyst monitor sensor mechanical damage</p> <p>Catalyst monitor sensor to ECM wiring open circuit</p> <p>Catalyst monitor sensor sensing circuit short circuit to high voltage</p> <p>Catalyst monitor sensor RH short circuit to ground</p> <p>Catalyst monitor sensor ground braided shield open circuit</p>	<p>Inspect the HO2S for connection/damage. For HO2S sensor diagnosis, GO to Pinpoint Test G258127p8.</p> <p>Check for exhaust leak, for further information, Exhaust temperature will be low if misfire/poor fuel supply condition exists. Catalytic converter efficiency will be poor until it reaches "light-off".</p>

		Exhaust leak Low exhaust temperature Catalyst monitor sensor failure	
P0151	Left-hand H02S sensing circuit low current (universal oxygen sensor; lean condition at ECM - high current at sensor)	H02S disconnected H02S to ECM variable current circuit fault (H02S pin 3) ECM to H02S constant current circuit fault (H02S pin 4) H02S failure	For H02S tests, GO to Pinpoint Test G258127p10.
P0152	Left-hand H02S sensing circuit high current (universal oxygen sensor; rich condition at ECM - low current at sensor)	H02S disconnected H02S to ECM variable current circuit fault (H02S pin 3) ECM to H02S constant current circuit fault (H02S pin 4) H02S failure	For H02S tests, GO to Pinpoint Test G258127p10.
P0153	Left-hand H02S sensing circuit slow response	Engine misfire H02S disconnected H02S mechanical damage H02S to ECM wiring fault H02S short circuit to ground H02S to ECM wiring shield open circuit H02S heater circuit fault H02S failure Exhaust leak Catalyst efficiency decrease	Check for associated codes related to misfire, (P0300 to P0308) inspect the H02S for connection/damage. For H02S sensor tests, GO to Pinpoint Test G258127p10. Check for exhaust leak, for further information, Exhaust temperature will be low if misfire/poor fuel supply condition exists. Catalytic converter efficiency will be poor until it reaches "light-off".

		<p>Low exhaust temperature</p> <p>Injector flow partially blocked</p>	
P0157	Left-hand catalyst monitor sensor sensing circuit low voltage	<p>Catalyst monitor sensor disconnected</p> <p>Catalyst monitor sensor to ECM wiring open circuit</p> <p>Catalyst monitor sensor short circuit to ground</p> <p>Catalyst monitor sensor failure</p>	For catalyst monitor sensor tests, GO to Pinpoint Test G258127p14.
P0158	Left-hand catalyst monitor sensor sensing circuit high voltage	<p>Catalyst monitor sensor sensing circuit; short circuit to high voltage</p> <p>Catalyst monitor sensor ground braided shield open circuit</p> <p>Catalyst monitor sensor failure</p>	For catalyst monitor sensor tests, GO to Pinpoint Test G258127p14.
P0160	Left-hand catalyst monitor sensor sensing circuit no activity	<p>Catalyst monitor sensor disconnected</p> <p>Catalyst monitor sensor mechanical damage</p> <p>Catalyst monitor sensor to ECM wiring open circuit</p> <p>Catalyst monitor sensor sensing circuit short circuit to high voltage</p> <p>Catalyst monitor sensor LH short circuit to ground</p> <p>Catalyst monitor sensor ground braided shield open circuit</p> <p>Exhaust leak</p> <p>Low exhaust temperature</p> <p>Catalyst monitor sensor</p>	<p>Inspect the HO2S for connection/damage. For HO2S sensor diagnosis, GO to Pinpoint Test G258127p14.</p> <p>Check for exhaust leak, for further information, Exhaust temperature will be low if misfire/poor fuel supply condition exists. Catalytic converter efficiency will be poor until it reaches "light-off".</p>

		failure	
P0171	Right-hand cylinders combustion too lean	<p>Air intake leak between mass air flow (MAF) sensor and cylinder head</p> <p>Fuel injector restriction</p> <p>Fuel filter/system restriction</p> <p>Low fuel pump output</p> <p>Fuel pressure (IP) sensor failure (low fuel pressure)</p> <p>HO2S/Catalyst monitor sensor harness wiring condition fault</p> <p>Fuel temperature (EFT) sensor fault (low fuel temperature)</p> <p>MAF sensor fault (low intake air flow)</p> <p>Exhaust leak (before catalyst)</p> <p>ECM receiving incorrect signal from one or more of the following sensors; ECT, MAF*, IAT, IP, EFT, TP</p>	<p>For intake system, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For fuel injector, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703 For fuel filter and pump, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 For fuel pressure sensor, Fuel Charging and Controls - VIN Range: G00442->G45703 For HO2S/Catalyst monitor sensor tests, GO to Pinpoint Test G258127p6. GO to Pinpoint Test G258127p9. GO to Pinpoint Test G258127p8. For exhaust system, Refer to individual pinpoint tests for sensors listed. * If this DTC is flagged, pay particular attention to the MAF sensor.</p>
P0172	Right-hand cylinders combustion too rich	<p>Engine misfire</p> <p>Restricted air filter</p> <p>Leaking fuel injector(s)</p> <p>Fuel pressure (IP) sensor failure (high fuel pressure)</p> <p>Fuel temperature (EFT) sensor fault (high fuel temperature)</p> <p>MAF sensor fault (high</p>	<p>Check for "misfire detected" DTCs (P0300 to P0308) in this section. For intake system, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For fuel injectors, fuel pressure sensor, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703 Refer to individual pinpoint tests for</p>

		<p>intake air flow)</p> <p>HO2S/Catalyst monitor sensor harness wiring condition fault</p> <p>ECM receiving incorrect signal from one or more of the following sensors; ECT, MAF, IAT, IP, EFT, TP</p>	sensors and circuits listed.
P0174	Left-hand cylinders combustion too lean	<p>Air intake leak between MAF sensor and cylinder head</p> <p>Fuel filter/system restriction</p> <p>Fuel injector restriction</p> <p>Fuel pressure (IP) sensor failure (low fuel pressure)</p> <p>Low fuel pump output</p> <p>HO2S/Catalyst monitor sensor harness wiring condition fault</p> <p>Fuel temperature (EFT) sensor fault (low fuel temperature)</p> <p>MAF sensor fault (low intake air flow)</p> <p>Exhaust leak (before catalyst)</p> <p>ECM receiving incorrect signal from one or more of the following sensors - ECT, MAF*, IAT, IP, EFT, TP.</p>	<p>For intake system, Intake Air Distribution and Filtering - VIN Range: G00442->G45703 For fuel injector, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703 For fuel filter and pump, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 For fuel pressure sensor, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703 For HO2S/Catalyst monitor sensor tests, GO to Pinpoint Test G258127p10. GO to Pinpoint Test G258127p11. GO to Pinpoint Test G258127p12. For exhaust system, Refer to individual pinpoint tests for sensors listed. * If this DTC is flagged, pay particular attention to the MAF sensor.</p>
P0175	Left-hand cylinders combustion too rich	<p>Engine misfire</p> <p>Restricted air filter</p>	Check for "misfire detected" DTCs (P0300 to P0308) in this section. For intake system, Intake Air Distribution and

		<p>Leaking fuel injector(s)</p> <p>Fuel pressure (IP) sensor failure (high fuel pressure)</p> <p>Fuel temperature (EFT) sensor fault (high fuel temperature)</p> <p>MAF sensor fault (high intake air flow)</p> <p>HO2S/Catalyst monitor sensor harness wiring condition fault</p> <p>ECM receiving incorrect signal from one or more of the following sensors; ECT, MAF, IAT, IP, EFT, TP</p>	<p>Filtering - VIN Range: G00442->G45703 For fuel injectors, fuel pressure sensor, Fuel Charging and Controls - VIN Range: G00442->G45703</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703 Refer to individual pinpoint tests for sensors and circuits listed.</p>
P0181	Engine fuel temperature (EFT) sensor range/performance	<p>EFT sensor disconnected</p> <p>EFT sensor to ECM sensing circuit; high resistance, open circuit, short circuit to ground, short circuit to high voltage</p> <p>EFT sensor to splice sensor ground circuit; high resistance, open circuit</p> <p>Above normal air flow through engine compartment, due to accident damage and/or missing panels</p> <p>EFT sensor failure</p>	<p>For EFT sensor sensing circuit tests, GO to Pinpoint Test G258127p34.</p> <p>For sensor ground tests, GO to Pinpoint Test G258127p26. Check the vehicle for panel damage.</p>
P0182	Engine fuel temperature (EFT) sensor circuit low voltage (high temperature)	<p>EFT sensor to ECM sensing circuit; short circuit to ground</p> <p>EFT sensor to splice sensor ground circuit; short circuit</p> <p>EFT sensor failure</p>	<p>For EFT sensor sensing circuit tests, GO to Pinpoint Test G258127p34.</p> <p>For sensor ground tests, GO to Pinpoint Test G258127p26.</p>

P0183	Engine fuel temperature (EFT) sensor circuit high voltage (low temperature)	<p>EFT sensor disconnected</p> <p>EFT sensor to ECM sensing circuit; high resistance, open circuit, short circuit to high voltage</p> <p>EFT sensor to splice sensor ground circuit; high resistance, open circuit</p> <p>EFT sensor failure</p>	<p>For EFT sensor sensing circuit tests, GO to Pinpoint Test G258127p34.</p> <p>For sensor ground tests, GO to Pinpoint Test G258127p26.</p>
P0191	Fuel rail pressure (FRP) sensor circuit range/performance	<p>Fuel filter/system restriction</p> <p>Fuel system leak</p> <p>Incorrect fuel pump output</p> <p>FRP sensor to ECM sensing circuit; high resistance, open circuit, short circuit to ground, short circuit to high voltage</p> <p>FRP sensor to splice in sensor supply circuit; high resistance, open circuit</p> <p>FRP sensor to splice in sensor ground circuit; high resistance, open circuit, short circuit to ground, short circuit to high voltage</p> <p>FRP sensor failure</p>	<p>For fuel filter, pump and lines, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 For FRP sensor tests, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703</p>
P0192	Fuel rail pressure (FRP) sensor circuit low input	<p>FRP sensor disconnected</p> <p>FRP sensor to ECM sensing circuit; open circuit or short circuit to ground</p> <p>FRP sensor to splice in sensor supply circuit; high resistance, open circuit</p> <p>FRP sensor failure</p>	<p>For FRP sensor tests, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703</p>

P0193	Fuel rail pressure (FRP) sensor circuit high input	FRP sensor to ECM wiring (supply/sense) short circuit to each other FRP sensor to ECM sensing circuit; short circuit to high voltage FRP sensor to splice in sensor ground circuit; open circuit FRP sensor failure	For FRP sensor tests, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703
P0196	Engine oil temperature (EOT) sensor range/performance	EOT sensor to ECM sensing circuit; high resistance when hot, intermittent high resistance EOT sensor failure ECT sensor malfunction	For EOT sensor tests, GO to Pinpoint Test G258127p13. Check for ECT sensor DTCs.
P0197	Engine oil temperature (EOT) sensor low voltage (high oil temperature)	EOT sensor to ECM sensing circuit; short circuit to ground EOT sensor failure	For EOT sensor tests, GO to Pinpoint Test G258127p13. Check for ECT sensor DTCs.
P0198	Engine oil temperature (EOT) sensor high voltage (low oil temperature)	EOT sensor disconnected EOT sensor to ECM sensing circuit; high resistance, open circuit or short circuit to B+ voltage EOT sensor failure	For EOT sensor tests, GO to Pinpoint Test G258127p13. Check for ECT sensor DTCs.
P0201	Fuel injector circuit malfunction, Cyl 1	Injector disconnected Injector wiring open or short circuit Injector failure	Check injector connections. For injector circuit tests, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703
P0202	Fuel injector circuit malfunction, Cyl 2	Injector disconnected Injector wiring open or short circuit Injector failure	Check injector connections. For injector circuit tests, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703

P0203	Fuel injector circuit malfunction, Cyl 3	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>Check injector connections. For injector circuit tests,</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p>
P0204	Fuel injector circuit malfunction, Cyl 4	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>Check injector connections. For injector circuit tests,</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p>
P0205	Fuel injector circuit malfunction, Cyl 5	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>Check injector connections. For injector circuit tests,</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p>
P0206	Fuel injector circuit malfunction, Cyl 6	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>Check injector connections. For injector circuit tests,</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p>
P0207	Fuel injector circuit malfunction, Cyl 7	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>Check injector connections. For injector circuit tests,</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p>
P0208	Fuel injector circuit malfunction, Cyl 8	<p>Injector disconnected</p> <p>Injector wiring open or short circuit</p> <p>Injector failure</p>	<p>Check injector connections. For injector circuit tests,</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p>
P0222	Throttle position (TP) sensor circuit 2 (TP2) low	<p>TP sensor to ECM sensing circuit (TP2); open circuit, short circuit to</p>	<p>For TP sensor tests, GO to Pinpoint Test G258127p5.</p>

	voltage	ground or high resistance TP sensor failure	
P0223	Throttle position (TP) sensor circuit 2 (TP2) high voltage	TP sensor to ECM sensing circuit (TP2); short circuit to high voltage TP sensor failure	For TP sensor tests, GO to Pinpoint Test G258127p5.
P0300	Random misfire detected	ECM to ignition coil primary circuit faults (cylinder misfire detected DTCs also logged) Fuel injector circuit fault(s) (injector DTCs also logged) Ignition coil failure Spark plug failure/fouled/incorrect gap Cylinder compression low Fuel delivery pressure (low/high) Fuel injectors restricted/leaking Fuel injectors continuously open Fuel contamination Worn camshaft/broken valve springs Valve clearance adjustment Ignition coil failure	For engine information, Engine For fuel system, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703 For ignition system, Engine Ignition - VIN Range: G00442->G45703
P0301	Misfire detected, Cyl 1	Refer to P0300 possible sources	Refer to P0300 Actions
P0302	Misfire detected, Cyl 2	Refer to P0300 possible sources	Refer to P0300 Actions
P0303	Misfire detected, Cyl 3	Refer to P0300 possible sources	Refer to P0300 Actions

P0304	Misfire detected, Cyl 4	Refer to P0300 possible sources	Refer to P0300 Actions
P0305	Misfire detected, Cyl 5	Refer to P0300 possible sources	Refer to P0300 Actions
P0306	Misfire detected, Cyl 6	Refer to P0300 possible sources	Refer to P0300 Actions
P0307	Misfire detected, Cyl 7	Refer to P0300 possible sources	Refer to P0300 Actions
P0308	Misfire detected, Cyl 8	Refer to P0300 possible sources	Refer to P0300 Actions
P0327	Right-hand knock sensor (KS) sensing circuit out of range (low voltage)	<p>Poor sensor contact with cylinder block</p> <p>KS to ECM sensing circuit; short circuit to ground</p> <p>KS failure</p>	Check KS for correct fitment, REFER to Knock sensor (KS) in this section. For KS tests, GO to Pinpoint Test G258127p15.
P0328	Right-hand knock sensor (KS) sensing circuit out of range (high voltage)	<p>Poor sensor contact with cylinder block</p> <p>KS to ECM sensing circuit; high resistance, open circuit, short circuit to high voltage</p> <p>KS failure</p>	Check KS for correct fitment, For KS tests, GO to Pinpoint Test G258127p15.
P0332	Left-hand knock sensor (KS) sensing circuit out of range (low voltage)	<p>Poor sensor contact with cylinder block</p> <p>KS to ECM sensing circuit; short circuit to ground</p> <p>KS failure</p>	Check KS for correct fitment, For KS tests, GO to Pinpoint Test G258127p16.
P0333	Left-hand knock sensor (KS) sensing circuit out of range (high voltage)	<p>Poor sensor contact with cylinder block</p> <p>KS to ECM sensing circuit; high resistance, open circuit, short circuit to high voltage</p> <p>KS failure</p>	Check KS for correct fitment, REFER to Knock sensor (KS) in this section. For KS tests, GO to Pinpoint Test G258127p16.
P0335	Crankshaft position (CKP) sensor circuit malfunction	<p>CKP sensor disconnected</p> <p>CKP sensor gap incorrect/foreign matter on sensor face</p>	For CKP sensor tests, GO to Pinpoint Test G258127p17.

		<p>CKP sensor sensing circuit; open circuit, short circuit to ground, short circuit to high voltage</p> <p>CKP sensor failure</p>	
P0336	Crankshaft position (CKP) sensor range/performance	<p>CKP sensor reluctor; foreign matter/damaged teeth</p> <p>CKP sensor sensing circuit; intermittent open circuit, short circuit to ground, short circuit to high voltage</p> <p>CKP sensor failure</p>	For CKP sensor tests, GO to Pinpoint Test G258127p17.
P0340	Right-hand camshaft position (CMP) sensor circuit malfunction	<p>CMP sensor disconnected</p> <p>CMP sensor gap incorrect/foreign matter on sensor face</p> <p>CMP sensor sensing circuit; open circuit, short circuit to ground, short circuit to high voltage</p> <p>CMP sensor failure</p>	For CMP sensor tests, GO to Pinpoint Test G258127p18.
P0341	Right-hand camshaft position (CMP) sensor range/performance	<p>CMP sensor disconnected</p> <p>CMP sensor gap incorrect/foreign matter on face</p> <p>CMP sensor sensing circuit open circuit, short circuit to ground, short circuit to high voltage</p> <p>CMP sensor failure</p>	For CMP sensor tests, GO to Pinpoint Test G258127p18.
P0351	Ignition coil primary circuit malfunction, Cyl 1	<p>ECM to ignition coil primary circuit; open circuit, short circuit to ground, high resistance</p> <p>Ignition coil ground circuit; open circuit, high resistance</p>	For ignition system tests, Engine Ignition - VIN Range: G00442->G45703

		Ignition coil failure	
P0352	Ignition coil primary circuit malfunction, Cyl 2	ECM to ignition coil primary circuit; open circuit, short circuit to ground, high resistance Ignition coil ground circuit; open circuit, high resistance Ignition coil failure	For ignition system tests, Engine Ignition - VIN Range: G00442->G45703
P0353	Ignition coil primary circuit malfunction, Cyl 3	ECM to ignition coil primary circuit; open circuit, short circuit to ground, high resistance Ignition coil ground circuit; open circuit, high resistance Ignition coil failure	For ignition system tests, Engine Ignition - VIN Range: G00442->G45703
P0354	Ignition coil primary circuit malfunction, Cyl 4	ECM to ignition coil primary circuit; open circuit, short circuit to ground, high resistance Ignition coil ground circuit; open circuit, high resistance Ignition coil failure	For ignition system tests, Engine Ignition - VIN Range: G00442->G45703
P0355	Ignition coil primary circuit malfunction, Cyl 5	ECM to ignition coil primary circuit; open circuit, short circuit to ground, high resistance Ignition coil ground circuit; open circuit, high resistance Ignition coil failure	For ignition system tests, Engine Ignition - VIN Range: G00442->G45703
P0356	Ignition coil primary circuit malfunction, Cyl 6	ECM to ignition coil primary circuit; open circuit, short circuit to ground, high resistance Ignition coil ground circuit; open circuit, high	For ignition system tests, Engine Ignition - VIN Range: G00442->G45703

		resistance Ignition coil failure	
P0357	Ignition coil primary circuit malfunction, Cyl 7	ECM to ignition coil primary circuit; open circuit, short circuit to ground, high resistance Ignition coil ground circuit; open circuit, high resistance Ignition coil failure	For ignition system tests, Engine Ignition - VIN Range: G00442->G45703
P0358	Ignition coil primary circuit malfunction, Cyl 8	ECM to ignition coil primary circuit; open circuit, short circuit to ground, high resistance Ignition coil ground circuit; open circuit, high resistance Ignition coil failure	For ignition system tests, Engine Ignition - VIN Range: G00442->G45703
P0400	Exhaust gas recirculation (EGR) flow malfunction	EGR valve incorrectly fitted or loose EGR pipe blocked EGR valve stuck open/closed, blocked EGR valve failure	For EGR system information, Engine Emission Control - VIN Range: G00442->G45703
P0405	Exhaust gas recirculation (EGR) valve drive circuits low voltage	EGR valve power supply circuit; open circuit EGR valve to ECM drive circuit pair (EGR valve pins 1/4, 6/3); open circuit, high resistance EGR valve failure (stepper motor open circuit)	For EGR system information, Engine Emission Control - VIN Range: G00442->G45703
P0406	Exhaust gas recirculation (EGR) valve drive circuits high voltage	EGR valve to ECM drive circuit pair (EGR valve pins 1/4, 6/3); short circuit to ground or high voltage EGR valve failure (stepper	For EGR system information, Engine Emission Control - VIN Range: G00442->G45703

		motor short circuit)	
P0420	Right-hand catalytic converter efficiency below threshold	<p>Catalytic converter failure (melted, fractured)</p> <p>Catalytic converter contaminated (sulphur)</p>	<p>Monitoring conditions</p> <p>Start engine and bring to normal operating temperature</p> <p>Allow to idle for 2 minutes</p> <p>Rev engine to between 2500 and 2700 rpm for 5 minutes</p> <p>Drive vehicle for at least 1 minute (general conditions)</p> <p>Check for DTCs</p> <p>Stop the engine</p> <p>Examine the catalytic converters for damage/contamination. Follow the DTC index for any other codes indicated.</p>
P0430	Left-hand catalytic converter efficiency below threshold	<p>Catalytic converter failure (melted, fractured)</p> <p>Catalytic converter contaminated (sulphur)</p>	<p>Monitoring conditions</p> <p>Start engine and bring to normal operating temperature</p> <p>Allow to idle for 2 minutes</p> <p>Rev engine to between 2500 and 2700 rpm for 5 minutes</p> <p>Drive vehicle for at least 1 minute (general conditions)</p> <p>Check for DTCs</p> <p>Stop the engine</p> <p>Examine the catalytic converters for damage/contamination. Follow the DTC index for any</p>

			other codes indicated.
P0441	Evaporative emissions system (EVAP) incorrect purge flow	<p>EVAP canister purge pipe restricted, leaking, disconnected</p> <p>EVAP canister vent restricted</p> <p>EVAP canister purge valve to engine pipe(s) restricted, leaking, disconnected</p> <p>EVAP canister purge valve failure</p>	For EVAP system components, Evaporative Emissions - VIN Range: G00442->G45703
P0442	Evaporative emissions system (EVAP) leak detected - small (0.040 in)	<p>Fuel cap seal defective</p> <p>EVAP system leak (canister damage, pipework damage)</p> <p>EVAP canister purge valve to ECM drive circuit; open circuit, short circuit, high resistance</p> <p>EVAP canister purge valve power supply circuit; open circuit, short circuit</p> <p>EVAP canister purge valve to engine purge pipe; restricted, leaking, disconnected</p> <p>EVAP canister purge valve operating vacuum hose leak/restriction</p> <p>EVAP canister purge valve failure</p> <p>Fuel tank leak</p>	For EVAP system components, Evaporative Emissions - VIN Range: G00442->G45703
P0443	Evaporative emissions system (EVAP) canister purge valve circuit malfunction	EVAP canister purge valve to ECM drive circuit; open circuit, short circuit, high resistance	For EVAP system components, Evaporative Emissions - VIN Range: G00442->G45703

		<p>EVAP canister purge valve power supply circuit; open circuit, short circuit</p> <p>EVAP canister purge valve operating vacuum hose leak/restriction</p> <p>EVAP canister purge valve failure</p>	
P0444	Evaporative emissions system (EVAP) canister purge valve circuit open circuit	<p>EVAP canister purge valve disconnected</p> <p>EVAP canister purge valve to ECM drive circuit; open circuit, high resistance</p> <p>EVAP canister purge valve failure</p>	For EVAP system components, Evaporative Emissions - VIN Range: G00442->G45703
P0445	Evaporative emissions system (EVAP) canister purge valve circuit short circuit	<p>EVAP canister purge valve to ECM drive circuit; short circuit to ground</p> <p>EVAP canister purge valve failure</p>	For EVAP system components, Evaporative Emissions - VIN Range: G00442->G45703
P0446	Evaporative emissions system (EVAP) canister close valve (CCV) malfunction	<p>CCV power supply circuit; open circuit, short circuit</p> <p>CCV to ECM drive circuit; open circuit, high resistance, short circuit to B+ voltage</p> <p>CCV failure</p>	For EVAP system components, Evaporative Emissions - VIN Range: G00442->G45703
P0447	Evaporative emissions system (EVAP) canister close valve (CCV) circuit open circuit	<p>CCV power supply circuit; open circuit, short circuit</p> <p>CCV to ECM drive circuit open circuit, high resistance, short circuit to B+ voltage</p> <p>CCV failure</p>	For EVAP system components, Evaporative Emissions - VIN Range: G00442->G45703
P0448	Evaporative emissions system (EVAP) canister close valve (CCV) circuit	<p>CCV to ECM drive circuit; short circuit to ground</p>	For EVAP system components, Evaporative Emissions - VIN

	short circuit	CCV failure	Range: G00442->G45703
P0450	Fuel tank pressure (FTP) sensor circuit malfunction	FTP sensor disconnected FTP sensor to ECM sensing circuit; open circuit, short circuit to ground, short circuit to B+ voltage FTP sensor to splice sensor supply circuit; open circuit, high resistance FTP sensor to splice ground circuit; open circuit, high resistance FTP sensor failure	For EVAP system components, Evaporative Emissions - VIN Range: G00442->G45703
P0452	Fuel tank pressure (FTP) sensor circuit low voltage (low pressure)	FTP sensor disconnected FTP sensor to ECM sensing circuit; open circuit, short circuit to ground FTP sensor to splice sensor supply circuit; open circuit, high resistance FTP sensor failure	For EVAP system components, Evaporative Emissions - VIN Range: G00442->G45703
P0453	Fuel tank pressure (FTP) sensor circuit high voltage (high pressure)	FTP sensor to splice sensor ground circuit; open circuit, high resistance FTP sensor to ECM sensing circuit; short circuit to high voltage FTP sensor failure	For EVAP system components, Evaporative Emissions - VIN Range: G00442->G45703
P0455	EVAP system leak detected - large	Fuel filler cap missing Fuel filler cap seal defective EVAP system leak (canister damage, pipework damage) EVAP canister purge valve to ECM drive circuit; open	For EVAP system components, Evaporative Emissions - VIN Range: G00442->G45703

		<p>circuit, short circuit, high resistance</p> <p>EVAP canister purge valve power supply circuit; open circuit, short circuit</p> <p>EVAP canister purge valve to engine purge pipe restricted, leaking, disconnected</p> <p>EVAP canister purge valve operating vacuum hose leak/restriction</p> <p>EVAP canister purge valve failure</p> <p>Fuel tank leak</p>	
P0456	EVAP system leak detected - very small (0.020)	<p>Fuel cap seal defective</p> <p>EVAP system leak (canister damage, pipework damage)</p> <p>EVAP purge valve to ECM drive circuit; open circuit, short circuit, high resistance</p> <p>EVAP purge valve power supply circuit; open circuit, short circuit</p> <p>EVAP purge valve to engine purge pipe; restricted/leaking</p> <p>EVAP purge valve operating vacuum hose leak/blockage</p> <p>EVAP purge valve failure</p> <p>Fuel tank leak</p>	For EVAP system components, Evaporative Emissions - VIN Range: G00442->G45703
P0460	Fuel level sensor circuit range/performance	Fuel level sensor to instrument cluster circuits intermittent	For fuel level sensor circuit tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA

		<p>short or open circuit, high resistance</p> <p>Fuel level sensor failure</p> <p>Instrument cluster fault (incorrect fuel level data)</p>	V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703
P0480	Radiator cooling fan module drive circuit malfunction	<p>ECM to radiator cooling fan module drive circuit; short circuit, open circuit, high resistance</p> <p>Radiator cooling fan fault</p> <p>Radiator cooling fan module fault</p>	For radiator cooling fan module tests, GO to Pinpoint Test G258127p19.
P0506	Idle rpm lower than expected	<p>Air intake restriction</p> <p>Accessory drive overload (defective/siezed component)</p> <p>Throttle valve stuck closed</p> <p>Throttle body failure</p>	<p>Check air intake system for restriction,</p> <p>Intake Air Distribution and Filtering - VIN Range: G00442->G45703</p> <p>Check accessory drive components,</p> <p>Check throttle body operation,</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p>
P0507	Idle rpm higher than expected	<p>Air intake leak between MAF sensor and throttle</p> <p>Air intake leak between throttle and engine</p> <p>Engine breather leak</p> <p>Throttle valve stuck open</p> <p>Throttle assembly failure</p>	<p>Inspect air intake system.</p> <p>Intake Air Distribution and Filtering - VIN Range: G00442->G45703</p> <p>For breather system, Engine Emission Control - VIN Range: G00442->G45703</p> <p>For throttle body, Fuel Charging and Controls - VIN Range: G00442->G45703</p> <p>Fuel Charging and Controls - VIN Range: G00442->G45703</p>
P0532	Air conditioning pressure sensor circuit low voltage (high pressure)	<p>Air conditioning pressure sensor disconnected</p> <p>Air conditioning pressure sensor to ECM sensing circuit; open circuit,</p>	<p>For A/C pressure sensor tests, GO to Pinpoint Test G258127p35.</p> <p>For sensor supply circuit tests, GO to Pinpoint Test</p>

		<p>short circuit to ground</p> <p>Air conditioning pressure sensor to splice sensor supply circuit; open circuit, high resistance</p> <p>Air conditioning pressure sensor failure</p>	<p>G258127p25.</p> <p>For air conditioning system information, Air Conditioning</p>
P0533	Air conditioning pressure sensor circuit high voltage (low pressure)	<p>Air conditioning pressure sensor to splice sensor ground circuit; open circuit, high resistance</p> <p>Air conditioning pressure sensor to ECM sensing circuit; short circuit to high voltage</p> <p>Air conditioning pressure sensor failure</p>	<p>For A/C pressure sensor tests, GO to Pinpoint Test G258127p35.</p> <p>For sensor ground circuit tests, GO to Pinpoint Test G258127p26.</p> <p>For air conditioning system information, Air Conditioning</p>
P0560	Battery power supply voltage malfunction	ECM battery power supply open circuit, high resistance	For ECM power supply tests, GO to Pinpoint Test G258127p20.
P0566	Speed control CANCEL switch ON fault	<p>Speed control switches internal steering wheel circuit; short circuit to ground</p> <p>Steering wheel cassette reel; short circuit to ground</p> <p>Cassette reel to ECM circuit; short circuit to ground</p> <p>CANCEL switch failure (stuck ON)</p>	For speed control tests, Speed Control - VIN Range: G00442->G45703
P0567	Speed control RESUME switch ON fault	<p>Speed control switches internal steering wheel circuit; short circuit to ground</p> <p>Steering wheel cassette reel; short circuit to ground</p> <p>Cassette reel to ECM circuit;</p>	For speed control tests, Speed Control - VIN Range: G00442->G45703

		<p>short circuit to ground</p> <p>RESUME switch failure (stuck ON)</p>	
P0568	Speed control input signal low/high resistance	<p>Speed control switches internal steering wheel circuit; open circuit, high resistance</p> <p>Steering wheel cassette reel; open circuit, high resistance</p> <p>Cassette reel to ECM circuit; open circuit, high resistance</p>	For speed control tests, Speed Control - VIN Range: G00442->G45703
P0569	Speed control SET/- switch ON fault	<p>Speed control switches internal steering wheel circuit; short circuit to ground</p> <p>Steering wheel cassette reel; short circuit to ground</p> <p>Cassette reel to ECM circuit; short circuit to ground</p> <p>SET/- switch failure</p>	For speed control tests, Speed Control - VIN Range: G00442->G45703
P0570	Speed control SET/+ switch ON fault	<p>Speed control switches internal steering wheel circuit; short circuit to ground</p> <p>Steering wheel cassette reel; short circuit to ground</p> <p>Cassette reel to ECM circuit; short circuit to ground</p> <p>SET/+ switch failure (stuck ON)</p>	For speed control tests, Speed Control - VIN Range: G00442->G45703
P0603	Engine control module (ECM) keep alive memory error	ECM failure	Contact dealer technical support for advice on possible ECM failure.
P0605	Transmission control module (TCM) self-test	TCM/Control valve failure	For transmission tests,

	error		
P0606	Transmission control module (TCM) "watch-dog" circuit malfunction	TCM/Control valve failure	For transmission tests,
P0610	Transmission control module (TCM) configuration error	Reconfigure TCM	For transmission tests,
P0617	Starter relay drive circuit high voltage/starter relay request on (ignition switch position III, START)	Starter relay drive circuit; short circuit to high voltage Starter relay failure	For starter system tests,
P0641	Sensor supply voltage circuit malfunction	TCM/Control valve failure	For transmission tests,
P0651	Pressure regulator and shift solenoid supply circuit malfunction	TCM/Control valve failure	For transmission tests,
P0666	Substrate temperature sensor circuit malfunction	TCM/Control valve failure ABS system failure	For transmission tests,
P0701	TCM control errors	TCM/Control valve failure ABS system failure	For transmission tests, For ABS system tests, Anti-Lock Control - Stability Assist - VIN Range: G00442->G45703
P0702	TCM battery power supply low voltage (short time)	Battery power supply fuse failure Battery power supply; intermittent open circuit	For transmission tests,
P0705	Gear position switch circuit malfunction	TCM/Control valve failure	For transmission tests,
P0706	Gear selector position plausibility fault	TCM/J-Gate module CAN fault J-Gate module failure	For CAN tests, Communications Network For J-Gate module tests, External Controls

P0709	Gear selector intermediate position fault	J-Gate module failure	For J-Gate module tests, External Controls
P0710	Transmission fluid temperature sensor circuit malfunction	TCM/Control valve failure	For transmission tests,
P0711	Transmission fluid temperature range fault	Transmission fluid burnt (requires replacement)	For transmission fluid renewal and level checking,
P0715	Turbine speed sensor circuit failure	TCM/Control valve failure	For transmission tests,
P0720	Output speed sensor circuit failure	TCM/Control valve failure	For transmission tests,
P0721	Output speed sensor signal gradient fault	Transmission mechanical failure TCM/Control valve failure	For transmission tests,
P0725	Engine over-speed range fault	TCM/ECM CAN fault	For CAN tests, Communications Network
P0729	Sixth gear ratio fault	Transmission mechanical failure	For transmission tests,
P0730	Gear ratio fault	Transmission mechanical failure	For transmission tests,
P0731	First gear ratio fault	Transmission mechanical failure	For transmission tests,
P0732	Second gear ratio fault	Transmission mechanical failure	For transmission tests,
P0733	Third gear ratio fault	Transmission mechanical failure	For transmission tests,
P0734	Fourth gear ratio fault	Transmission mechanical failure TCM/Control valve failure	For transmission tests,

P0735	Fifth gear ratio fault	Transmission mechanical failure TCM/Control valve failure	For transmission tests,
P0736	Reverse gear ratio fault	Transmission mechanical failure	For transmission tests,
P0740	Torque converter clutch pressure regulator solenoid circuit malfunction	TCM/Control valve failure	For transmission tests,
P0741	Torque converter clutch pressure regulator solenoid stuck open	TCM/Control valve failure Transmission mechanical failure	For transmission tests,
P0743	Torque converter clutch pressure regulator solenoid circuit plausibility error	TCM/Control valve failure	For transmission tests,
P0750	Pressure regulator solenoid 1 circuit malfunction	TCM/Control valve failure	For transmission tests,
P0753	Pressure regulator solenoid 1 circuit plausibility error	TCM/Control valve failure	For transmission tests,
P0755	Pressure regulator solenoid 2 circuit malfunction	TCM/Control valve failure	For transmission tests,
P0758	Pressure regulator solenoid 2 circuit plausibility error	TCM/Control valve failure	For transmission tests,
P0760	Pressure regulator solenoid 3 circuit malfunction	TCM/Control valve failure	For transmission tests,
P0763	Pressure regulator solenoid 3 circuit plausibility error	TCM/Control valve failure	For transmission tests,

P0765	Pressure regulator solenoid 4 circuit malfunction	TCM/Control valve failure	For transmission tests,
P0768	Pressure regulator solenoid 4 circuit plausibility error	TCM/Control valve failure	For transmission tests,
P0770	Pressure regulator solenoid 5 circuit malfunction	TCM/Control valve failure	For transmission tests,
P0773	Pressure regulator solenoid 5 circuit plausibility error	TCM/Control valve failure	For transmission tests,
P0780	Gear load fault	Transmission mechanical failure	For transmission tests,
P0781	1-2/2-1 Gear load fault	Transmission mechanical failure	For transmission tests,
P0782	2-3/3-2 Gear load fault	Transmission mechanical failure	For transmission tests,
P0783	3-4/4-3 Gear load fault	Transmission mechanical failure	For transmission tests,
P0784	4-5/5-4 Gear load fault	Transmission mechanical failure	For transmission tests,
P0787	Shift solenoid circuit malfunction	TCM/Control valve failure	For transmission tests,
P0788	Shift solenoid circuit plausibility error	TCM/Control valve failure	For transmission tests,
P0825	Gear positions R, D plausibility error	J-Gate incorrectly adjusted J-Gate module failure	For J-Gate module adjustment/replacement, External Controls
P0829	5-6 Gear load fault	Transmission mechanical failure	For transmission tests,

P0860	J-Gate module CAN network malfunction. (J-Gate module/CAN monitored by the ECM)	CAN open circuit fault CAN short circuit fault J-Gate module failure	For CAN tests, Communications Network For J-Gate module, External Controls
P1000	System checks not complete since last memory clear	OBD monitors have not completed	Carry out comprehensive component monitor drive cycle. Refer to the DTC section of JTIS, accessed by the icon on the opening page.
P1104	Mass air flow (MAF) sensor ground malfunction	MAF sensor to ECM sensor ground circuit; open circuit, short circuit to high voltage, high resistance MAF sensor to ECM sensing circuit open circuit MAF sensor failure	For MAF ground tests, GO to Pinpoint Test G258127p21.
P1107	Manifold absolute pressure (MAP) sensor sensing circuit low voltage	MAP sensor to ECM sensing circuit; open circuit or short circuit to ground MAP sensor supply circuit (to splice) open circuit MAP sensor failure	For MAP sensor tests, GO to Pinpoint Test G258127p33.
P1108	Manifold absolute pressure (MAP) sensor sensing circuit high voltage	MAP sensor ground circuit (to splice) open circuit MAP sensor to ECM sensing circuit; short circuit to high voltage MAP sensor failure	For MAP sensor tests, GO to Pinpoint Test G258127p33.
P1111	System checks complete since last memory clear	OBD monitors have completed	No action necessary.
P1122	Accelerator pedal position (APP) sensor circuit low voltage - APP1	APP sensor to ECM sensing circuit "1"; open circuit, short circuit to ground or high resistance APP sensor power supply circuit; open circuit,	For APP 1 sensor tests, GO to Pinpoint Test G258127p22.

		high resistance APP sensor failure	
P1123	Accelerator pedal position (APP) sensor circuit high voltage - APP1. Note: This DTC could be flagged by both sensor element circuits having faults	APP sensor to ECM sensing circuit(s) short circuit to high voltage APP sensor ground circuit(s) open circuit APP sensor failure	For APP 1 sensor tests, GO to Pinpoint Test G258127p22.
P1215	Accelerator pedal position (APP) sensor sensing circuit low voltage - APP2	APP sensor to ECM sensing circuit (APP2); open circuit, short circuit to ground, high resistance APP sensor supply circuit (to splice) open circuit, high resistance APP sensor failure	For APP 2 sensor tests, GO to Pinpoint Test G258127p23.
P1216	Accelerator pedal position (APP) sensor sensing circuit high voltage - APP2. Note: This DTC could be flagged by both sensor element circuits having faults	APP sensor to ECM sensing circuit(s) short circuit to high voltage APP sensor ground circuit(s) (to splice) open circuit APP sensor failure	For APP 2 sensor tests, GO to Pinpoint Test G258127p23.
P1224	Throttle control position error	Throttle motor failure Throttle body failure	For throttle body, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703
P1229	Throttle motor control circuit malfunction	Throttle motor disconnected Throttle motor to ECM drive circuits; short circuit or open circuit ECM ground circuit fault(s) (PI01-04, 05, 54) Throttle motor failure Throttle body failure	For throttle motor to ECM circuit tests, GO to Pinpoint Test G258127p24. For throttle body, Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703

P1233	Fuel pump 2 drive circuit fault	ECM to fuel pump 2 module control drive circuit; open circuit, short circuit, high resistance Fuel pump 2 module failure	For fuel pump 2 module tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703
P1234	No fuel pump commands received by ECM	ECM to rear electronic module (REM) drive circuit; open circuit, short circuit, high resistance REM failure	For fuel pump module tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703
P1236	Fuel pump not activated when requested by ECM	ECM to rear electronic module (REM) drive circuit; open circuit, short circuit, high resistance REM failure	For fuel pump module tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703
P1240	Sensor power supply circuit malfunction	ECM to sensors supply voltage circuit(s); short circuit to ground, short circuit to high voltage, open circuit, high resistance	For sensor supply tests, GO to Pinpoint Test G258127p25.
P1241	Sensor power supply circuit low voltage	ECM to sensors supply voltage circuit(s); short circuit to ground	For sensor supply tests, GO to Pinpoint Test G258127p25.
P1242	Sensor power supply circuit high voltage	ECM to sensors supply voltage circuit(s); open circuit, high resistance, short circuit to high voltage	For sensor supply tests, GO to Pinpoint Test G258127p25.
P1243	Sensor ground circuits open circuit	ECM to sensors ground circuit; open circuit, high resistance	For sensor ground tests, GO to Pinpoint Test G258127p26.
P1245	Engine crank signal low voltage	Ignition switch to ECM circuit; open circuit Ignition switch failure	For crank signal tests, GO to Pinpoint Test G258127p27.
P1246	Engine crank signal high voltage	Ignition switch to ECM circuit; short circuit to high voltage Ignition switch failure	For crank signal tests, GO to Pinpoint Test G258127p27.
P1250	Throttle valve return	Throttle return spring	INSTALL a new throttle body.

	spring malfunction	failure (throttle body failure)	Fuel Charging and Controls - VIN Range: G00442->G45703 Fuel Charging and Controls - VIN Range: G00442->G45703
P1251	Throttle motor relay OFF failure	Throttle motor relay coil power supply circuit; open circuit Throttle motor relay failure Throttle motor relay coil to ECM circuit; open circuit ECM ground circuit fault (relay coil drive)	For throttle motor relay tests, GO to Pinpoint Test G258127p36.
P1254	Throttle "limp-home" spring malfunction	Throttle limp-home spring failure (throttle body failure)	INSTALL a new throttle body, Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 (19.70.04)
P1260	Security input malfunction. Note: This DTC can only be cleared following rectification after an ignition OFF/ON cycle	Invalid ignition key code PATs signal to instrument cluster missing or corrupted Security message (PATs) CAN failure	Contact dealer technical support for information on security system.
P1313	Misfire rate catalyst damage, Right-hand (Note; This DTC will flag only when accompanied by a random or individual cylinder misfire DTC; P0300, P0301 to P0308)	Refer to P0300 possible sources	Refer to P0300 Actions.
P1314	Misfire rate catalyst damage, Left-hand (Note; This DTC will flag only when accompanied by a random or individual cylinder misfire DTC; P0300 to P0308)	Refer to P0300 possible sources	Refer to P0300 Actions.

P1316	Misfire excess emission (Note; This DTC will flag only when accompanied by an individual cylinder misfire DTC; P0300 to P0308)	Refer to P0300 possible sources	Refer to P0300 Actions.
P1338	Fuel pump drive circuit low/high voltage	REM to fuel pump drive circuit; open circuit, short circuit, high resistance REM failure Fuel pump failure	For fuel pump module tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703
P1339	Fuel pump 2 drive circuit low/high voltage	Fuel pump 2 module to fuel pump drive circuit; open circuit, short circuit, high resistance Fuel pump 2 module to ECM monitor circuit; open circuit, short circuit, high resistance Fuel pump 2 module failure Fuel pump 2 failure	For fuel pump 2 module tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703
P1340	Left-hand camshaft position sensor (CMP) sensor circuit malfunction	CMP sensor disconnected CMP sensor gap incorrect/foreign matter on sensor face CMP sensor sensing circuit; open circuit, short circuit to ground, short circuit to high voltage CMP sensor failure	For CMP sensor tests, GO to Pinpoint Test G258127p28.
P1341	Left-hand camshaft position (CMP) sensor range/performance	CMP sensor disconnected CMP sensor gap incorrect/foreign matter on sensor face CMP sensor sensing circuit open circuit, short circuit to ground, short	For CMP sensor tests, GO to Pinpoint Test G258127p28.

		circuit to high voltage	
		CMP sensor failure	
P1344	Accelerator pedal position (APP) sensor sensing circuits range/performance	<p>APP sensor to ECM sensing circuits; short circuit, open circuit, high resistance</p> <p>APP sensor supply circuits; short circuit, open circuit, high resistance</p> <p>APP sensor ground circuits; open circuit</p> <p>APP sensor failure</p>	<p>For APP sensor sensing circuit tests, GO to Pinpoint Test G258127p22.</p> <p>and GO to Pinpoint Test G258127p23.</p> <p>For sensor ground tests, GO to Pinpoint Test G258127p26.</p> <p>For sensor supply tests, GO to Pinpoint Test G258127p25.</p>
P1367	Right-hand cylinders ignition monitor fault	<p>Ignition monitoring circuit between splice and ECM; open circuit, short circuit to ground or short circuit to B+ voltage</p> <p>Ignition coil ground circuit fault</p>	<p>For ignition system, Engine Ignition - VIN Range: G00442->G45703</p>
P1368	Left-hand cylinders ignition monitor fault	<p>Ignition monitoring circuit between splice and ECM; open circuit, short circuit to ground or short circuit to B+ voltage</p> <p>Ignition coil ground circuit fault</p>	<p>For ignition system, Engine Ignition - VIN Range: G00442->G45703</p>
P1384	Right-hand variable camshaft timing (VCT) oil control solenoid malfunction	<p>VCT solenoid to ECM PWM drive circuit fault</p> <p>VCT solenoid ground circuit fault</p> <p>VCT solenoid failure</p> <p>Oil contamination</p> <p>VCT oil flow fault</p> <p>VCT/camshaft mechanical failure</p>	<p>Check oil condition; For VCT solenoid tests, GO to Pinpoint Test G258127p29.</p> <p>For engine information, Engine</p>

P1396	Left-hand variable camshaft timing (VCT) oil control solenoid malfunction	<p>VCT solenoid to ECM PWM drive circuit fault</p> <p>VCT solenoid ground circuit fault</p> <p>VCT solenoid failure</p> <p>Oil contamination</p> <p>VCT oil flow fault</p> <p>VCT/camshaft mechanical failure</p>	<p>Check oil condition; For VCT solenoid tests, GO to Pinpoint Test G258127p30.</p> <p>For engine information, Engine</p>
P1410	Air cleaner solenoid valve drive circuit malfunction	<p>ECM to air cleaner solenoid circuit; open circuit, short circuit, high resistance</p> <p>Air cleaner solenoid failure</p>	<p>For air cleaner solenoid circuit tests, GO to Pinpoint Test G258127p38.</p>
P1474	Intercooler coolant pump malfunction	<p>Intercooler coolant pump failure</p>	<p>For Intercooler coolant pump circuit tests, GO to Pinpoint Test G258127p39.</p>
P1516	Gear change PARK/NEUTRAL driving malfunction	<p>ECM P/N circuit; short circuit to high voltage, high resistance</p> <p>Gear selector cable adjustment incorrect</p> <p>J-Gate module adjustment incorrect</p> <p>J-Gate module/ECM CAN fault</p>	<p>For P/N circuit tests and gear selector cable/J-Gate module adjustment, External Controls For CAN tests, Communications Network</p>
P1517	Gear change PARK/NEUTRAL starting malfunction	<p>ECM P/N circuit; short circuit to ground, high resistance</p> <p>Gear selector cable adjustment incorrect</p> <p>J-Gate module adjustment incorrect</p> <p>J-Gate module/ECM CAN fault</p>	<p>For P/N circuit tests and gear selector cable/J-Gate module adjustment, External Controls For CAN tests, Communications Network</p>

P1571	Brake ON/OFF switch; brake CANCEL switch malfunction. (Note: Brake ON/OFF switch - normally open; brake CANCEL switch - normally closed)	Brake ON/OFF switch to ECM circuit; open circuit, short circuit to ground, high resistance Brake ON/OFF switch power supply circuit; open circuit Brake ON/OFF switch failure Brake CANCEL switch to ECM circuit; open circuit, short circuit to ground, high resistance Brake CANCEL switch power supply circuit; open circuit Brake CANCEL switch failure	For speed control tests, Speed Control - VIN Range: G00442->G45703
P1582	"Flight recorder" data is stored if any one of five conditions occur Inertia switch activated Throttle limp-home mode activated Engine starts and stumbles Engine fails to start Engine stall	If none of the five conditions occur, check: Inertia switch to ECM circuit; short circuit to B+ voltage Inertia switch failure	Check the five conditions, for inertia switch circuit tests, GO to Pinpoint Test G258127p31.
P1603	TCM internal communications error	TCM/Control valve failure	For transmission tests,
P1605	TCM RAM error	Battery power supply circuit; open circuit, short circuit to ground TCM/Control valve failure	For transmission tests,
P1606	Engine management system (EMS) control relay malfunction	ECM control relay failure ECM control relay to ECM	For EMS control relay tests, GO to Pinpoint Test G258127p32.

		<p>circuit fault</p> <p>ECM control relay coil power supply open circuit</p> <p>ECM ground circuit fault (relay coil drive)</p>	
P1609	ECM microprocessor-to-microprocessor communication failure	ECM failure	Contact dealer technical support for advice on possible ECM failure.
P1611	ECM sub CPU failure	ECM failure	Contact dealer technical support for advice on possible ECM failure.
P1631	Throttle motor relay coil drive circuit OFF failure	<p>Throttle motor relay coil power supply circuit; open circuit</p> <p>Throttle motor relay failure</p> <p>Throttle motor relay coil to ECM drive circuit open circuit, short circuit to ground</p>	For throttle motor relay tests, GO to Pinpoint Test G258127p36.
P1632	Generator charge system failure/generator CHARGE/FAULT circuit failure	<p>ECM to generator CHARGE/FAULT circuit; short circuit, open circuit, high resistance</p> <p>Generator regulator failure</p> <p>Generator failure</p>	For charging system tests, Generator
P1633	ECM main CPU failure	ECM failure	Contact dealer technical support for advice on possible ECM failure.
P1634	Throttle "watchdog" circuit malfunction	ECM failure	Contact dealer technical support for advice on possible ECM failure.
P1637	CAN ECM to DSCCM network malfunction	<p>CAN open circuit fault - DSCCM to ECM</p> <p>CAN short circuit fault</p>	For CAN tests, Communications Network Contact dealer technical support for advice on possible ECM

		DSCCM failure ECM failure	failure.
P1638	CAN ECM/IC network malfunction	CAN open circuit fault - IC to ECM CAN short circuit fault IC failure ECM failure	For CAN tests, Communications Network Contact dealer technical support for advice on possible ECM failure.
P1642	CAN circuit malfunction	CAN short circuit fault Control module failure - check for additional logged DTCs to locate control module source	For CAN tests, Communications Network
P1643	CAN ECM/TCM network malfunction	CAN open circuit fault - TCM to ECM CAN short circuit fault TCM failure ECM failure	For CAN tests, Communications Network For transmission tests, Contact dealer technical support for advice on possible ECM failure.
P1646	Right-hand ECM HO2S control malfunction	HO2S heater failure HO2S sensing circuit; short circuit to ground, short circuit to high voltage, open circuit, high resistance ECM failure	For HO2S tests, GO to Pinpoint Test G258127p6. and GO to Pinpoint Test G258127p7. Contact dealer technical support for advice on possible ECM failure.
P1647	Left-hand ECM HO2S control malfunction	HO2S heater failure HO2S sensing circuit; short circuit to ground, short circuit to high voltage, open circuit, high resistance ECM failure	For HO2S tests, and GO to Pinpoint Test G258127p11. Contact dealer technical support for advice on possible ECM failure.
P1648	ECM internal KS CPU self-test failure	ECM failure	Contact dealer technical support for advice on possible ECM failure.

P1656	TP sensor amplifier circuit malfunction	ECM failure	Contact dealer technical support for advice on possible ECM failure.
P1657	Throttle motor relay coil drive circuit ON failure	Throttle motor relay failure Throttle motor relay coil to ECM drive circuit; short circuit to B+ voltage	For throttle motor relay tests, GO to Pinpoint Test G258127p36.
P1658	Throttle motor relay ON failure	Throttle motor relay failure Throttle motor relay coil to ECM drive circuit; short circuit to B+ voltage	For throttle motor relay tests, GO to Pinpoint Test G258127p36.
P1696	CAN ECM/ASCCM network malfunction	CAN open circuit fault - ASCCM to ECM CAN short circuit fault ASCCM failure ECM failure	For CAN tests, Communications Network Contact dealer technical support for advice on possible ECM failure.
P1697	Adaptive speed control HEADWAY switch(es) circuit malfunction	Speed control switches internal steering wheel circuit; short circuit to ground Steering wheel cassette reel; short circuit to ground Cassette reel to ECM circuit; short circuit to ground HEADWAY +/- switch(es) failure (stuck ON)	For speed control system, Speed Control - VIN Range: G00442->G45703
P1699	CAN ECM/A/CCM network malfunction	CAN open circuit fault - A/CCM to ECM CAN short circuit fault A/CCM failure ECM failure	For CAN tests, Communications Network Contact dealer technical support for advice on possible ECM failure.
P1774	CAN TCM/J-Gate module network malfunction	CAN open circuit fault - TCM to J-Gate module	For CAN tests, Communications Network For J-Gate module,

		CAN short circuit fault J-Gate module failure	External Controls
P1783	Transmission over-temperature shut-down	Transmission fluid level low Transmission fluid cooler circuit; obstructed/leaking Transmission fluid cooler fins blocked by debris Transmission mechanical failure	For transmission information,
P1794	TCM ignition switched power supply circuit malfunction	Ignition switched power supply fuse failure Ignition switched power supply circuit; short circuit to ground, open circuit	For transmission tests,
P1796	CAN network fault	CAN open circuit or short circuit fault TCM/Control valve failure	For CAN tests, Communications Network For transmission tests,
P1797	CAN TCM/ECM network malfunction	CAN open circuit fault - TCM to ECM CAN short circuit fault ECM failure TCM/Control valve failure	For CAN tests, Communications Network For transmission tests, Contact dealer technical support for advice on possible ECM failure
P1798	CAN TCM/IC network malfunction	CAN open circuit fault - TCM to IC CAN short circuit fault IC failure TCM/Control valve failure	For CAN tests, Communications Network For transmission tests, Contact dealer technical support for advice on possible ECM failure
P1799	CAN TCM/DSCCM network malfunction	CAN open circuit fault - TCM to DSCCM CAN short circuit fault	For CAN tests, Communications Network For transmission tests,

		DSCCM failure	
		TCM/Control valve failure	

Pinpoint Tests

PINPOINT TEST G258127p1 : DTC P0101, P0102, P0103; MASS AIR FLOW (MAF) SENSOR CIRCUIT RANGE/PERFORMANCE, HIGH/LOW VOLTAGE

G258127t1 : CHECK THE MAF SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Disconnect the MAF sensor electrical connector, PI14. 4. Measure the resistance between PI01, pin 44 (GW) and PI14, pin 03 (GW).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t2.

G258127t2 : CHECK THE MAF SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between the MAF sensor electrical connector, PI14, pin 03 (GW) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t3.

G258127t3 : CHECK THE MAF SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI14, pin 03 (GW) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation

-> No

GO to Pinpoint Test G258127t4.

G258127t4 : CHECK THE MAF SENSOR SUPPLY CIRCUIT VOLTAGE

1. Reconnect the ECM electrical connector, PI01. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between the MAF sensor electrical connector, PI14, pin 01 (GU) and GROUND.

Is the voltage greater than 10 volts?

-> Yes

INSTALL a new MAF sensor.

Mass Air Flow (MAF) Sensor (18.30.15) CLEAR the DTC. TEST the system for normal operation.

-> No

REPAIR the circuit between the MAF sensor electrical connector, PI14, pin 01 (GU) and BATTERY. This circuit includes the EMS control relay, fuse 14 of the front power distribution box, and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p2 : DTC P0111, P0112, P0113; INTAKE AIR TEMPERATURE (IAT) SENSOR CIRCUIT RANGE/PERFORMANCE, HIGH/LOW VOLTAGE

G258127t5 : CHECK THE IAT SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Disconnect the MAF sensor electrical connector, PI14. 4. Measure the resistance between PI01, pin 71 (U) and PI14, pin 04 (U).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t6.

G258127t6 : CHECK THE IAT SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the **ON** position. 3. Measure the voltage between PI14, pin 04 (U) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t7.

G258127t7 : CHECK THE IAT SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI14, pin 04 (U) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new MAF sensor.

Mass Air Flow (MAF) Sensor (18.30.15) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p3 : DTC P0116*, P0117, P0118, P0125; ENGINE COOLANT TEMPERATURE (ECT) SENSOR CIRCUIT RANGE/PERFORMANCE, HIGH/LOW VOLTAGE

G258127t8 : CHECK THE ECT SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Disconnect the ECT sensor electrical connector, PI25. 4. Measure the resistance between PI01, pin 70 (UY) and PI25, pin 02 (UY).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t9.

G258127t9 : CHECK THE ECT SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI25, pin 02 (UY) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t10.

G258127t10 : CHECK THE ECT SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI25, pin 02 (UY) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new ECT sensor.

Engine Coolant Temperature (ECT) Sensor - 4.2L NA V8 - AJV8 (18.30.10) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p4 : DTC P0121, P0122, P0123; THROTTLE POSITION (TP) SENSOR RANGE/PERFORMANCE, HIGH/LOW VOLTAGE

G258127t11 : CHECK THE TP SENSOR SENSING CIRCUIT TP1 FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Disconnect the TP sensor electrical connector, PI26. 4. Measure the resistance between PI01, pin 75 (R) and PI26, pin 03 (R).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t12.

G258127t12 : CHECK THE TP SENSOR SENSING CIRCUIT TP1 FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI26, pin 03 (R) and GROUND.

Is the voltage greater than 5 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t13.

G258127t13 : CHECK THE TP SENSOR SENSING CIRCUIT TP1 FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI26, pin 03 (R) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new TP sensor.

Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 (19.70.04) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p5 : DTC P0222, P0223; THROTTLE POSITION (TP) SENSOR CIRCUIT TP2 HIGH/LOW VOLTAGE

G258127t14 : CHECK TP SENSOR SENSING CIRCUIT TP2 FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the TP sensor electrical connector, PI26. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI01, pin 76 (Y) and PI26, pin 02 (Y).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t15.

G258127t15 : CHECK TP SENSOR SENSING CIRCUIT TP2 FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI26, pin 02 (Y) and GROUND.

Is the voltage greater than 5 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t16.

G258127t16 : CHECK TP SENSOR SENSING CIRCUIT TP2 FOR SHORT TO GROUND

1. Measure the resistance between PI26, pin 02 (Y) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new TP sensor.

Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 (19.70.04) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p6 : DTC P0131, P0132, P0133, P1646; RIGHT-HAND H02S SENSING CIRCUIT

LOW/HIGH CURRENT, SLOW RESPONSE, ECM CONTROL MALFUNCTION

G258127t17 : CHECK THE H02S VARIABLE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the H02S electrical connector, PI10. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI10, pin 03 (R) and PI01, pin 83 (R).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t18.

G258127t18 : CHECK THE H02S VARIABLE CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI01, pin 83 (R) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t19.

G258127t19 : CHECK THE H02S VARIABLE CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI01, pin 83 (R) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t20.

G258127t20 : CHECK THE H02S CONSTANT CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between PI10, pin 04 (Y) and PI01, pin 84 (Y).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t21.

G258127t21 : CHECK THE H02S CONSTANT CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Measure the voltage between PI10, pin 04 (Y) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t22.

G258127t22 : CHECK THE H02S CONSTANT CIRCUIT FOR SHORT TO GROUND

1. Measure the resistance between PI10, pin 04 (Y) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new H02S.

CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G258127p7 : DTC P0031, P0032; RIGHT-HAND H02S HEATER CONTROL CIRCUIT HIGH/LOW CURRENT

G258127t23 : CHECK H02S HEATER POWER SUPPLY CIRCUIT

1. Disconnect the H02S electrical connector, PI10. 2. Turn the ignition switch to the ON position. 3. Make sure the O2S heater relay is engaged. 4. Measure the voltage between PI10, pin 01 (WG) and GROUND.

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G258127t24.

-> No

REPAIR the power supply circuit to the H02S heater. This circuit includes the H02S heater relay, fuse 34 of the front power distribution box, and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

G258127t24 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Measure the resistance between PI01, pin 01 (RU) and PI10, pin 02 (RU). 4. Measure the resistance between PI01, pin 02 (RU) and EM21, pin 02 (RU).

Is either resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t25.

G258127t25 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI10, pin 02 (RU) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams.
CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t26.

G258127t26 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI10, pin 02 (RU) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new H02S.

CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G258127p8 : DTC P0137, P0138, P0140; RIGHT-HAND CATALYST MONITOR SENSOR SENSING CIRCUIT LOW/HIGH VOLTAGE, NO ACTIVITY

G258127t27 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the H02S electrical connector, PI11. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI11, pin 04 (N) and PI01, pin 128 (N).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the

DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t28.

G258127t28 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI11, pin 04 (N) and GROUND.

Is the voltage greater than 5 volts?

-> **Yes**

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t29.

G258127t29 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI11, pin 04 (N) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t30.

G258127t30 : CHECK THE CATALYST MONITOR SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between PI11, pin 03 (B) and PI01, pin 130 (BW).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new catalyst monitor sensor.

CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p9 : DTC P0037, P0038; RIGHT-HAND CATALYST MONITOR SENSOR HEATER CONTROL CIRCUIT LOW/HIGH RESISTANCE

G258127t31 : CHECK THE POWER SUPPLY TO THE CATALYST MONITOR HEATER

1. Disconnect the catalyst monitor sensor electrical connector, PI11. 2. Turn the ignition switch to the ON position. 3. Make sure the O2S heater relay is engaged. 4. Measure the voltage between PI11, pin 01 (WG) and GROUND.

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G258127t32.

-> **No**

REPAIR the power supply circuit to the catalyst monitor sensor heater. This circuit includes the heater relay, fuse 34 of the front power distribution box, and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

G258127t32 : CHECK THE CATALYST MONITOR HEATER CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Measure the resistance between PI11, pin 02 (UY) and PI01, pin 92 (UY).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new catalyst monitor sensor.

CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G258127p10 : DTC P0151, P0152, P0153; LEFT-HAND H02S SENSING CIRCUIT LOW/HIGH CURRENT, SLOW RESPONSE, ECM CONTROL MALFUNCTION

G258127t33 : CHECK THE H02S VARIABLE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the H02S electrical connector, PI12. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI12, pin 03 (G) and PI01, pin 107 (G).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t34.

G258127t34 : CHECK THE H02S VARIABLE CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI12, pin 03 (G) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t35.

G258127t35 : CHECK THE H02S VARIABLE CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI12, pin 03 (G) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t36.

G258127t36 : CHECK THE H02S CONSTANT CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between PI12, pin 04 (N) and PI01, pin 108 (N).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t37.

G258127t37 : CHECK THE H02S CONSTANT CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Measure the voltage between PI12, pin 04 (N) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t38.

G258127t38 : CHECK THE H02S CONSTANT CIRCUIT FOR SHORT TO GROUND

1. Measure the resistance between PI12, pin 04 (N) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new H02S.

CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G258127p11 : DTC P0051, P0052; LEFT-HAND H02S HEATER CONTROL CIRCUIT HIGH/LOW CURRENT

G258127t39 : CHECK H02S HEATER POWER SUPPLY CIRCUIT

1. Disconnect the H02S electrical connector, PI12. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI12, pin 01 (WR) and GROUND.

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G258127t40.

-> No

REPAIR the power supply circuit to the H02S heater. This circuit includes the heater relay, fuse 33 of the front power distribution box, and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

G258127t40 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Measure the resistance between PI12, pin 02 (RW) and PI01, pin 55 (RW). 4. Measure the resistance between PI12, pin 02 (RW) and PI01, pin 56 (RW).

Is either resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t41.

G258127t41 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI12, pin 02 (RW) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t42.

G258127t42 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI12, pin 02 (RW) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new H02S.

CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G258127p12 : DTC P0057, P0058; LEFT-HAND CATALYST MONITOR SENSOR HEATER CONTROL CIRCUIT LOW/HIGH RESISTANCE

G258127t43 : CHECK THE POWER SUPPLY TO THE CATALYST MONITOR SENSOR HEATER

1. Disconnect the catalyst monitor sensor electrical connector, PI13. 2. Turn the ignition switch to the ON position. 3. Make sure the O2S heater relay is engaged. 4. Measure the voltage between PI13, pin 01 (WR) and GROUND.

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G258127t44.

-> No

REPAIR the power supply circuit to the H02S heater. This circuit includes the heater relay, fuse 33 of the front power distribution box, and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

G258127t44 : CHECK THE CATALYST MONITOR SENSOR HEATER CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Measure the resistance between PI13, pin 02 (RW) and PI01, pin 93 (RW).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new catalyst monitor sensor.

CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G258127p13 : DTC P0196, P0197, P0198; ENGINE OIL TEMPERATURE (EOT) SENSOR RANGE/PERFORMANCE, HIGH/LOW VOLTAGE

G258127t45 : CHECK THE EOT SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the EOT sensor electrical connector, PI24. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI24, pin 01 (Y) and PI01, pin 78 (Y).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t46.

G258127t46 : CHECK THE EOT SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI24, pin 01 (Y) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t47.

G258127t47 : CHECK THE EOT SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI24, pin 01 (Y) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t48.

G258127t48 : CHECK THE EOT SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between PI24, pin 02 (BG) and PI01, pin 19 (BG).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. This circuit includes harness splices, PIS1 and EMS2. For additional

information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new EOT sensor.

CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G258127p14 : DTC P0157, P0158, P0160; LEFT-HAND CATALYST MONITOR SENSOR SENSING CIRCUIT LOW/HIGH VOLTAGE, NO ACTIVITY

G258127t49 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the catalyst monitor sensor electrical connector, PI13. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI13, pin 04 (N) and PI01, pin 129 (N).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t50.

G258127t50 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI13, pin 04 (N) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t51.

G258127t51 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI13, pin 04 (N) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t52.

G258127t52 : CHECK THE CATALYST MONITOR SENSOR GROUND CIRCUIT FOR OPEN CIRCUIT

1. Measure the resistance between PI13, pin 03 (B) and PI01, pin 130 (BW).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new catalyst monitor sensor.

CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p15 : DTC P0327, P0328; RIGHT-HAND KNOCK SENSOR (KS) HIGH/LOW VOLTAGE

G258127t53 : CHECK KS SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the KS electrical connector, PI20. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI20, pin 02 (N) and PI01, pin 98 (N).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t54.

G258127t54 : CHECK KS SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Turn the ignition switch to the ON position. 2. Reconnect the battery negative terminal. 3. Measure the voltage between PI20, pin 02 (N) and GROUND.

Is the voltage greater than 5 volts?

-> **Yes**

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t55.

G258127t55 : CHECK KS SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI20, pin 02 (N) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t56.

G258127t56 : CHECK KS GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between PI20, pin 01 (B) and PI01, pin 100 (BG).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new KS.

CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p16 : DTC P0332, P0333; LEFT-HAND KNOCK SENSOR (KS) HIGH/LOW VOLTAGE

G258127t57 : CHECK KS SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the KS electrical connector, PI19. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI19, pin 01 (N) and PI01, pin 99 (N).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t58.

G258127t58 : CHECK KS SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Turn the ignition switch to the ON position. 2. Reconnect the battery negative terminal. 3. Measure the voltage between PI19, pin 01 (N) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t59.

G258127t59 : CHECK KS SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI19, pin 01 (N) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR

the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t60.

G258127t60 : CHECK KS GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between PI19, pin 02 (B) and PI01, pin 100 (BG).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new KS.

CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p17 : DTC P0335, P0336; CRANKSHAFT POSITION (CKP) SENSOR CIRCUIT RANGE/PERFORMANCE, CIRCUIT MALFUNCTION

G258127t61 : CHECK THE CKP SENSOR FOR CORRECT INSTALLATION

1. Turn the ignition switch to the OFF position. 2. Check the CKP sensor for correct installation.

Is the CKP sensor correctly installed?

-> **Yes**

GO to Pinpoint Test G258127t62.

-> **No**

INSTALL the CKP sensor correctly.

Reconnect the sensor. CLEAR the DTCs. TEST the system for normal operation.

G258127t62 : CHECK THE CKP SENSOR FOR DEBRIS

1. Remove the CKP sensor and inspect for debris.

Is the CKP sensor free of debris?

-> **Yes**

GO to Pinpoint Test G258127t63.

-> **No**

CLEAN the sensor and wheel. INSTALL the sensor.

Reconnect the sensor. CLEAR the DTCs. TEST the system for normal operation.

G258127t63 : CHECK THE CKP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Disconnect the CKP sensor electrical connector, PI21. 4. Measure the resistance between PI21, pin 02 (O) and PI01, pin 36 (O).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t64.

G258127t64 : CHECK THE CKP SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the **ON** position. 3. Measure the voltage between PI21, pin 02 (O) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t65.

G258127t65 : CHECK THE CKP SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI21, pin 02 (O) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t66.

G258127t66 : CHECK THE CKP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between PI21, pin 01 (B) and PI01, pin 37 (B).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new CKP sensor.

CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p18 : DTC P0340, P0341; RIGHT-HAND CAMSHAFT POSITION (CMP) SENSOR CIRCUIT RANGE/PERFORMANCE, CIRCUIT MALFUNCTION

G258127t67 : CHECK THE CMP SENSOR FOR CORRECT INSTALLATION

1. Turn the ignition switch to the OFF position. 2. Check the CMP sensor for correct installation.

Is the CMP sensor correctly installed?

-> **Yes**

GO to Pinpoint Test G258127t68.

-> **No**

INSTALL the CMP sensor correctly.

CLEAR the DTCs. TEST the system for normal operation.

G258127t68 : CHECK THE CMP SENSOR FOR FOREIGN DEBRIS

1. Remove the CMP sensor and inspect for foreign debris.

Is the CMP sensor free of foreign debris?

-> Yes

GO to Pinpoint Test G258127t69.

-> No

CLEAN the sensor and wheel. INSTALL the sensor.

CLEAR the DTCs. TEST the system for normal operation.

G258127t69 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the CMP sensor electrical connector, PI23. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI23, pin 02 (Y) and PI01, pin 94 (Y).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t69.

G258127t70 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI23, pin 02 (Y) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t71.

G258127t71 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI23, pin 02 (Y) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t72.

G258127t72 : CHECK THE CMP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between PI23, pin 01 (R) and PI01, pin 95 (R).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new CMP sensor.

CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p19 : DTC P0480; RADIATOR COOLING FAN MODULE DRIVE CIRCUIT MALFUNCTION

G258127t73 : CHECK THE RADIATOR FAN MODULE PERMANENT SUPPLY

1. Disconnect the fan module electrical connector, GC04. 2. Measure the voltage between GC04 (NG) and GROUND.

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the cooling fan module and battery. This circuit includes fuse 35 of the front power distribution box (80A), and the high power protection module. For additional

information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

Reconnect electrical connector, GC04. GO to Pinpoint Test G258127t74.

G258127t74 : CHECK THE RADIATOR FAN MODULE GROUND

1. Disconnect the fan module electrical connector, GCU03. 2. Measure the resistance between GCU03 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

Reconnect electrical connector, GCU03. GO to Pinpoint Test G258127t75.

G258127t75 : CHECK THE RADIATOR FAN MODULE EMS SWITCHED SUPPLY

1. Disconnect the fan module electrical connector, GC01. 2. Turn the ignition switch to the ON position. 3. Make sure the EMS relay is engaged. 4. Measure the voltage between GC01, pin 02 (GU) and GROUND.

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the cooling fan module and battery. This circuit includes the front power distribution box, (fuse 14) the EMS control relay, and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t76.

G258127t76 : CHECK THE ECM TO RADIATOR FAN MODULE CIRCUIT FOR HIGH RESISTANCE

1. Turn the ignition switch to the OFF position. 2. Disconnect the battery negative terminal. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between GC01, pin 01 (WU) and PI01, pin 51 (W).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t77.

G258127t77 : CHECK THE ECM TO RADIATOR FAN MODULE CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between GC01, pin 01 (WU) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t78.

G258127t78 : CHECK THE ECM TO RADIATOR FAN MODULE CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between GC01, pin 01 (WU) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new radiator cooling fan module. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p20 : DTC P0560; BATTERY POWER SUPPLY VOLTAGE MALFUNCTION

G258127t79 : CHECK THE BATTERY POWER SUPPLY TO THE ECM

1. Disconnect the ECM electrical connector, PI01. 2. Measure the voltage between PI01, pin 22 (NR) and GROUND.

Is the voltage greater than 10 volts?

-> Yes

Recheck the DTCs.

-> No

REPAIR the battery power supply circuit. This circuit includes fuse 17 of the front power distribution box, and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p21 : DTC P1104; MASS AIR FLOW (MAF) SENSOR GROUND MALFUNCTION

G258127t80 : CHECK THE MAF SENSOR GROUND

1. Disconnect the MAF sensor electrical connector, PI14. 2. Turn the ignition switch to the ON position. 3. Measure the resistance between PI14, pin 02 (BK) and GROUND.

Is the resistance greater than 5 ohms?

-> Yes

GO to Pinpoint Test G258127t81.

-> No

INSTALL a new MAF sensor.

CLEAR the DTC. TEST the system for normal operation.

G258127t81 : CHECK THE MAF SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Measure the resistance between PI14, pin 02 (BK) and PI01, pins 45 and 46 (BK).

Is either resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t82.

G258127t82 : CHECK THE MAF SENSOR GROUND CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI14, pin 02 (BK) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

Contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G258127p22 : DTC P1122, P1123*; ACCELERATOR PEDAL POSITION (APP) SENSOR SENSING CIRCUIT 1 HIGH/LOW VOLTAGE

G258127t83 : CHECK THE APP SENSOR SENSING CIRCUIT 1 FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Disconnect the APP sensor electrical connector, CR14. 4. Measure the resistance between CR14, pin 01 (Y) and PI01, pin 103 (Y).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t84.

G258127t84 : CHECK THE APP SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between CR14, pin 01 (Y) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t85.

G258127t85 : CHECK THE APP SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between CR14, pin 01 (Y) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t86.

G258127t86 : CHECK THE APP SENSOR SUPPLY VOLTAGE AT THE SENSOR

1. Reconnect the ECM electrical connector, PI01. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between CR14, pin 02 (OY) and GROUND.

Is the voltage less than 4 volts?

-> Yes

GO to Pinpoint Test G258127t87.

-> No

INSTALL a new APP sensor.

Accelerator Pedal (19.20.01) CLEAR the DTC. TEST the system for normal operation.

G258127t87 : CHECK THE APP SENSOR SUPPLY VOLTAGE CIRCUIT FOR HIGH RESISTANCE

1. Turn the ignition switch to the OFF position. 2. Disconnect the ECM electrical connector, PI01. 3. Measure the resistance between PI01, pin 12 (OY) and CR14, pin 02 (OY).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

Check the ECM power supplies (recheck DTCs. P1104 may be flagged).

PINPOINT TEST G258127p23 : DTC P1215, P1216*; ACCELERATOR PEDAL POSITION (APP) SENSOR SENSING CIRCUIT 2 HIGH/LOW VOLTAGE

G258127t88 : CHECK THE APP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Disconnect the APP sensor electrical connector, CR14. 4. Measure the resistance between CR14, pin 04 (R) and PI01, pin 102 (R).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t89.

G258127t89 : CHECK THE APP SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between CR14, pin 04 (R) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t90.

G258127t90 : CHECK THE APP SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between CR14, pin 04 (R) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t91.

G258127t91 : CHECK THE APP SENSOR SUPPLY VOLTAGE AT THE SENSOR

1. Reconnect the ECM electrical connector, PI01. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between CR14, pin 05 (Y) and GROUND.

Is the voltage less than 4 volts?

-> **Yes**

GO to Pinpoint Test G258127t92.

-> **No**

INSTALL a new APP sensor.

Accelerator Pedal (19.20.01) CLEAR the DTC. TEST the system for normal operation.

G258127t92 : CHECK THE APP SENSOR SUPPLY VOLTAGE CIRCUIT FOR HIGH RESISTANCE

1. Turn the ignition switch to the OFF position. 2. Disconnect the ECM electrical connector, PI01. 3. Measure the resistance between CR14, pin 05 (Y) and PI01, pin 13 (Y).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the

DTC. TEST the system for normal operation.

-> **No**

Check the ECM power supplies (recheck DTCs. P1104 may be flagged).

PINPOINT TEST G258127p24 : DTC P1229; THROTTLE MOTOR CONTROL CIRCUIT MALFUNCTION

G258127t93 : CHECK THE THROTTLE MOTOR - TO ECM CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the throttle motor electrical connector, PI18. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI18, pin 01 (GW) and PI01, pin 80 (GW).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t94.

G258127t94 : CHECK THE THROTTLE MOTOR + TO ECM CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between PI18, pin 02 (RW) and PI01, pin 106 (RW).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new throttle body.

Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 (19.70.04) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p25 : DTC P1240, P1241, P1242; SENSOR SUPPLY

VOLTAGE MALFUNCTION, HIGH/LOW VOLTAGE

G258127t95 : CHECK THE SUPPLY VOLTAGE AT THE APP SENSOR

1. Disconnect the APP sensor electrical connector, CR14. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between CR14, pin 02 (OY) and GROUND.

Is the voltage less than 5 volts?

-> Yes

GO to Pinpoint Test G258127t96.

-> No

GO to Pinpoint Test G258127t97.

G258127t96 : CHECK THE APP SENSOR SUPPLY VOLTAGE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between CR14, pin 02 (OY) and PI01, pin 12 (OY).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t97.

G258127t97 : CHECK THE APP SENSOR SUPPLY VOLTAGE CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Turn the ignition switch to the ON position. 2. Measure the voltage between CR14, pin 02 (OY) and GROUND.

Is the voltage greater than 6 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t98.

G258127t98 : CHECK THE APP SENSOR SUPPLY VOLTAGE CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between CR14, pin 02 (OY) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t99.

G258127t99 : CHECK THE SUPPLY VOLTAGE AT THE TP SENSOR

1. Disconnect the throttle position sensor electrical connector, PI26. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI26, pin 04 (OY) and GROUND.

Is the voltage less than 5 volts?

-> Yes

GO to Pinpoint Test G258127t100.

-> No

GO to Pinpoint Test G258127t101.

G258127t100 : CHECK THE TP SENSOR SUPPLY VOLTAGE CIRCUIT FOR HIGH RESISTANCE

1. Turn the ignition switch to the OFF position. 2. Disconnect the ECM electrical connector, PI01. 3. Measure the resistance between PI26, pin 04 (OY) and PI01, pin 12 (OY).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t101.

G258127t101 : CHECK THE TP SENSOR SUPPLY VOLTAGE CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Turn the ignition switch to the ON position. 2. Measure the voltage between PI26, pin 04 (OY) and GROUND.

Is the voltage greater than 6 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t102.

G258127t102 : CHECK THE TP SENSOR SUPPLY VOLTAGE CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI26, pin 04 (OY) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t103.

G258127t103 : CHECK THE SUPPLY VOLTAGE AT THE FUEL TANK PRESSURE SENSOR

1. Disconnect the fuel tank pressure sensor electrical connector, FP01. 2. Reconnect the ECM electrical connector, PI01. 3. Turn the ignition switch to the ON position. 4. Measure the voltage between FO01, pin 03 (OY) and GROUND.

Is the voltage less than 5 volts?

-> Yes

GO to Pinpoint Test G258127t104.

-> No

GO to Pinpoint Test G258127t105.

G258127t104 : CHECK THE FUEL TANK PRESSURE SENSOR SUPPLY VOLTAGE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between FP01, pin 03 (OY) and PI01, pin 12 (OY).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t105.

G258127t105 : CHECK THE FUEL TANK PRESSURE SENSOR SUPPLY VOLTAGE CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Turn the ignition switch to the ON position. 2. Measure the voltage between FP01, pin 03 (OY) and GROUND.

Is the voltage greater than 6 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t106.

G258127t106 : CHECK THE FUEL TANK PRESSURE SENSOR SUPPLY VOLTAGE CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between FP01, pin 03 (OY) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t107.

G258127t107 : CHECK THE SUPPLY VOLTAGE AT THE MANIFOLD ABSOLUTE PRESSURE SENSOR

1. Disconnect the MAP sensor electrical connector, PI29. 2. Reconnect the ECM electrical connector, PI01. 3. Turn the ignition switch to the ON position. 4. Measure the voltage between PI29, pin 02 (OY) and GROUND.

Is the voltage less than 5 volts?

-> Yes

GO to Pinpoint Test G258127t108.

-> No

GO to Pinpoint Test G258127t109.

G258127t108 : CHECK THE MANIFOLD ABSOLUTE PRESSURE SENSOR SUPPLY VOLTAGE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between PI29, pin 02 (OY) and PI01, pin 12 (OY).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t109.

G258127t109 : CHECK THE MANIFOLD ABSOLUTE PRESSURE SENSOR SUPPLY VOLTAGE CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Turn the ignition switch to the ON position. 2. Measure the voltage between PI29, pin 02 (OY) and GROUND.

Is the voltage greater than 6 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t110.

G258127t110 : CHECK THE MANIFOLD ABSOLUTE PRESSURE SENSOR SUPPLY VOLTAGE CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI29, pin 02 (OY) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t111.

G258127t111 : CHECK THE SUPPLY VOLTAGE AT THE FUEL RAIL PRESSURE (FRP) SENSOR

1. Disconnect the FRP sensor electrical connector, PI28. 2. Reconnect the ECM electrical connector, PI01. 3. Turn the ignition switch to the ON position. 4. Measure the voltage between PI28, pin 01 (OY) and GROUND.

Is the voltage less than 5 volts?

-> Yes

GO to Pinpoint Test G258127t112.

-> No

GO to Pinpoint Test G258127t113.

G258127t112 : CHECK THE FUEL RAIL PRESSURE (FRP) SENSOR SUPPLY VOLTAGE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between PI28, pin 01 (OY) and PI01, pin 12 (OY).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t113.

G258127t113 : CHECK THE FUEL RAIL PRESSURE (FRP) SENSOR SUPPLY VOLTAGE CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Turn the ignition switch to the ON position. 2. Measure the voltage between PI28, pin 02 (OY) and GROUND.

Is the voltage greater than 6 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t114.

G258127t114 : CHECK THE FUEL RAIL PRESSURE (FRP) SENSOR SUPPLY VOLTAGE CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI28, pin 02 (OY) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

Check for DTCs relating to individual sensors, and/or sensor GROUND. Carry out pinpoint tests for sensors indicated.

PINPOINT TEST G258127p26 : DTC P1243; SENSOR GROUND CIRCUITS OPEN CIRCUIT

G258127t115 : CHECK THE SENSOR GROUND AT THE THROTTLE POSITION (TP) SENSORS

1. Disconnect the throttle sensor electrical connector, PI26. 2. Measure the resistance between PI26, pin 01 (BG) and GROUND.

Is the resistance greater than 5 ohms?

-> Yes

GO to Pinpoint Test G258127t116.

-> **No**

GO to Pinpoint Test G258127t117.

G258127t116 : CHECK THE THROTTLE POSITION (TP) SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between PI26, pin 01 (BG) and PI01, pin 19 (BG).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t117.

G258127t117 : CHECK THE SENSOR GROUND AT THE ACCELERATOR PEDAL POSITION (APP) SENSOR

1. Disconnect the APP sensor electrical connector, CR14. 2. Reconnect the ECM electrical connector, PI01. 3. Measure the resistance between CR14, pin 06 (BG) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

GO to Pinpoint Test G258127t118.

-> **No**

GO to Pinpoint Test G258127t119.

G258127t118 : CHECK THE ACCELERATOR PEDAL POSITION (APP) SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between CR14, pin 06 (BG) and PI01, pin 19 (BG).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t119.

G258127t119 : CHECK THE SENSOR GROUND AT THE FUEL TANK PRESSURE (FTP) SENSOR

1. Disconnect the FTP sensor electrical connector, FP01. 2. Reconnect the ECM electrical connector, PI01. 3. Measure the resistance between FP01, pin 01 (BG) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

GO to Pinpoint Test G258127t120.

-> **No**

GO to Pinpoint Test G258127t121.

G258127t120 : CHECK THE FUEL TANK PRESSURE (FTP) SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between FP01, pin 01 (BG) and PI01, pin 19 (BG).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t121.

G258127t121 : CHECK THE SENSOR GROUND AT THE ENGINE COOLANT TEMPERATURE (ECT) SENSOR

1. Reconnect the ECM electrical connector, PI01. 2. Disconnect the ECT sensor electrical connector, PI25. 3. Measure the resistance between PI25, pin 01 (BG) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

GO to Pinpoint Test G258127t122.

-> **No**

GO to Pinpoint Test G258127t123.

G258127t122 : CHECK THE ENGINE COOLANT TEMPERATURE (ECT) SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between PI25, pin 01 (BG) and PI01, pin 19 (BG).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t123.

G258127t123 : CHECK THE SENSOR GROUND AT THE MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

1. Disconnect the MAP sensor electrical connector, PI29. 2. Reconnect the ECM electrical connector, PI01. 3. Measure the resistance between PI29, pin 04 (BG) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

GO to Pinpoint Test G258127t124.

-> **No**

GO to Pinpoint Test G258127t125.

G258127t124 : CHECK THE MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between PI29, pin 04 (BG) and PI01, pin 19 (BG).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t125.

G258127t125 : CHECK THE SENSOR GROUND AT THE FUEL TEMPERATURE (FT) SENSOR

1. Disconnect the FT sensor electrical connector, IL09. 2. Reconnect the ECM electrical connector, PI01. 3. Measure the resistance between IL09, pin 02 (BG) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

GO to Pinpoint Test G258127t126.

-> **No**

GO to Pinpoint Test G258127t127.

G258127t126 : CHECK THE FUEL TEMPERATURE (FT) SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between IL09, pin 02 (BG) and PI01, pin 19 (BG).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t127.

G258127t127 : CHECK THE SENSOR GROUND AT THE FUEL RAIL PRESSURE (FRP) SENSOR

1. Disconnect the FRP sensor electrical connector, IL12. 2. Reconnect the ECM electrical connector, PI01. 3. Measure the resistance between IL12, pin 02 (BG) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

GO to Pinpoint Test G258127t128.

-> **No**

GO to Pinpoint Test G258127t129.

G258127t128 : CHECK THE FUEL RAIL PRESSURE (FRP) SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between IL12, pin 02 (BG) and PI01, pin 19 (BG).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t129.

G258127t129 : CHECK THE SENSOR GROUND AT THE ENGINE OIL TEMPERATURE (EOT) SENSOR

1. Disconnect the EOT sensor electrical connector, PI38. 2. Reconnect the ECM electrical connector, PI01. 3. Measure the resistance between PI24, pin 02 (BG) and GROUND.

Is the resistance greater than 5 ohms?

-> Yes

GO to Pinpoint Test G258127t130.

-> No

GO to Pinpoint Test G258127t131.

G258127t130 : CHECK THE ENGINE OIL TEMPERATURE (EOT) SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between PI24, pin 02 (BG) and PI01, pin 19 (BG).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t131.

G258127t131 : CHECK THE SENSOR GROUND AT THE A/C PRESSURE SENSOR

1. Disconnect the A/C pressure sensor electrical connector, EC11. 2. Reconnect the ECM electrical connector, PI01. 3. Measure the resistance between EC11, pin 01 (BG) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

GO to Pinpoint Test G258127t132.

-> **No**

Check for DTCs relating to individual sensors. Carry out pinpoint tests for sensors indicated.

G258127t132 : CHECK THE A/C PRESSURE SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI01. 2. Measure the resistance between EC11, pin 02 (BG) and PI01, pin 19 (BG).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

Check for DTCs relating to individual sensors. Carry out pinpoint tests for sensors indicated.

PINPOINT TEST G258127p27 : DTC P1245, P1246; ENGINE CRANK SIGNAL LOW/HIGH VOLTAGE

G258127t133 : CHECK THE IGNITION SWITCH TO ECM CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ignition switch electrical connector, IP34. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between IP34, pin 01 (Y) and PI01, pin 06 (Y).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t134.

G258127t134 : CHECK THE IGNITION SWITCH TO ECM CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between IP34, pin 01 (Y) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new ignition switch. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p28 : DTC P1340, P1341; LEFT-HAND CAMSHAFT POSITION (CMP) SENSOR CIRCUIT MALFUNCTION RANGE/PERFORMANCE

G258127t135 : CHECK THE CMP SENSOR FOR CORRECT INSTALLATION

1. Check the CMP sensor for correct installation.

Is the CMP sensor correctly installed?

-> **Yes**

GO to Pinpoint Test G258127t136.

-> **No**

INSTALL the CMP sensor correctly.
CLEAR the DTCs. TEST the system for normal operation.

G258127t136 : CHECK THE CMP SENSOR FOR FOREIGN DEBRIS

1. Remove the CMP sensor and inspect for foreign debris.

Is the CMP sensor free of foreign debris?

-> **Yes**

GO to Pinpoint Test G258127t137.

-> **No**

CLEAN the sensor and wheel. INSTALL the sensor.

CLEAR the DTCs. TEST the system for normal operation.

G258127t137 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the CMP sensor electrical connector, PI56. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI01, pin 68 (N) and PI56, pin 01 (N).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t138.

G258127t138 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI01, pin 68 (N) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t139.

G258127t139 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI56, pin 01 (N) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new CMP sensor.

CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p29 : DTC P0010, P1384; RIGHT-HAND VARIABLE CAMSHAFT TIMING (VCT) OIL CONTROL SOLENOID MALFUNCTION, CIRCUIT MALFUNCTION

G258127t140 : CHECK ECM TO VCT SOLENOID + CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the VCT electrical connector, PI16. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI16, pin 01 (Y) and PI01, pin 109 (Y).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t141.

G258127t141 : CHECK ECM TO VCT SOLENOID + CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI16, pin 01 (Y) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams.
CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t141.

G258127t142 : CHECK ECM TO VCT SOLENOID + CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI16, pin 01 (Y) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t143.

G258127t143 : CHECK VCT SOLENOID GROUND

1. Measure the resistance between PI16, pin 02 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new VCT solenoid.

CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p30 : DTC P1396; LEFT-HAND VARIABLE CAMSHAFT TIMING (VCT) OIL

CONTROL SOLENOID MALFUNCTION, CIRCUIT MALFUNCTION

G258127t144 : CHECK ECM TO VCT SOLENOID + CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the VCT electrical connector, PI17. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI17, pin 01 (YU) and PI01, pin 110 (YU).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t145.

G258127t145 : CHECK ECM TO VCT SOLENOID + CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI17, pin 01 (YU) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t146.

G258127t146 : CHECK ECM TO VCT SOLENOID + CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI17, pin 01 (YU) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t147.

G258127t147 : CHECK VCT SOLENOID GROUND

1. Disconnect the battery negative terminal. 2. Measure the resistance between PI17, pin 02 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new VCT solenoid.

CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p31 : DTC P1582; "FLIGHT RECORDER" DATA IS STORED IF ANY ONE OF FIVE CONDITIONS OCCUR

G258127t148 : CHECK THE INERTIA SWITCH TO ECM CIRCUIT FOR SHORT CIRCUIT TO B+ VOLTAGE

1. Make sure the inertia switch is not tripped. 2. Disconnect the inertia switch electrical connector, CR02. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the voltage between PI01, pin 10 (GU) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit to B+. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new inertia switch. CLEAR the DTC. CLEAR the flight recorder information. TEST the system for normal operation.

PINPOINT TEST G258127p32 : DTC P1606; EMS CONTROL RELAY MALFUNCTION

G258127t149 : CHECK THE EMS RELAY PERMANENT B+ SUPPLY

1. Remove the EMS relay. 2. Measure the voltage between the relay base, pins 02 and 03 and GROUND.

Are both voltages greater than 10 volts?

-> Yes

GO to Pinpoint Test G258127t151.

-> No

REPAIR the circuit between the relay base and battery. This circuit includes the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

G258127t150 : CHECK THE EMS RELAY TO ECM CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Measure the resistance between the relay base, pin 05 and PI01, pins 23 (WR) and 24 (WR).

Is either resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t151.

G258127t151 : CHECK THE ECM TO EMS RELAY CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Measure the resistance between the relay base, pin 01 and PI01, pin 40 (U).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the

DTC. TEST the system for normal operation.

-> **No**

INSTALL a new EMS relay. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p33 : P0105, P1107, P1108; MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR SENSING CIRCUIT MALFUNCTION, HIGH/LOW VOLTAGE

G258127t152 : CHECK THE MAP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the MAP sensor electrical connector, PI29. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI29, pin 01 (BK) and PI01, pin 127 (BK).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t153.

G258127t153 : CHECK THE MAP SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Measure the voltage between PI29, pin 01 (BK) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t154.

G258127t154 : CHECK THE MAP SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Measure the resistance between PI29, pin 01 (BK) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new MAP sensor.

CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, contact dealer technical support for advice on possible ECM failure.

PINPOINT TEST G258127p34 : DTC P0181, P0182, P0183; ENGINE FUEL TEMPERATURE (EFT) SENSOR RANGE/PERFORMANCE, LOW/HIGH VOLTAGE

G258127t155 : CHECK THE EFT SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the EFT sensor electrical connector, IL09. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between IL09, pin 01 (WU) and PI01, pin 50 (WU).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t156.

G258127t156 : CHECK THE EFT SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between IL09, pin 01 (WU) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams.
CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t157.

G258127t157 : CHECK THE EFT SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between IL09, pin 01 (WU) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new EFT sensor.

CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p35 : DTC P0532, P0533; AIR CONDITIONING PRESSURE SENSOR CIRCUIT LOW/HIGH VOLTAGE

G258127t158 : CHECK THE A/C PRESSURE SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the A/C pressure sensor electrical connector, EC11. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between EC11, pin 02 (WU) and PI01, pin 121 (WU).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t159.

G258127t159 : CHECK THE A/C PRESSURE SENSOR SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the ECM electrical connector, PI01. 2. Reconnect the battery negative terminal. 3. Turn the ignition switch to the ON position. 4. Measure the voltage between EC11, pin 02 (WU) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G258127t160.

G258127t160 : CHECK THE A/C PRESSURE SENSOR SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between EC11, pin 02 (WU) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new A/C pressure sensor.

Pressure Cutoff Switch - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (82.10.32)

PINPOINT TEST G258127p36 : P1251, P1631, P1657, P1658; THROTTLE MOTOR RELAY CONTROL CIRCUIT MALFUNCTION/OFF FAILURE/ON FAILURE

G258127t161 : CHECK THE THROTTLE MOTOR RELAY POWER SUPPLIES

1. Remove the throttle motor relay. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between the relay base, pins 01 and 03 and GROUND.

Is either voltage less than 10 volts?

-> Yes

REPAIR the circuit between the relay base and battery. This circuit includes the front power distribution box (fuse 14). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t162.

G258127t162 : CHECK THE THROTTLE MOTOR RELAY COIL DRIVE CIRCUIT FROM THE ECM FOR HIGH RESISTANCE

1. Turn the ignition switch to the OFF position. 2. Disconnect the battery negative terminal. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between the relay base, pin 02 and PI01, pin 52 (GR).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t163.

G258127t163 : CHECK THE THROTTLE MOTOR RELAY COIL DRIVE CIRCUIT FROM THE ECM FOR SHORT TO B +

1. Reconnect the battery negative terminal. 2. Measure the voltage between the relay base, pin 02 and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t164.

G258127t164 : CHECK THE POWER SUPPLY CIRCUIT FROM THE RELAY BASE TO THE ECM FOR HIGH RESISTANCE

1. Measure the resistance between the relay base, pin 05 and PI01, pin 134 (GU).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. This circuit includes the front power distribution box (fuse 24). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t165.

G258127t165 : CHECK THE POWER SUPPLY CIRCUIT FROM THE RELAY BASE TO THE ECM FOR SHORT TO B +

1. Measure the voltage between the relay base, pin 05 and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new throttle motor relay. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p37 : P0096, P0097, P0098; INTAKE AIR TEMPERATURE (IAT) SENSOR 2 SENSING CIRCUIT RANGE/PERFORMANCE, HIGH/LOW VOLTAGE

G258127t166 : CHECK IAT SENSOR 2 SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the IAT sensor 2 electrical connector, PI43. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between PI43, pin 01 (YU) and PI01, pin 72 (YU).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t167.

G258127t167 : CHECK IAT SENSOR 2 SENSING CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between PI43, pin 01 (YU) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t168.

G258127t168 : CHECK IAT SENSOR 2 SENSING CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between PI43, pin 01 (YU) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new IATS 2.

CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p38 : P1410; AIR CLEANER SOLENOID VALVE DRIVE CIRCUIT MALFUNCTION

G258127t169 : CHECK THE POWER SUPPLY TO THE AIR CLEANER SOLENOID VALVE

1. Disconnect the air cleaner solenoid valve electrical connector, EC37. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between EC37, pin 01 (GU) and GROUND.

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G258127t170.

-> No

REPAIR the circuit between the air cleaner solenoid valve and battery. This circuit includes the front power distribution box (fuse 14), the EMS relay, and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

G258127t170 : CHECK THE AIR CLEANER SOLENOID VALVE TO ECM CIRCUIT FOR HIGH RESISTANCE

1. Turn the ignition switch to the OFF position. 2. Disconnect the battery negative terminal. 3. Disconnect the ECM electrical connector, PI01. 4. Measure the resistance between EC37, pin 02 (U) and PI01, pin 14 (U).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t171.

G258127t171 : CHECK THE AIR CLEANER SOLENOID VALVE TO ECM CIRCUIT FOR SHORT TO HIGH VOLTAGE

1. Reconnect the battery negative terminal. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between EC37, pin 02 (U) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t172.

G258127t172 : CHECK THE AIR CLEANER SOLENOID VALVE TO ECM CIRCUIT FOR SHORT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between EC37, pin 02 (U) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new air cleaner solenoid valve. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G258127p39 : DTC P1474; CHECK INTERCOOLER COOLANT PUMP FUNCTION

G258127t173 : CHECK POWER SUPPLY TO INTERCOOLER COOLANT PUMP

1. Disconnect the intercooler coolant pump electrical connector, CP02. 2. Turn the ignition switch to the ON position. 3. Make sure the EMS relay is energized. 4. Measure the voltage between CP02, pin 02 (NG) and GROUND.

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between CP02, pin 02 and battery. This circuit includes the front power distribution box (fuse 31), the ignition relay, and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G258127t174.

G258127t174 : CHECK THE INTERCOOLER COOLANT PUMP GROUND

1. Measure the resistance between CP02, pin 01 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. TEST the

system for normal operation.

-> **No**

INSTALL a new intercooler coolant pump.

Water Pump CLEAR the DTC. TEST the system for normal operation.

Electronic Engine Controls - VIN Range: G45704->G99999

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit, plus the addition of secondary air injection and changes to evaporative emissions and exhaust gas recirculation to comply with stage four emissions requirements.

For more information on these systems,

Electronic Engine Controls

Engine Emission Control - VIN Range: G45704->G99999

Evaporative Emissions - VIN Range: G45704->G99999

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Engine oil level	Fuses
Cooling system coolant level	Wiring harness
Fuel level	Electrical connector(s)
Fuel contamination/grade/quality	Sensor(s)
Throttle body	Engine control module (ECM)
Poly-vee belt	Transmission control module

- 1 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
- 2 . If the cause is not visually evident, use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC Index, or the symptom chart if no DTCs are set.

Symptom Chart

Symptom (general)	Symptom (specific)	Possible source	Action
-------------------	--------------------	-----------------	--------

Non-Start	Engine does not crank	Security system /Immobilizer engaged Engine in shut-down mode ECM relay Battery Park/Neutral switch Starting system Harness Engine seized	Check that the security system is disarmed. Check for DTCS. For starting system, For ECM relay tests, GO to Pinpoint Test G531332p32. For battery information, Battery For Park/Neutral tests, External Controls For engine information, Engine
	Engine cranks, but does not fire	Engine breather system disconnected/restricted Ignition system Fuel system Harness Crankshaft position (CKP) sensor ECM fault	Check the engine breather system, Engine Emission Control - VIN Range: G45704->G99999 For ignition system tests, Engine Ignition - VIN Range: G45704->G99999 For fuel system tests, Fuel Charging and Controls - VIN Range: G45704->G99999 For CKP tests, GO to Pinpoint Test G531332p17. Refer to the warranty policy and procedures manual if an ECM is suspect.
	Engine cranks and fires, but will not start	Evaporative emissions purge valve Fuel pump Spark plugs Ignition coil failure(s) Harness	For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999 For fuel system tests, Fuel Charging and Controls - VIN Range: G45704->G99999 For ignition system tests, Engine Ignition - VIN Range: G45704->G99999
Difficult to start	Difficult to start cold	Check coolant anti-freeze content	For battery information, Battery For CKP sensor tests, GO to Pinpoint Test

		<p>Battery</p> <p>CKP sensor</p> <p>Exhaust gas recirculation (EGR) valve stuck open</p> <p>Fuel pump</p> <p>Evaporative emissions purge valve</p>	<p>G531332p17.</p> <p>For EGR system tests, Engine Emission Control - VIN Range: G45704->G99999 For fuel system tests, Fuel Charging and Controls - VIN Range: G45704->G99999 For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999</p>
	Difficult to start hot	<p>Injector leak</p> <p>Engine fuel temperature (EFT) sensor</p> <p>Intake air temperature (IAT) sensor</p> <p>Mass air flow (MAF) sensor</p> <p>Evaporative emissions purge valve</p> <p>Fuel pump</p> <p>Ignition system</p>	<p>For fuel system tests, Fuel Charging and Controls - VIN Range: G45704->G99999 For EFT sensor tests, GO to Pinpoint Test G531332p34.</p> <p>For IAT sensor tests, GO to Pinpoint Test G531332p2.</p> <p>For MAF sensor tests, GO to Pinpoint Test G531332p1.</p> <p>For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999</p>
	Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)	<p>Injector leak</p> <p>EFT sensor</p> <p>IAT sensor</p> <p>MAF sensor</p> <p>Evaporative emissions purge valve</p> <p>Fuel pump</p> <p>Ignition system</p>	<p>For fuel system tests, Fuel Charging and Controls - VIN Range: G45704->G99999 For EFT sensor tests, GO to Pinpoint Test G531332p34.</p> <p>For IAT sensor tests, GO to Pinpoint Test G531332p2.</p> <p>For MAF sensor tests, GO to Pinpoint Test G531332p1.</p> <p>For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999</p>
	Engine cranks too fast/slow	<p>Compressions high/low</p> <p>Battery</p> <p>Starting system</p>	<p>Check compressions, Engine For battery information, Battery For starting system tests,</p>

Engine stalls	Engine stalls soon after start	<p>Breather system disconnected/restricted</p> <p>ECM relay</p> <p>MAF sensor</p> <p>Ignition system</p> <p>Air filter restricted</p> <p>Fuel lines</p> <p>Fuel rail pressure (FRP) sensor</p> <p>Air leakage</p>	<p>Check the engine breather system,</p> <p>Engine Emission Control - VIN Range: G45704->G99999 For ECM relay tests, GO to Pinpoint Test G531332p32.</p> <p>For MAF sensor tests, GO to Pinpoint Test G531332p1.</p> <p>For ignition system tests, Engine Ignition - VIN Range: G45704->G99999 For air filter information,</p> <p>Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For fuel system, Fuel Charging and Controls - VIN Range: G45704->G99999 For FRP sensor tests, GO to Pinpoint Test G531332p40.</p> <p>For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999</p>
	Engine stalls on overrun	<p>ECM relay</p> <p>Throttle position (TP) sensors</p>	<p>For ECM relay tests, GO to Pinpoint Test G531332p32.</p> <p>For TP sensor tests, GO to Pinpoint Test G531332p4. and GO to Pinpoint Test G531332p5.</p> <p>For fuel system tests, Fuel Charging and Controls - VIN Range: G45704->G99999</p>
	Engine stalls at steady speed	<p>ECM relay</p> <p>CKP sensor</p> <p>TP sensors</p>	<p>For ECM relay tests, GO to Pinpoint Test G531332p32.</p> <p>For fuel system, Fuel Charging and Controls - VIN Range: G45704->G99999 For CKP sensor tests, GO to Pinpoint Test G531332p17.</p> <p>For TP sensor tests, GO to Pinpoint Test G531332p4. and GO to Pinpoint Test</p>

			G531332p5.
	Engine stalls with speed control enabled	ECM relay	For ECM relay tests, GO to Pinpoint Test G531332p32.
	Engine stalls when maneuvering	<p>ECM relay</p> <p>TP sensors</p> <p>Additional engine loads (PAS, air conditioning, etc)</p> <p>Transmission malfunction</p> <p>CAN malfunction</p>	<p>For ECM relay tests, GO to Pinpoint Test G531332p32.</p> <p>For TP sensor tests, GO to Pinpoint Test G531332p4. and GO to Pinpoint Test G531332p5.</p> <p>For accessory drive information, Accessory Drive Belt - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.5L NA V8 - AJV8 (12.10.40) For transmission information, For CAN network tests,</p>
Poor driveability	Engine hesitates/poor acceleration	<p>Fuel pump</p> <p>Fuel lines</p> <p>Injector leak</p> <p>Fuel pressure</p> <p>Air leakage</p> <p>TP sensors</p> <p>Throttle motor</p> <p>Ignition system</p> <p>EGR valve stuck</p> <p>HO2 sensors</p> <p>Transmission malfunction</p> <p>Restricted pedal travel (carpet, etc)</p> <p>Accelerator pedal position (APP) sensor</p>	<p>For fuel pump and fuel line tests,</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999</p> <p>For injector tests,</p> <p>Fuel Charging and Controls - VIN Range: G45704->G99999 For intake system,</p> <p>Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For TP sensor tests, GO to Pinpoint Test G531332p4.</p> <p>and GO to Pinpoint Test G531332p5.</p> <p>For throttle motor tests, GO to Pinpoint Test G531332p24.</p> <p>For ignition system tests, Engine Ignition - VIN Range: G45704->G99999 For EGR tests,</p> <p>Engine Emission Control - VIN Range: G45704->G99999 Check</p>

			for DTCs relating to HO2 sensors, refer to the DTC index. For transmission information, Check the accelerator pedal travel. For APP sensor tests, GO to Pinpoint Test G531332p22. and GO to Pinpoint Test G531332p23.
	Engine backfires	Fuel pump Fuel lines Air leakage MAF sensor HO2 sensors Ignition system Sticking variable camshaft timing (VCT) hub APP sensor	For fuel pump and lines tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For MAF sensor tests, GO to Pinpoint Test G531332p1. Check for DTCs relating to HO2 sensors, refer to the DTC index. For ignition system, Engine Ignition - VIN Range: G45704->G99999 For VCT information, Engine For APP sensor tests, GO to Pinpoint Test G531332p22. and GO to Pinpoint Test G531332p23.
	Engine surges	Fuel pump Fuel lines MAF sensor Harness TP sensors Throttle motor Ignition system	Check the fuel pressure and fuel lines. Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For MAF sensor tests, GO to Pinpoint Test G531332p1. For TP sensor tests, GO to Pinpoint Test G531332p4. and GO to Pinpoint Test G531332p5. For throttle motor tests, GO to

			Pinpoint Test G531332p24. For ignition system, Engine Ignition - VIN Range: G45704->G99999
	Engine detonates/knocks	<p>Knock sensor (KS)/circuit malfunction</p> <p>Fuel pump</p> <p>Fuel lines</p> <p>Fuel quality</p> <p>FRP sensor</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Air leakage</p> <p>Sticking VCT hub</p> <p>BARO sensor malfunction (internal ECM fault)</p>	<p>For KS circuit tests, GO to Pinpoint Test G531332p15. and GO to Pinpoint Test G531332p16.</p> <p>Check the fuel pressure and fuel lines.</p> <p>Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999</p> <p>For FRP sensor tests, GO to Pinpoint Test G531332p40.</p> <p>For MAF sensor tests, GO to Pinpoint Test G531332p1.</p> <p>Check for DTCs relating to HO2 sensors, refer to the DTC index.</p> <p>For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check DTCs for VCT range/performance fault. For VCT information, Engine Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
	No throttle response	<p>APP sensor malfunction</p> <p>TP sensors</p> <p>Throttle motor</p>	<p>GO to Pinpoint Test G531332p4. and GO to Pinpoint Test G531332p5.</p> <p>For TP sensor tests, GO to Pinpoint Test G531332p4. and GO to Pinpoint Test G531332p5.</p> <p>For throttle motor tests, GO to Pinpoint Test G531332p24.</p>
	Speed control inhibited or disabled	Default mode enabled	Check message center for default message. For speed control switches,

		<p>Speed control switch</p> <p>TP sensors</p> <p>Brake pedal switch switch</p> <p>CAN fault</p>	<p>Speed Control - VIN Range: G45704->G99999 For TP sensor tests, GO to Pinpoint Test G531332p4.</p> <p>and GO to Pinpoint Test G531332p5.</p> <p>For brake pedal switch tests, GO to Pinpoint Test G531332p42.</p> <p>For CAN tests,</p>
	Poor throttle response	<p>APP sensor malfunction</p> <p>TP sensors</p> <p>ECT sensor</p> <p>MAF sensor</p> <p>Transmission malfunction</p> <p>Traction control event</p> <p>Air leakage</p> <p>Breather system disconnected/restricted</p>	<p>For APP sensor tests, GO to Pinpoint Test G531332p22.</p> <p>and GO to Pinpoint Test G531332p23.</p> <p>For TP sensor tests, GO to Pinpoint Test G531332p4.</p> <p>and GO to Pinpoint Test G531332p5.</p> <p>For ECT sensor tests, GO to Pinpoint Test G531332p3.</p> <p>For MAF sensor tests, GO to Pinpoint Test G531332p1.</p> <p>For transmission information.</p> <p>For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For breather system information,</p>
	Engine defaults, warning light and messages. Refer to the owner handbook	<p>Park/Neutral switch</p> <p>TP sensors</p> <p>MAF sensor</p> <p>ECT sensor</p> <p>Harness</p>	<p>For Park/Neutral tests, External Controls For TP sensor tests, GO to Pinpoint Test G531332p4.</p> <p>and GO to Pinpoint Test G531332p5.</p> <p>For MAF sensor tests, GO to Pinpoint Test G531332p1.</p> <p>For ECT sensor tests, GO to Pinpoint Test G531332p3.</p>

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

DTC	Description	Possible causes	Action
C003100	Left front wheel speed sensor	Invalid data received from ABS: left front wheel speed signal	Anti-Lock Control - Stability Assist - VIN Range: G45704->G99999
C003400	Right front wheel speed sensor	Invalid data received from ABS: right front wheel speed signal	Anti-Lock Control - Stability Assist - VIN Range: G45704->G99999
C003700	Left rear wheel speed sensor	Invalid data received from ABS: left rear wheel speed signal	Anti-Lock Control - Stability Assist - VIN Range: G45704->G99999
C003A00	Right rear wheel speed sensor	Invalid data received from ABS: right rear wheel speed signal	Anti-Lock Control - Stability Assist - VIN Range: G45704->G99999
P001100	Intake (A) camshaft position timing - over-advanced (right hand bank)	Cam timing has not been set up correctly Timing chain has slipped	Check the engine timing. Timing Drive Components - VIN Range: G45704->G99999 (12.65.13)
P001200	Intake (A) camshaft position timing - over-retarded (right hand bank)	Cam timing has not been set up correctly Timing chain has slipped	Check the engine timing. Timing Drive Components - VIN Range: G45704->G99999 (12.65.13)
P001600	Crankshaft position (CKP)/Camshaft position	The relative positions of the CKP and CMP teeth are not correct Sensors	Reset the sensor positions.

	(CMP) sensor correlation, right hand bank	incorrectly aligned on rebuild	Camshaft Position (CMP) Sensor LH (18.31.12) Camshaft Position (CMP) Sensor RH (18.31.11) Crankshaft Position (CKP) Sensor (18.30.12)
P001800	Crankshaft position (CKP)/Camshaft position (CMP) sensor correlation, left hand bank	The relative positions of the CKP and CMP teeth are not correct Sensors incorrectly aligned on rebuild	Reset the sensor positions. Camshaft Position (CMP) Sensor LH (18.31.12) Camshaft Position (CMP) Sensor RH (18.31.11) Crankshaft Position (CKP) Sensor (18.30.12)
P002100	Intake camshaft position timing - over-advanced (left hand bank)	Cam timing has not been set up correctly Timing chain has slipped	Check the engine timing. Timing Drive Components - VIN Range: G45704->G99999 (12.65.13)
P002200	Intake camshaft position timing - over-retarded (left hand bank)	Cam timing has not been set up correctly Timing chain has slipped	Check the engine timing. Timing Drive Components - VIN Range: G45704->G99999 (12.65.13)
P002672	Variable camshaft timing (VCT) control solenoid circuit range/performance (right hand bank) - actuator stuck open	Oil contamination VCT oil flow fault VCT solenoid fault VCT/Camshaft mechanical failure	Check the oil condition and flow. For right hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531332p29.
P002677	Variable camshaft timing (VCT) control solenoid circuit range/performance (right hand bank) - commanded position not reachable	Oil contamination VCT oil flow fault VCT solenoid fault VCT/Camshaft mechanical failure	Check the oil condition and flow. For right hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531332p29.
P002872	Variable camshaft timing (VCT) control solenoid circuit	Oil contamination	Check the oil condition and flow. For left hand

	range/performance (left hand bank) - actuator stuck open	VCT oil flow fault VCT solenoid fault VCT/Camshaft mechanical failure	bank VCT solenoid circuit tests, GO to Pinpoint Test G531332p30.
P002877	Variable camshaft timing (VCT) control solenoid circuit range/performance (left hand bank) - commanded position not reachable	Oil contamination VCT oil flow fault VCT solenoid fault VCT/Camshaft mechanical failure	Check the oil condition and flow. For left hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531332p30.
P003100	HO2S heater control circuit low (right hand bank)	HO2S heater power supply circuit: open circuit HO2S heater control circuit: high resistance HO2S heater ground circuit(s) fault HO2S heater failure	For right hand bank HO2S heater circuit tests, GO to Pinpoint Test G531332p7.
P003200	HO2S heater control circuit high (right hand bank)	HO2S heater power supply circuit: open circuit HO2S heater control circuit: high resistance HO2S heater ground circuit(s) fault HO2S heater failure	For right hand bank HO2S heater circuit tests, GO to Pinpoint Test G531332p7.
P003600	Catalyst monitor heater control circuit (right hand bank)	Catalyst monitor sensor heater control circuit: short circuit to ground Catalyst monitor sensor heater control circuit: high resistance Catalyst monitor sensor heater failure	For right hand bank catalyst monitor heater circuit tests, GO to Pinpoint Test G531332p9.
P005100	HO2S heater control circuit low (left hand bank)	HO2S heater power supply circuit: open circuit HO2S heater control circuit:	For left hand bank HO2S heater circuit tests, GO to Pinpoint Test G531332p11.

		<p>high resistance</p> <p>HO2S heater ground circuit(s) fault</p> <p>HO2S heater failure</p>	
P005200	HO2S heater control circuit high (left hand bank)	<p>HO2S heater power supply circuit: open circuit</p> <p>HO2S heater control circuit: high resistance</p> <p>HO2S heater ground circuit(s) fault</p> <p>HO2S heater failure</p>	For left hand bank HO2S heater circuit tests, GO to Pinpoint Test G531332p11.
P005600	Catalyst monitor heater control circuit (left hand bank)	<p>Catalyst monitor sensor heater control circuit: short circuit to ground</p> <p>Catalyst monitor sensor heater control circuit: high resistance</p> <p>Catalyst monitor sensor heater failure</p>	For left hand bank catalyst monitor heater circuit tests, GO to Pinpoint Test G531332p12.
P006900	Manifold absolute pressure (MAP) - Barometric pressure correlation	<p>MAP sensor failure</p> <p>BARO sensor failure (internal ECM fault)</p>	<p>For MAP sensor circuit tests, vehicles without supercharger, GO to Pinpoint Test G531332p33.</p> <p>For MAP sensor circuit tests, vehicles with supercharger, GO to Pinpoint Test G531332p36.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P007100	Ambient air temperature sensor range/performance	Ambient temperature value missing from CAN bus	Control Components
P007200	Ambient air temperature sensor circuit low	Ambient air temperature sensor circuit: high	Control Components

		<p>resistance</p> <p>Ambient air temperature sensor circuit: short circuit to ground</p>	
P007300	Ambient air temperature sensor circuit high	Ambient air temperature sensor circuit: short circuit to power	Control Components
P007500	Variable camshaft timing (VCT) control circuit (right hand bank)	<p>VCT solenoid valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit: high resistance</p> <p>VCT solenoid failure</p>	For right hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531332p29.
P007600	Variable camshaft timing (VCT) control circuit low (right hand bank)	<p>VCT solenoid valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit: short circuit to ground</p> <p>VCT solenoid failure</p>	For right hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531332p29.
P007700	Variable camshaft timing (VCT) control circuit high (right hand bank)	<p>VCT solenoid valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit: short circuit to power</p> <p>VCT solenoid failure</p>	For right hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531332p29.
P008100	Variable camshaft timing (VCT) control circuit (left hand bank)	<p>VCT solenoid valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit: high resistance</p> <p>VCT solenoid failure</p>	For left hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531332p30.
P008200	Variable camshaft timing (VCT) control circuit low (left hand bank)	<p>VCT solenoid valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit: short circuit to ground</p> <p>VCT solenoid failure</p>	For left hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531332p30.

P008300	Variable camshaft timing (VCT) control circuit high (left hand bank)	<p>VCT solenoid valve disconnected</p> <p>VCT solenoid valve to ECM PWM drive circuit: short circuit to power</p> <p>VCT solenoid failure</p>	For left hand bank VCT solenoid circuit tests, GO to Pinpoint Test G531332p30.
P008700	Fuel rail/system pressure - too low	<p>Fuel rail pressure (FRP) sensor disconnected</p> <p>Fuel rail pressure (FRP) sensor to ECM sensing circuit: open circuit or short circuit to ground</p> <p>Fuel rail pressure (FRP) sensor supply circuit: high resistance</p> <p>Fuel rail pressure (FRP) sensor failure</p> <p>Fuel pump failure</p> <p>Fuel line leak</p> <p>Restricted fuel line</p>	<p>For FRP sensor circuit tests, GO to Pinpoint Test G531332p40.</p> <p>For fuel pump circuit and fuel line tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999</p>
P008800	Fuel rail/system pressure - too high	<p>FRP sensor to ECM wiring (supply/sense): short circuit to each other</p> <p>FRP sensor to ECM sense circuit: short circuit to high voltage</p> <p>FRP sensor ground circuit: high resistance</p> <p>FRP sensor failure</p> <p>Restricted fuel line</p> <p>Fuel pump short circuit to battery</p>	<p>For FRP sensor circuit tests, GO to Pinpoint Test G531332p40. and GO to Pinpoint Test G531332p25.</p> <p>For fuel pump circuit and fuel line tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999</p>
P009700	Manifold absolute pressure/temperature (MAPT) sensor intake air	<p>MAPT intake air temperature sensor circuit: short circuit to ground</p> <p>MAPT intake air temperature</p>	For MAPT intake air temperature sensor tests, GO to Pinpoint

	temperature low input	sensor circuit: high resistance	Test G531332p37.
P009800	Manifold absolute pressure/temperature (MAPT) sensor intake air temperature high input	MAPT intake air temperature sensor circuit: short circuit to power	For MAPT intake air temperature sensor tests, GO to Pinpoint Test G531332p37.
P010100	Mass or volume air flow A circuit range/performance	Blocked air cleaner Air intake leak Engine breather leak Mass air flow (MAF) sensor to ECM sensing circuit: high resistance, intermittent short circuit to ground MAF sensor supply circuit: high resistance Throttle adaption fault (check throttle position voltage at Ignition ON)	For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the engine breather system, Engine Emission Control - VIN Range: G45704->G99999 For MAF sensor circuit tests, GO to Pinpoint Test G531332p1.
P010200	Mass or volume air flow A circuit low input	MAF sensor supply circuit: high resistance, short circuit to ground MAF sensor ground circuit: high resistance MAF sensor failure	For MAF sensor circuit tests, GO to Pinpoint Test G531332p1. and GO to Pinpoint Test G531332p26.
P010300	Mass or volume air flow A circuit high input	MAF sensor to ECM sensing circuit: short circuit to battery MAF sensor to ECM sensor ground circuit: high resistance MAF sensor failure	For MAF sensor circuit tests, GO to Pinpoint Test G531332p1. and GO to Pinpoint Test G531332p26.
P010600	Manifold absolute pressure (MAP)/BARO sensor range/performance	Intake manifold air leak (loose or missing component) MAP sensor to ECM circuit(s) fault Throttle adaption fault (check	For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For MAP sensor circuit tests, vehicles without

		throttle position voltage at Ignition ON) MAP sensor failure	supercharger, GO to Pinpoint Test G531332p33. For MAP sensor circuit tests, vehicles with supercharger, GO to Pinpoint Test G531332p36.
P010700	Manifold absolute pressure (MAP)/BARO sensor low input	MAP sensor to ECM circuit: high resistance, short circuit to ground MAP sensor sensor supply circuit: open circuit MAP sensor failure	For MAP sensor circuit tests, vehicles without supercharger, GO to Pinpoint Test G531332p33. For MAP sensor circuit tests, vehicles with supercharger, GO to Pinpoint Test G531332p36.
P010800	Manifold absolute pressure (MAP)/BARO sensor high input	MAP sensor sensor ground circuit: high resistance MAP sensor to ECM sense circuit: short circuit to high voltage MAP sensor failure	For MAP sensor circuit tests, vehicles without supercharger, GO to Pinpoint Test G531332p33. For MAP sensor circuit tests, vehicles with supercharger, GO to Pinpoint Test G531332p36.
P011123	Intake air temperature (IAT) sensor circuit range/performance - signal stuck low	IAT sensor to ECM wiring: high resistance IAT sensor failure	For IAT sensor circuit tests, GO to Pinpoint Test G531332p2.
P011124	Intake air temperature (IAT) sensor circuit range/performance - signal stuck high	IAT sensor to ECM wiring: high resistance IAT sensor failure	For IAT sensor circuit tests, GO to Pinpoint Test G531332p2.
P011129	Intake air temperature (IAT) sensor circuit range/performance - signal	IAT sensor to ECM wiring: high resistance IAT sensor failure	For IAT sensor circuit tests, GO to Pinpoint Test G531332p2.

	invalid		
P011200	Intake air temperature (IAT) sensor circuit low input	<p>IAT sensor disconnected</p> <p>IAT sensor to ECM wiring: high resistance</p> <p>IAT sensor failure</p>	For IAT sensor circuit tests, GO to Pinpoint Test G531332p2.
P011300	Intake air temperature (IAT) sensor circuit high input	<p>IAT sensor to ECM wiring: short circuit to ground</p> <p>IAT sensor to ECM sensing circuit: short circuit to battery</p> <p>IAT sensor failure</p>	For IAT sensor circuit tests, GO to Pinpoint Test G531332p2.
P011623	Engine coolant temperature (ECT) sensor circuit range/performance - signal stuck low	<p>Low coolant level</p> <p>ECT sensor to ECM sensing circuit: intermittent high resistance</p> <p>Engine thermostat failure</p> <p>ECT sensor failure</p>	Check the coolant level, etc. For ECT sensor circuit tests, GO to Pinpoint Test G531332p3.
P011624	Engine coolant temperature (ECT) sensor circuit range/performance - signal stuck high	<p>Low coolant level</p> <p>ECT sensor to ECM sensing circuit: intermittent high resistance</p> <p>Engine coolant thermostat failure</p> <p>ECT sensor failure</p>	Check the coolant level, etc. For ECT sensor circuit tests, GO to Pinpoint Test G531332p3.
P011629	Engine coolant temperature (ECT) sensor circuit range/performance - signal invalid	<p>Low coolant level</p> <p>ECT sensor to ECM sensing circuit: intermittent high resistance</p> <p>Engine coolant thermostat failure</p> <p>ECT sensor failure</p>	Check the coolant level, etc. For ECT sensor circuit tests, GO to Pinpoint Test G531332p3.
P011700	Engine coolant temperature (ECT) sensor circuit low input	<p>ECT sensor disconnected</p> <p>ECT sensor to ECM sensing circuit: high resistance,</p>	For ECT sensor circuit tests, GO to Pinpoint Test G531332p3.

		open circuit, short circuit to battery ECT sensor failure	
P011800	Engine coolant temperature (ECT) sensor 1 circuit high input	Engine overheat condition/cooling fan failure ECT sensor to ECM wiring: short circuit to ground ECT sensor failure	For cooling fan circuit tests, GO to Pinpoint Test G531332p19. For ECT sensor circuit tests, GO to Pinpoint Test G531332p3.
P012100	Throttle position (TP) sensor circuit range/performance, circuit 1 and 2	TP sensor to ECM wiring: high resistance TP sensor to ECM sensing circuits: (TP 1 or TP 2) short circuit to battery TP sensor failure	For throttle position sensor circuit 1 tests, GO to Pinpoint Test G531332p4. For throttle position sensor circuit 2 tests, GO to Pinpoint Test G531332p5.
P012200	Throttle position (TP) sensor circuit 1 low input	TP sensor to ECM sensing circuit 1: short circuit to ground, high resistance TP sensor failure	For throttle position sensor circuit 1 tests, GO to Pinpoint Test G531332p4.
P012300	Throttle position (TP) sensor circuit 1 low input	TP sensor to ECM sensing circuit (TP1): short circuit to high voltage TP sensor failure	For throttle position sensor circuit 1 tests, GO to Pinpoint Test G531332p4.
P012500	Insufficient coolant temp for closed loop fuel control	Low coolant level ECT sensor to ECM sensing circuit: intermittent high resistance Engine thermostat failure ECT sensor failure	Check the coolant level, etc. For ECT sensor circuit tests, GO to Pinpoint Test G531332p3.
P012800	Coolant thermostat (coolant temp below thermostat regulating temperature)	Contaminated coolant Engine coolant thermostat failure ECT sensor failure ECT sensor DTC may also be flagged	Check the coolant level, etc. Check the thermostat condition and function. Check for ECT sensor DTCs.

P01311A	H02 sensor circuit low voltage (right hand bank)	H02S disconnected H02S to ECM variable current circuit fault ECM to H02S constant current circuit fault H02S failure	For right hand bank HO2 sensor circuit tests, GO to Pinpoint Test G531332p6.
P01321B	H02 sensor circuit high voltage (right hand bank)	H02S disconnected H02S to ECM variable current circuit fault ECM to H02S constant current circuit fault H02S failure	For right hand bank HO2 sensor circuit tests, GO to Pinpoint Test G531332p6.
P013300	HO2 sensor circuit slow response (right hand bank)	HO2S to ECM wiring shield high resistance Exhaust leak Fuel control system fault HO2 sensor failure	For right hand bank HO2 sensor circuit tests, GO to Pinpoint Test G531332p6.
P013400	HO2 sensor circuit no activity detected (right hand bank)	HO2S slow activation	For right hand bank HO2 sensor circuit tests, GO to Pinpoint Test G531332p6.
P013700	Catalyst monitor circuit low voltage (right hand bank)	Catalyst monitor sensor disconnected Catalyst monitor sensor to ECM wiring: high resistance Catalyst monitor sensor: short circuit to ground Catalyst monitor sensor failure	For right hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531332p8.
P013800	Catalyst monitor circuit high voltage (right hand bank)	Catalyst monitor sensor sensing circuit: short circuit to power Catalyst monitor sensor ground braided shield:	For right hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531332p8.

		high resistance Catalyst monitor sensor failure	
P013900	Catalyst monitor sensor circuit slow response (right hand bank)	Catalyst monitor sensor slow response	For right hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531332p8.
P014000	Catalyst monitor circuit no activity detected (right hand bank)	Catalyst monitor disconnected Catalyst monitor mechanical damage Catalyst monitor to ECM wiring: high resistance Catalyst monitor sensing circuit: short circuit to power Catalyst monitor: short circuit to ground Catalyst monitor ground (BRD braided shield) high resistance	For right hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531332p8.
P014100	Catalyst monitor heater circuit (right hand bank)	Catalyst monitor sensor heater control circuit: high resistance Catalyst monitor sensor heater failure	For right hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531332p8.
P01511A	H02 sensor circuit low voltage (left hand bank) - circuit resistance below threshold	HO2 sensing circuit: short circuit to ground, short circuit to high voltage, high resistance HO2S failure	For left hand bank HO2S circuit tests, GO to Pinpoint Test G531332p10.
P01521B	H02 sensor circuit low voltage (left hand bank) - circuit resistance above threshold	HO2S sensing circuit: short circuit to ground, short circuit to high voltage, high resistance HO2S failure	For left hand bank HO2S circuit tests, GO to Pinpoint Test G531332p10.
P015300	HO2S circuit slow response	HO2S to ECM wiring shield	For left hand bank HO2S circuit tests, GO to

	(left hand bank)	<p>high resistance</p> <p>Exhaust leak</p> <p>Fuel control system fault</p> <p>H02S failure</p>	Pinpoint Test G531332p10.
P015400	H02S circuit no activity detected (left hand bank)	H02S slow activation	For left hand bank H02S circuit tests, GO to Pinpoint Test G531332p10.
P015700	Catalyst monitor sensor circuit low voltage (left hand bank)	<p>Catalyst monitor sensor disconnected</p> <p>Catalyst monitor sensor to ECM wiring high resistance</p> <p>Catalyst monitor sensor short circuit to ground</p> <p>Fuel control system lean fault</p> <p>Catalyst monitor sensor failure</p>	For left hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531332p14.
P015800	Catalyst monitor sensor circuit high voltage (left hand bank)	<p>Catalyst monitor sensor sensing circuit: short circuit to high voltage</p> <p>Catalyst monitor sensor ground (BRD braided shield) high resistance</p> <p>Catalyst monitor sensor failure</p>	For left hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531332p14.
P015900	Catalyst monitor sensor circuit slow response (left hand bank)	Catalyst monitor sensor slow response	For left hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531332p14.
P016000	Catalyst monitor sensor circuit no activity detected (left hand bank)	<p>Catalyst monitor sensor disconnected</p> <p>Catalyst monitor sensor mechanical damage</p> <p>Catalyst monitor sensor to</p>	For left hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531332p14.

		<p>ECM wiring high resistance</p> <p>Catalyst monitor sensor sensing circuit: short circuit to high voltage</p> <p>Catalyst monitor sensor short circuit to ground</p> <p>Catalyst monitor sensor ground (BRD braided shield) high resistance</p>	
P016100	Catalyst monitor sensor heater circuit (left hand bank)	Catalyst monitor sensor heater control circuit malfunction	For left hand bank catalyst monitor circuit tests, GO to Pinpoint Test G531332p14.
P017100	System too lean (right hand bank)	<p>Air intake leak between MAF sensor and cylinder head</p> <p>Fuel filter/system restriction</p> <p>Fuel injector restriction</p> <p>MAF sensor fault (low intake air flow)</p> <p>Exhaust leak (before catalyst)</p>	<p>For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For fuel line and fuel pressure tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 For fuel injector information, Fuel Injectors (18.10.02) For MAF sensor circuit tests, GO to Pinpoint Test G531332p1. Check the exhaust system (before catalyst) for condition and security,</p>
P017200	System too rich (right hand bank)	<p>Restricted air filter</p> <p>Leaking fuel injector(s)</p>	For intake system information, Intake Air Distribution and Filtering - VIN Range:

		<p>Oil contaminated with fuel (too many cold starts with vehicle subsequently not getting hot enough for long enough)</p> <p>MAF sensor fault (high intake air flow)</p>	<p>G45704->G99999 For fuel injector information, Fuel Injectors (18.10.02) Check oil condition, if contamination is present, renew engine oil and filter. For MAF sensor circuit tests, GO to Pinpoint Test G531332p1.</p>
P017400	System too lean (left hand bank)	<p>Air intake leak between MAF sensor and cylinder head</p> <p>Fuel filter/system restriction</p> <p>Fuel injector restriction</p> <p>MAF sensor fault (low intake air flow)</p> <p>Exhaust leak (before catalyst)</p>	<p>For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For fuel line and pressure tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704- >G99999 For fuel injector information, Fuel Injectors (18.10.02) For MAF sensor circuit tests, GO to Pinpoint Test G531332p1. Check the exhaust system (before catalyst) for condition and security,</p>
P017500	System too rich (left hand bank)	<p>Restricted air filter</p> <p>Leaking fuel injector(s)</p> <p>Oil contaminated with fuel (too many cold starts with vehicle subsequently not getting hot enough for long enough)</p> <p>MAF sensor fault (high intake</p>	<p>For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For fuel injector information, Fuel Injectors (18.10.02) Check oil condition, if contamination is present,</p>

		air flow)	renew engine oil and filter. For MAF sensor circuit tests, GO to Pinpoint Test G531332p1.
P018123	Engine fuel temperature (EFT) sensor A circuit range/performance - signal stuck low	EFT sensor to ECM sensing circuit: high resistance, short circuit to ground, short circuit to high voltage EFT sensor ground circuit: high resistance EFT sensor failure	For EFT sensor circuit tests, GO to Pinpoint Test G531332p34.
P018124	Engine fuel temperature (EFT) sensor circuit range/performance - signal stuck high	EFT sensor to ECM sensing circuit: high resistance, short circuit to ground, short circuit to high voltage EFT sensor ground circuit: high resistance EFT sensor failure	For EFT sensor circuit tests, GO to Pinpoint Test G531332p34.
P018129	Engine fuel temperature (EFT) sensor A circuit range/performance - signal invalid	EFT sensor to ECM sensing circuit: high resistance, short circuit to ground, short circuit to high voltage EFT sensor ground circuit: high resistance EFT sensor failure	For EFT sensor circuit tests, GO to Pinpoint Test G531332p34.
P018200	Engine fuel temperature (EFT) sensor circuit low input	EFT sensor to ECM sensing circuit: short circuit to ground EFT sensor to splice sensor ground circuit: short circuit EFT sensor failure	For EFT sensor circuit tests, GO to Pinpoint Test G531332p34.
P018300	Engine fuel temperature (EFT) sensor circuit high input	EFT sensor disconnected EFT sensor to ECM sensing circuit: high resistance,	For EFT sensor circuit tests, GO to Pinpoint

		short circuit to high voltage EFT sensor to splice sensor ground circuit: high resistance EFT sensor failure	Test G531332p34.
P019100	Fuel rail pressure (FRP) sensor circuit range/performance	FRP sensor range and performance	For FRP sensor circuit tests, GO to Pinpoint Test G531332p40.
P019200	Fuel rail pressure (FRP) sensor circuit low input	FRP sensor disconnected FRP sensor to ECM sensing circuit: high resistance or short circuit to ground FRP sensor to supply circuit: high resistance FRP sensor failure	For FRP sensor circuit tests, GO to Pinpoint Test G531332p40.
P019300	Fuel rail pressure (FRP) sensor circuit high input	FRP sensor to ECM wiring (supply, sense): short circuit to each other FRP sensor to ECM sense circuit: short circuit to high voltage FRP sensor ground circuit: high resistance FRP sensor failure	For FRP sensor circuit tests, GO to Pinpoint Test G531332p40.
P019623	Engine oil temperature (EOT) sensor circuit range/performance - signal stuck low	EOT sensor to ECM sensing circuit: intermittent high resistance EOT sensor failure	For EOT sensor circuit tests, GO to Pinpoint Test G531332p13.
P019624	Engine oil temperature (EOT) sensor circuit range/performance - signal stuck high	EOT sensor to ECM sensing circuit: intermittent high resistance EOT sensor failure	For EOT sensor circuit tests, GO to Pinpoint Test G531332p13.
P019629	Engine oil temperature (EOT) sensor circuit range/performance - signal	EOT sensor to ECM sensing circuit: intermittent high resistance	For EOT sensor circuit tests, GO to Pinpoint Test G531332p13.

	invalid	EOT sensor failure	
P019700	Engine oil temperature (EOT) sensor circuit low input	EOT sensor to ECM sensing circuit: short circuit to ground EOT sensor failure	For EOT sensor circuit tests, GO to Pinpoint Test G531332p13.
P019800	Engine oil temperature (EOT) sensor circuit high input	EOT sensor disconnected EOT sensor to ECM sensing circuit: high resistance, short circuit to battery EOT sensor failure	For EOT sensor circuit tests, GO to Pinpoint Test G531332p13.
P020100	Cylinder 1 injector circuit/open	Injector disconnected Injector harness wiring: high resistance, short circuit to ground Injector failure	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999
P020200	Cylinder 2 injector circuit/open	Injector disconnected Injector harness wiring: high resistance, short circuit to ground Injector failure	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999
P020300	Cylinder 3 injector circuit/open	Injector disconnected Injector harness wiring: high resistance, short circuit to ground Injector failure	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999
P020400	Cylinder 4 injector circuit/open	Injector disconnected Injector harness wiring: high resistance, short circuit to ground Injector failure	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999
P020500	Cylinder 5 injector circuit/open	Injector disconnected Injector harness wiring: high resistance, short circuit to ground	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999

		Injector failure	
P020600	Cylinder 6 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: high resistance, short circuit to ground</p> <p>Injector failure</p>	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999
P020700	Cylinder 7 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: high resistance, short circuit to ground</p> <p>Injector failure</p>	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999
P020800	Cylinder 8 injector circuit/open	<p>Injector disconnected</p> <p>Injector harness wiring: high resistance, short circuit to ground</p> <p>Injector failure</p>	For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999
P022200	Throttle position (TP) sensor circuit 2 low input	TP sensor circuit 2 low input	For TP sensor circuit 2 tests, GO to Pinpoint Test G531332p5.
P022300	Throttle position (TP) sensor circuit 2 high input	TP sensor circuit 2 high input	For TP sensor circuit 2 tests, GO to Pinpoint Test G531332p5.
P022700	Accelerator pedal position (APP) sensor circuit 1 low input	<p>Accelerator pedal position (APP) sensor circuit 1: short circuit to ground</p> <p>Accelerator pedal position (APP) sensor circuit 1: high resistance</p>	For APP sensor circuit 1 tests, GO to Pinpoint Test G531332p22.
P022800	Accelerator pedal position (APP) sensor circuit 1 high input	Accelerator pedal position (APP) sensor circuit 1: short circuit to power	For APP sensor circuit 1 tests, GO to Pinpoint Test G531332p22.
P023700	Manifold absolute pressure/temperature (MAPT) sensor pressure low	<p>MAPT pressure sensor to ECM circuit: short circuit to ground</p> <p>MAPT pressure sensor to ECM circuit: high resistance</p>	For MAPT pressure sensor tests, GO to Pinpoint Test G531332p41.

P023800	Manifold absolute pressure/temperature (MAPT) sensor pressure high	MAPT pressure sensor to ECM circuit: short circuit to power	For MAPT pressure sensor tests, GO to Pinpoint Test G531332p41.
P023B13	Charge air cooler coolant pump control circuit low	Charge air cooler coolant pump circuit low (short circuit)	For auxiliary coolant pump tests, GO to Pinpoint Test G531332p39.
P023C12	Charge air cooler coolant pump control circuit high	Charge air cooler coolant pump circuit (open circuit)	For auxiliary coolant pump tests, GO to Pinpoint Test G531332p39.
P030000	Random/multiple cylinder misfire detected	<p>ECM to ignition coil primary circuit faults (cylinder misfire detected DTCs also logged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Fuel delivery pressure (low/high)</p> <p>Fuel injector circuit fault(s) (injector DTCs also logged)</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p> <p>Cylinder compression low</p> <p>Worn camshaft/broken valve springs</p> <p>Valve clearance adjustment</p>	<p>For ignition coil and spark plug tests, Engine Ignition - VIN Range: G45704->G99999</p> <p>For fuel pressure test, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999</p> <p>For fuel injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999</p> <p>Check compressions, valve gear, etc, Engine - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8</p>
P030100	Cylinder 1 misfire detected	Refer to P030000 possible	Refer to P030000 actions

		sources	
P030200	Cylinder 2 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P030300	Cylinder 3 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P030400	Cylinder 4 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P030500	Cylinder 5 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P030600	Cylinder 6 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P030700	Cylinder 7 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P030800	Cylinder 8 misfire detected	Refer to P030000 possible sources	Refer to P030000 actions
P031300	Misfire detected with low fuel	Misfire detected during low fuel level condition	Check for fuel level sensor codes, add fuel. Clear the DTC and test for normal operation.
P031600	Engine misfire detected on startup	Misfire detected on first 1000 revs Refer to P030000 possible sources	Carry out the tests indicated for a normal misfire code, but on a cold engine.
P032700	Knock sensor (KS) 1 circuit low input (right hand bank)	Poor sensor contact with the cylinder block KS to ECM sense circuit: short circuit to ground KS failure	For right hand bank KS circuit tests, GO to Pinpoint Test G531332p15.
P032800	Knock sensor (KS) 1 circuit high input (right hand bank)	Poor sensor contact with the cylinder block KS to ECM sense circuit: high resistance, short circuit to	For right hand bank KS circuit tests, GO to Pinpoint Test G531332p15.

		power KS failure	
P033200	Knock sensor (KS) 2 circuit low input (left hand bank)	Poor sensor contact with the cylinder block KS to ECM sense circuit: short circuit to ground KS failure	For left hand bank KS circuit tests, GO to Pinpoint Test G531332p16.
P033300	Knock sensor (KS) 2 circuit high input (left hand bank)	Poor sensor contact with the cylinder block KS to ECM sense circuit: high resistance, short circuit to power KS failure	For left hand bank KS circuit tests, GO to Pinpoint Test G531332p16.
P033592	Crankshaft position (CKP) sensor A circuit - performance or incorrect operation	CKP sensor disconnected CKP Sensor gap incorrect/ foreign matter on sensor face /damaged teeth on rotor CKP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power CKP sensor failure	For CKP sensor circuit tests, GO to Pinpoint Test G531332p17.
P033594	Crankshaft position (CKP) sensor A circuit - unexpected operation	CKP sensor disconnected CKP sensor gap incorrect/ foreign matter on sensor face /damaged teeth on rotor CKP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power CKP sensor failure	For CKP sensor circuit tests, GO to Pinpoint Test G531332p17.
P033600	Crankshaft position (CKP) sensor A circuit range/performance	CKP sensor gap incorrect/ foreign matter on sensor face /damaged teeth on rotor	For CKP sensor circuit tests, GO to Pinpoint Test G531332p17.

		CKP sensor sensing circuit: intermittent high resistance, short circuit to ground, short circuit to power CKP sensor failure	
P034092	Camshaft position (CMP) sensor A circuit (right hand bank or single sensor) - performance or incorrect operation	CMP sensor disconnected CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor CMP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power CMP sensor 1 failure	For right hand bank CMP circuit tests, GO to Pinpoint Test G531332p18.
P034094	Camshaft position (CMP) sensor A circuit (right hand bank or single sensor) - unexpected operation	CMP sensor disconnected CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor CMP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power CMP sensor 1 failure	For right hand bank CMP circuit tests, GO to Pinpoint Test G531332p18.
P034100	Camshaft position (CMP) sensor A circuit range/performance (right hand bank or single sensor)	CMP sensor disconnected CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor CMP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power CMP sensor 1 failure	For right hand bank CMP circuit tests, GO to Pinpoint Test G531332p18.
P034592	Camshaft position (CMP) sensor A circuit (left hand bank) - performance or incorrect operation	CMP sensor disconnected CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor	For left hand bank CMP circuit tests, GO to Pinpoint Test G531332p28.

		<p>CMP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power</p> <p>CMP sensor 2 failure</p>	
P034594	Camshaft position (CMP) sensor A circuit (left hand bank) - unexpected operation	<p>CMP sensor disconnected</p> <p>CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor</p> <p>CMP sensor sensing circuit: high resistance short circuit to ground, short circuit to power</p> <p>CMP sensor 2 failure</p>	For left hand bank CMP circuit tests, GO to Pinpoint Test G531332p28.
P034600	Camshaft position (CMP) sensor A circuit range/performance (left hand bank)	<p>CMP sensor disconnected</p> <p>CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor</p> <p>CMP sensor sensing circuit: high resistance, short circuit to ground, short circuit to power</p> <p>CMP sensor 2 failure</p>	For left hand bank CMP circuit tests, GO to Pinpoint Test G531332p28.
P035100	Ignition coil 1 primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: high resistance, short circuit to ground</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil battery supply circuit: high resistance (including relay, if fitted)</p>	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999
P035200	Ignition coil 2 primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground</p>	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999

		<p>circuit: open circuit</p> <p>Ignition module/coil battery supply circuit: high resistance (including relay, if fitted)</p>	
P035300	Ignition coil 3 primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil battery supply circuit: high resistance (including relay, if fitted)</p>	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999
P035400	Ignition coil 4 primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil battery supply circuit: high resistance (including relay, if fitted)</p>	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999
P035500	Ignition coil 5 primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil battery supply circuit: high resistance (including relay, if fitted)</p>	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999
P035600	Ignition coil 6 primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground</p>	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999

		<p>circuit: high resistance</p> <p>Ignition module/coil battery supply circuit: high resistance (including relay, if fitted)</p>	
P035700	Ignition coil 7 primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil battery supply circuit: high resistance (including relay, if fitted)</p>	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999
P035800	Ignition coil 8 primary/secondary circuit	<p>ECM to ignition module/coil drive circuit: short circuit to ground, high resistance</p> <p>Ignition module/coil ground circuit: high resistance</p> <p>Ignition module/coil battery supply circuit: high resistance (including relay, if fitted)</p>	For ignition coil tests, Engine Ignition - VIN Range: G45704->G99999
P040100	Exhaust gas recirculation (EGR) flow insufficient detected	<p>EGR valve incorrectly fitted or loose</p> <p>EGR pipe blocked</p> <p>EGR valve stuck closed, blocked</p> <p>EGR valve failure</p>	For EGR tests, Engine Emission Control - VIN Range: G45704->G99999
P041300	Secondary air injection switching valve A circuit open	Secondary air check valve control circuit high	For secondary air injection tests, Engine Emission Control - VIN Range: G45704->G99999
P041400	Secondary air injection switching valve A circuit	Secondary air check valve control circuit low	For secondary air injection tests, Engine Emission Control -

	shorted		VIN Range: G45704- >G99999
P042000	Catalyst system efficiency below threshold (right hand bank)	<p>Catalyst failure due to: overheating damage caused by misfire and/or lean combustion</p> <p>Catalyst failure due to: poisoning caused by excessive oil consumption and/or contaminated fuel</p>	Check the oil and fuel condition/level. Check the catalysts for damage.
P043000	Catalyst system efficiency below threshold (left hand bank)	<p>Catalyst failure due to: overheating damage caused by misfire and/or lean combustion</p> <p>Catalyst failure due to: poisoning caused by excessive oil consumption and/or contaminated fuel</p>	Check the oil and fuel condition/level. Check the catalysts for damage.
P044100	Evaporative emission (EVAP) system incorrect purge flow	Purge valve range performance	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704- >G99999
P044700	Evaporative emission (EVAP) system vent control circuit open	DMTL COV circuit ground short	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704- >G99999
P044800	Evaporative emission (EVAP) system vent control circuit shorted	<p>EVAP canister close valve power supply circuit: high resistance, short circuit</p> <p>EVAP canister close valve to ECM drive circuit: high resistance, short circuit to battery</p> <p>EVAP canister close valve failure</p>	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704- >G99999
P045600	Evaporative emission (EVAP) system leak detected (very	DMTL system has detected a leak	For evaporative emissions tests,

	small leak)		Evaporative Emissions - VIN Range: G45704->G99999
P045800	Evaporative emission (EVAP) system purge control valve circuit low	Purge valve control circuit: short circuit to ground Purge valve control circuit: high resistance EVAP canister purge valve failure	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P045900	Evaporative emission (EVAP) system purge control valve circuit high	Purge valve control circuit: short circuit to power	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P046129	Fuel level sensor A circuit range/performance - signal invalid	Fuel level sensor to rear electronic module (REM) circuits; intermittent short circuit or high resistance Fuel level sensor failure REM fault (incorrect fuel level data)	For fuel level sensor circuit tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999
P04612F	Fuel level sensor A circuit range/performance - signal erratic	Fuel level sensor to rear electronic module (REM) circuits; intermittent short circuit or high resistance Fuel level sensor failure REM fault (incorrect fuel level data)	For fuel level sensor circuit tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999
P046200	Fuel level sensor A circuit low input	Fuel level sensor to rear electronic module (REM) circuits; intermittent short circuit to ground or high resistance Fuel level sensor failure REM fault (incorrect fuel level data)	For fuel level sensor circuit tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999

P046300	Fuel level sensor A circuit high input	Fuel level sensor to rear electronic module (REM) circuits; intermittent short circuit to high voltage Fuel level sensor failure REM fault (incorrect fuel level data)	For fuel level sensor circuit tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999
P048023	Fan 1 control circuit low	Electric fan control circuit: short circuit to ground Electric fan control circuit: high resistance	For cooling fan circuit tests, GO to Pinpoint Test G531332p19.
P048024	Fan 1 control circuit high	Electric fan control circuit: short circuit to battery	For cooling fan circuit tests, GO to Pinpoint Test G531332p19.
P048309	Fan rationality check	Cooling fan difficult to turn Fan/Motor damaged	Clear any obstruction, replace the fan as necessary.
P048316	Fan rationality check	Fan control module reports battery voltage less than 9 volts	Check the battery condition. Check the charging system and fan circuits.
P048317	Fan rationality check	Fan control module reports battery voltage greater than 18 volts	Check the charging system and fan circuits.
P048397	Fan rationality check	Cooling fan jammed	Clear any obstruction, replace the fan as necessary.
P048900	Exhaust gas recirculation (EGR) control circuit low	EGR valve power supply circuit: high resistance EGR valve power supply circuit: short circuit to ground	For EGR tests, Engine Emission Control - VIN Range: G45704->G99999
P049000	Exhaust gas recirculation (EGR) control circuit high	EGR valve to ECM drive circuit: short circuit to battery	For EGR tests, Engine Emission Control - VIN Range: G45704->G99999

P050082	Vehicle speed sensor malfunction	Vehicle speed: invalid signal received over CAN	Check for TCM DTCs.
P050086	Vehicle speed sensor malfunction	Vehicle speed: invalid signal received over CAN	Check for TCM DTCs.
P050162	Vehicle speed sensor A range/performance - signal plausibility failure	Vehicle speed: range performance	Check for ABS/TCM DTCs.
P050400	Brake switch A/B correlation	The brake pressure reading does not agree with the brake light switch value	Check the brake switch function. GO to Pinpoint Test G531332p42. Anti-Lock Control - Stability Assist - VIN Range: G45704->G99999
P050401	Brake switch A/B correlation	Brake switch high fault: Brake lights stuck on Gearshift interlock inoperative Speed control inoperative Brake switch low fault: Brake lights inoperative Gearshift stuck in Park Reduced engine braking	For brake switch and circuit tests, GO to Pinpoint Test G531332p42.
P050464	Brake switch A/B correlation - signal plausibility failure	Brake switch malfunction	For brake switch and circuit tests, GO to Pinpoint Test G531332p42.
P050600	Idle air control system RPM lower than expected	Air intake restriction Accessory drive overload (defective/seized component)	Check the air intake system. Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the accessory drive belt and components. Accessory Drive Belt - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.5L NA V8 - AJV8 (12.10.40)
P050624	Idle air control system RPM	Air intake restriction	Check the air intake

	lower than expected	Accessory drive overload (defective/seized component)	system. Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check the accessory drive belt and components. Accessory Drive Belt - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.5L NA V8 - AJV8 (12.10.40)
P050700	Idle air control system RPM higher than expected	Intake air leak between MAF sensor and throttle Intake air leak between throttle and engine Engine crankcase breather leak	Check the air intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Inspect the engine breather system, Engine Emission Control - VIN Range: G45704->G99999
P050723	Idle air control system RPM higher than expected	Intake air leak between MAF sensor and throttle Intake air leak between throttle and engine Engine crankcase breather leak	Check the air intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Inspect the engine breather system, Engine Emission Control - VIN Range: G45704->G99999
P050B84	Cold start ignition timing performance	Cold start emission reduction strategy engine spark timing too retarded	Check for engine ignition related codes. Engine Ignition - VIN Range: G45704->G99999
P050B85	Cold start ignition timing performance	Cold start emission reduction strategy engine spark timing too advanced	Check for engine ignition related codes. Engine Ignition - VIN Range: G45704->G99999
P05120C	Starter request circuit	Crank request circuit: high input	For starter request circuit tests, GO to Pinpoint

			Test G531332p27.
P05120E	Starter request circuit	Crank request circuit: low input	For starter request circuit tests, GO to Pinpoint Test G531332p27.
P051300	Incorrect immobilizer key	Security key invalid	Programme keys using the Jaguar approved diagnostic system.
P053200	Air conditioning (A/C) refrigerant pressure sensor A circuit low input	A/C refrigerant pressure sensor circuit low input	For A/C pressure sensor tests, GO to Pinpoint Test G531332p35.
P053300	A/C refrigerant pressure sensor A circuit high input	A/C Refrigerant pressure sensor circuit high input	For A/C pressure sensor tests, GO to Pinpoint Test G531332p35.
P056013	System voltage	Battery back-up malfunction	For battery back-up tests, GO to Pinpoint Test G531332p20.
P056100	System voltage unstable	System voltage comparison	For FRP sensor tests, GO to Pinpoint Test G531332p40. For MAP sensor tests, GO to Pinpoint Test G531332p33. For TP sensor tests, GO to Pinpoint Test G531332p4. and GO to Pinpoint Test G531332p5.
P056200	System voltage low	ECM to sensor supply voltage circuit(s): short circuit to ground	For FRP sensor tests, GO to Pinpoint Test G531332p40. For MAP sensor tests, GO to Pinpoint Test G531332p33. For TP sensor tests, GO to Pinpoint Test G531332p4. and GO to Pinpoint Test

			G531332p5.
P056300	System voltage high	ECM to sensors supply voltage circuit(s): high resistance, short circuit to power	For FRP sensor tests, GO to Pinpoint Test G531332p40. For MAP sensor tests, GO to Pinpoint Test G531332p33. For TP sensor tests, GO to Pinpoint Test G531332p4. and GO to Pinpoint Test G531332p5.
P057501	Speed control cancel button fault	Speed control cancel button fault	For speed control, Speed Control - VIN Range: G45704->G99999
P057616	Speed control input circuit low	Speed control low input	For speed control, Speed Control - VIN Range: G45704->G99999
P057717	Speed control input circuit high	Speed control high input	For speed control, Speed Control - VIN Range: G45704->G99999
P057800	Speed control multi-function input A circuit stuck	Speed switch stuck fault	For speed control, Speed Control - VIN Range: G45704->G99999
P05791C	Speed control multi-function input A circuit range/performance	Speed control switch deadband detection	For speed control, Speed Control - VIN Range: G45704->G99999
P059000	Speed control multi-function input B circuit stuck	Active speed limiter fault	For speed control, Speed Control - VIN Range: G45704->G99999
P060143	Internal control module memory check sum error - special memory failure	CPU communication. - sub	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060145	Internal control module memory check sum error -	CPU communication	Refer to the warranty policy and procedures

	program memory failure		manual if an ECM is suspect.
P060442	Internal control module random access memory (RAM) error - general memory failure	Initial RAM test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060443	Internal control module random access memory (RAM) error - special memory failure	Shut off RAM test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060444	Internal control module random access memory (RAM) error - data memory failure	RAM check sum	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060445	Internal control module random access memory (RAM) error - program memory failure	ECM failure	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060500	Internal control module read only memory (ROM) error	EEPROM/flash checksum error	Configure the module using the Jaguar approved diagnostic system.
P060529	Internal control module read only memory (ROM) error	ROM error	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060542	Internal control module read only memory (ROM) error - general memory failure	ROM check sum	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060543	Internal control module read only memory (ROM) error - special memory failure	Shut off ROM test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060544	Internal control module read only memory (ROM) error -	Initial ROM test	Refer to the warranty policy and procedures

	data memory failure		manual if an ECM is suspect.
P060545	Internal control module read only memory (ROM) error - program memory failure	Continuous ROM test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060546	Internal control module read only memory (ROM) error	Continuous ROM test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060548	Internal control module read only memory (ROM) error - supervision software failure	Shut off ROM test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060564	Internal control module read only memory (ROM) error	ROM error - sub	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060600	ECM/PCM processor fault	Watchdog error	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060601	ECM/PCM processor - general electrical failure	Controller test - sub	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060604	ECM/PCM processor	System internal failures	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060605	ECM/PCM processor - system programming failures	Throttle return spring failure (throttle body failure)	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060641	ECM/PCM processor -	Watch dog timer fault - sub	Refer to the warranty policy and procedures

	general checksum failure		manual if an ECM is suspect.
P060642	ECM/PCM processor - general memory failure	Error capturing instructions	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060643	ECM/PCM processor - special memory failure	Duplication memory fault	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060644	ECM/PCM processor - data memory failure	Duplication memory fault - sub	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060645	ECM/PCM processor - program memory failure	Detection of write to internal ROM	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060646	ECM/PCM processor - calibration/parameter memory failure	Detection of write to internal ROM - sub	Configure the module using the Jaguar approved diagnostic system.
P060647	ECM/PCM processor fault	Watch dog timer fault	Configure the module using the Jaguar approved diagnostic system.
P060648	ECM/PCM processor - supervision software failure	Scheduling sequence check	Configure the module using the Jaguar approved diagnostic system.
P060649	ECM/PCM processor - internal electronic failure	Controller test	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060700	Control module performance	Sub - CPU watch dog	Refer to the warranty policy and procedures

			manual if an ECM is suspect.
P060D00	Internal control module accelerator pedal position performance	APS Communication	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060E62	Internal control module throttle position performance - signal compare failure	Throttle motor amplifier failure for valve sensor malfunction	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060E64	Internal control module throttle position performance - signal plausibility failure	TPS Communication	Refer to the warranty policy and procedures manual if an ECM is suspect.
P060A64	Internal control module monitoring processor performance	Internal control module monitoring processor performance	Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P060A67	Internal control module monitoring processor performance	Internal control module monitoring processor performance	Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P061043	Control module vehicle options error	VID block fault	Configure the module using the Jaguar approved diagnostic system.
P06160E	Starter relay circuit low	Starter relay drive circuit: short circuit to ground. Starter relay drive circuit: high resistance Starter relay failure	For starter relay tests, GO to Pinpoint Test G531332p27.
P06170C	Starter relay circuit high	Starter relay drive circuit: short circuit to battery Starter relay failure	For starter relay tests, GO to Pinpoint Test G531332p27.

P061A00	Internal control module torque performance	Pedal follower error	Refer to the warranty policy and procedures manual if an ECM is suspect.
P061A29	Internal control module torque performance - signal invalid	Absolute engine torque calculation failure - sub-processor	Refer to the warranty policy and procedures manual if an ECM is suspect.
P061A64	Internal control module torque performance - signal plausibility failure	Absolute engine torque calculation failure	Refer to the warranty policy and procedures manual if an ECM is suspect.
P061B29	Internal control module torque calculation performance - signal invalid	Absolute and dynamic engine torque calculation failure	Refer to the warranty policy and procedures manual if an ECM is suspect.
P061B64	Internal control module torque calculation performance - signal plausibility failure	Absolute and dynamic engine torque calculation failure	Refer to the warranty policy and procedures manual if an ECM is suspect.
P062700	Fuel pump A control circuit/open	Invalid fuel pump duty requested by the ECM	For fuel pump tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999
P062A00	Fuel pump A control circuit range/performance	Fuel pump circuit fault (FPDM to fuel pump)	For fuel pump tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999
P063000	VIN not programmed or incompatible - ECM/PCM	CCF to CAN VIN mismatch	Configure the module using the Jaguar approved diagnostic

			system.
P068773	ECM power relay control circuit high	EMS control relay malfunction	For EMS relay tests, GO to Pinpoint Test G531332p32.
P072186	Output speed sensor circuit range/performance	TCM Output shaft speed sensor error received	For transmission tests.
P08510E	Park/Neutral switch input circuit low	Park/Neutral switch input circuit low	For Park/Neutral switch tests, External Controls
P08520C	Park/Neutral switch input circuit high	Park/Neutral switch input circuit high	For Park/Neutral switch tests, External Controls
P114600	Generator load low	Generator - C line circuit low	For generator tests,
P114723	Manifold absolute pressure/temperature (MAPT) intake air temperature sensor circuit range/performance	MAPT intake air temperature stuck low at engine start	For MAPT tests, GO to Pinpoint Test G531332p37.
P114724	Manifold absolute pressure/temperature (MAPT) intake air temperature sensor circuit range/performance	MAPT intake air temperature stuck high at engine start	For MAPT tests, GO to Pinpoint Test G531332p37.
P114729	Manifold absolute pressure/temperature (MAPT) intake air temperature sensor circuit range/performance	MAPT intake air temperature stuck	For MAPT tests, GO to Pinpoint Test G531332p37.
P124400	Generator load high input (see P062600)	Generator - C line circuit high	For generator tests,
P125900	Immobilizer to PCM signal error	Incorrect ID received from instrument pack	Configure the system using the Jaguar approved diagnostic

			system.
P131500	Persistent misfire	<p>ECM to ignition coil primary circuit fault (cylinder misfire detected DTC also flagged)</p> <p>Fuel delivery pressure low</p> <p>Fuel injector circuit fault(s) (injector DTCs also flagged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Cylinder compression low</p>	<p>For ignition coil circuit tests, Engine Ignition - VIN Range: G45704->G99999</p> <p>Check the fuel pressure, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999</p> <p>For injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999</p> <p>For spark plug tests, Engine Ignition - VIN Range: G45704->G99999</p>
P131600	Injector driver misfire - emissions damage	Injector driver module codes detected	Check for associated DTCs and refer to the DTC index.
P136700	Ignition amplifier group A	<p>Ignition monitoring circuit to ECM: high resistance, short circuit to ground, short circuit to power</p> <p>Ignition module/coils ground circuit fault, right hand bank</p>	For ignition system tests, Engine Ignition - VIN Range: G45704->G99999
P136800	Ignition amplifier group B	<p>Ignition monitoring circuit to ECM: high resistance, short circuit to ground, short circuit to power</p> <p>Ignition module/coils ground circuit fault left hand bank</p>	For ignition system tests, Engine Ignition - VIN Range: G45704->G99999
P160300	EEPROM error	ECM fault	Refer to the warranty policy and procedure manual if an ECM is suspect.

P162600	Dynamic torque monitoring error	ECM electronic throttle monitoring / self test - torque monitoring problem	Refer to the warranty policy and procedure manual if an ECM is suspect.
P162900	Internal voltage regulator	Generator - F line failure	For generator tests,
P163200	Smart alternator faults sensor/circuit	Generator - L line failure	For generator tests,
P209600	Fuel trim too lean, right hand bank	HO2S fuel adaption - lean	Check for HO2 sensor codes. Check for air intake faults
P209700	Fuel trim too rich, right hand bank	HO2S fuel adaption - rich	Check for HO2 sensor codes. Check for air intake faults
P209800	Fuel trim too lean, left hand bank	HO2S fuel adaption - lean	Check for HO2 sensor codes. Check for air intake faults
P209900	Fuel trim too rich, left hand bank	HO2S fuel adaption - rich	Check for HO2 sensor codes. Check for air intake faults
P210129	Throttle actuator control motor circuit range/performance	Jammed throttle blade, gearing or motor	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 (19.70.04) or Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)
P210162	Throttle actuator control motor circuit range/performance	Jammed throttle blade, gearing or motor	Check for a message in the instrument cluster. Replace the throttle body.

			Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 (19.70.04) or Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)
P210164	Throttle actuator control motor circuit range/performance	Jammed throttle blade, gearing or motor	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 (19.70.04) or Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)
P210177	Throttle actuator motor control circuit range/performance (commanded position not reachable)	Throttle blade stuck open Intake air system leak	Check for throttle related DTCs. Check the intake system for leaks. Intake Air Distribution and Filtering - VIN Range: G45704->G99999
P210329	Throttle actuator motor control circuit high	Control circuit: short circuit to power ECM fault	For throttle actuator motor circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999 Refer to the warranty policy and procedures manual if an ECM is suspect.
P210364	Throttle actuator motor control circuit high - signal plausibility failure	Control circuit: short circuit to power ECM fault	For throttle actuator motor circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999 Refer

			to the warranty policy and procedures manual if an ECM is suspect.
P210500	Throttle actuator control system - forced engine shutdown	Throttle MIL request due to fuel cut	Check for DTCs indicating the reason for the fuel cut. Follow the action indicated for those DTCs.
P210629	Throttle actuator control system - forced limited power	Signal invalid	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 (19.70.04) or Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)
P210664	Throttle actuator control system - forced limited power	Signal plausibility failure	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 (19.70.04) or Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)
P211800	Throttle actuator motor control current range/performance	Control circuit: short circuit to power, short circuit to ground, high resistance ECM fault	For throttle actuator motor circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999 Refer to the warranty policy and procedures manual if

			an ECM is suspect.
P211900	Throttle actuator control throttle body range/performance	Throttle spring faulty	Check for a message in the instrument cluster. Replace the throttle body. Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 (19.70.04) or Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)
P212200	Accelerator pedal position (APP) sensor D circuit low input	APP sensor circuit 2 low input	For APP sensor tests, GO to Pinpoint Test G531332p22. and GO to Pinpoint Test G531332p23.
P212300	Accelerator pedal position (APP) sensor D circuit high input	APP sensor: circuit 2 high input	For APP sensor tests, GO to Pinpoint Test G531332p22. and GO to Pinpoint Test G531332p23.
P213528	Accelerator pedal position (APP) sensor 1 and 2 voltage correlation	APP sensor: incorrect start value (not zero)	Check connections, etc, clear the DTCs and retest. If the code resets, replace the APP sensor.
P213529	Accelerator pedal position (APP) sensor 1 and 2 voltage correlation	APP sensor: excessive difference between raw values of circuit 1 and 2 - sub-processor	Check connections, etc, clear the DTCs and retest. If the code resets, replace the APP sensor.
P213562	Accelerator pedal position (APP) sensor 1 and 2 voltage correlation	APP sensor: incorrect start value (not zero) sub-processor	Check connections, etc, clear the DTCs and retest. If the code resets, replace the APP sensor.
P213564	Accelerator pedal position (APP) sensor 1 and 2 voltage	APP sensor: excessive difference between raw	Check connections, etc, clear the DTCs and

	correlation	values of circuit 1 and 2	retest. If the code resets, replace the APP sensor.
P222800	Barometric pressure circuit low input	BARO sensor failure (internal ECM fault)	Refer to the warranty policy and procedures manual if an ECM is suspect.
P222900	Barometric pressure circuit high input	BARO sensor failure (internal ECM fault)	Refer to the warranty policy and procedures manual if an ECM is suspect.
P240100	Evaporative emission (EVAP) system leak detection pump control circuit low	DMTL pump circuit(s): short circuit to ground	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P240200	Evaporative emission system diagnostic monitoring of tank leakage (DMTL) pump control circuit high	DMTL pump circuit(s): short circuit to power	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P240429	Evaporative emission system DMTL pump sense circuit range/performance - signal invalid	DMTL reference leak DMTL pump circuit: short circuit, high resistance DMTL pipework blocked/leaking	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P24042F	Evaporative emission system DMTL pump sense circuit range/performance - signal erratic	DMTL reference leak DMTL pump circuit: short circuit, high resistance DMTL pipework blocked/leaking	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999
P240500	Evaporative emission system DMTL pump sense circuit low	DMTL pump circuit: short circuit, high resistance	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704->G99999

P240600	Evaporative emission system DMTL pump sense circuit high	DMTL pump circuit: short circuit, high resistance	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704- >G99999
P240B00	Evaporative emission system DMTL pump heater circuit low	DMTL heater control circuit low	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704- >G99999
P240C00	Evaporative emission system DMTL pump heater circuit high	DMTL heater control circuit high	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704- >G99999
P243100	Secondary air injection system air flow/pressure sensor circuit range/performance	Secondary air injection pump/valve/pipework leaks Secondary air injection pump Secondary air injection valve	For secondary air injection tests, Engine Emission Control - VIN Range: G45704- >G99999
P243200	Secondary air injection system air flow/pressure sensor circuit low input, right hand bank	Secondary air injection system MAP sensor circuit low	For secondary air injection tests, Engine Emission Control - VIN Range: G45704- >G99999
P243300	Secondary air injection system air flow/pressure sensor circuit high input, right hand bank	Secondary air injection system MAP sensor circuit high	For secondary air injection tests, Engine Emission Control - VIN Range: G45704- >G99999
P244400	Secondary air injection system pump stuck ON , right hand bank	Secondary air injection system pump control circuit low	For secondary air injection tests, Engine Emission Control - VIN Range: G45704- >G99999
P244500	Secondary air injection system pump stuck OFF , right	Secondary air pump control circuit high	For secondary air injection pump circuit

	hand bank		tests, Engine Emission Control - VIN Range: G45704- >G99999
P245000	Evaporative emission (EVAP) system change-over valve (COV) performance/stuck open	DMTL pump circuit: short circuit, high resistance	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704- >G99999
P245100	Evaporative emission control system COV valve stuck closed	DMTL pump circuit: short circuit, high resistance	For evaporative emissions tests, Evaporative Emissions - VIN Range: G45704- >G99999
P250300	Charging system voltage low	Generator - range/performance - output voltage low when high requested	For charging system tests,
P250400	Charging system voltage high	Generator - range/performance - output voltage high when low requested	For charging system tests,
P260100	Coolant pump control circuit range/performance	Coolant pump control circuit range/performance	For auxiliary coolant pump tests, GO to Pinpoint Test G531332p39.
P261064	ECM/PCM Internal engine off timer performance	ECT sensor fault Ambient temperature sensor fault Body processor module fault (time) CAN error	Check for DTCs indicating a fault with any of the components listed. Follow the action listed for those DTCs.
P261087	ECM/PCM Internal engine off timer performance	ECT sensor fault Ambient temperature sensor fault Body processor module fault	Check for DTCs indicating a fault with any of the components listed. Follow the action listed for those DTCs.

		(time) CAN error	
P263500	Fuel pump A low flow/performance (fuel pump not activated when requested by ECM)	ECM to rear electronic module (REM) drive circuit; open circuit, short circuit, high resistance Fuel pump module failure REM failure	For REM drive circuit tests, Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999
P267600	Air cleaner inlet control circuit low	Supercharger intake flap control circuit: short circuit to ground Supercharger intake flap control circuit: high resistance	For air cleaner solenoid valve tests, GO to Pinpoint Test G531332p38.
P267700	Air cleaner inlet control circuit high	Supercharger intake flap control circuit: short circuit to power	For air cleaner solenoid valve tests, GO to Pinpoint Test G531332p38.
U007300	Control module communication bus off	CAN Link circuit malfunction	For network tests,
U010100	Lost communication with TCM	CAN Link ECM/TCM network malfunction	For network tests,
U010300	Lost communication with gear shift control module	CAN Link ECM/gear shift network malfunction	For network tests,
U010400	Lost communication with speed control module	CAN Link ECM/ACC module network malfunction	For network tests,
U012100	Lost communication with anti-lock brake system (ABS) control module	CAN Link ECM/ABSCM network malfunction	For network tests,
U012800	Lost communication with park brake control module	CAN Link ECM/Electric park brake signal missing network malfunction	For network tests,
U013200	Lost communication with	CAN Link ECM/suspension control module network malfunction	For network tests,

	suspension control module		
U015100	Lost communication with restraints control module	Lost comms - CAN or hardwired	For network tests,
U015500	Lost communication with instrument panel cluster (IPC) control module	CAN Link ECM/INSTCM network malfunction	For network tests,
U016400	Lost communication with heating ventilation and air conditioning control module	CAN Link ECM/HEVAC network malfunction	For network tests,
U016700	Lost communication with vehicle immobilizer control module	Security challenge response timeout	Programme the keys using the Jaguar approved diagnostic system.
U040264	Invalid data received from transmission control module	Actual gear position status	For transmission tests.
U040267	Invalid data received from transmission control module	Gear shift position status	For transmission tests.
U040281	Invalid data received from transmission control module	Output shaft speed	For transmission tests.
U041564	Invalid data received from anti-lock brake system control module	MSR monitoring - plausibility	For network tests,
U041567	Invalid data received from anti-lock brake system control module	MSR monitoring - rationality	For network tests,
U042381	Invalid data received from instrument panel control module - invalid serial data received	External ambient temperature	For network tests,
U042386	Invalid data received from instrument panel control module - signal invalid	Battery voltage level	For network tests,

U042600	Invalid data received from vehicle immobilizer control module	Security code mismatch	Configure the module using the Jaguar approved diagnostic system.
U206400	Warning indicator requested by another control module	Crash event has occurred	For network tests,

Pinpoint Tests

PINPOINT TEST G531332p1 : MASS AIR FLOW (MAF) SENSOR CIRCUIT RANGE/PERFORMANCE, HIGH/LOW VOLTAGE

G531332t1 : CHECK THE MAF SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Disconnect the MAF sensor electrical connector, PI14. 4. Measure the resistance between:

ECM connector PI300, harness side	MAF connector PI14, harness side
Pin 70	Pin 03

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t2.

G531332t2 : CHECK THE MAF SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

MAF connector PI14, harness side	Battery
Pin 03	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t3.

G531332t3 : CHECK THE MAF SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

MAF connector PI14, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation

-> No

GO to Pinpoint Test G531332t4.

G531332t4 : CHECK THE MAF SENSOR SUPPLY CIRCUIT VOLTAGE

1. Reconnect the ECM electrical connector, PI300. 2. Key on, engine off. 3. Measure the voltage between:

MAF connector PI14, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

INSTALL a new MAF sensor.

Mass Air Flow (MAF) Sensor (18.30.15) CLEAR the DTC. TEST the system for normal operation.

-> No

REPAIR the circuit between the MAF sensor electrical connector, PI14, pin 01 (GU) and BATTERY. This circuit includes the EMS control relay, fuse 14 of the front power distribution box, and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p2 : INTAKE AIR TEMPERATURE (IAT) SENSOR CIRCUIT RANGE/PERFORMANCE, HIGH/LOW VOLTAGE

G531332t5 : CHECK THE IAT SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Disconnect the MAF sensor electrical connector, PI14. 4. Measure the resistance between:

ECM connector PI300, harness side	MAF connector PI14, harness side
Pin 66	Pin 04

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t6.

G531332t6 : CHECK THE IAT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

MAF connector PI14, harness side	Battery
Pin 04	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t7.

G531332t7 : CHECK THE IAT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

MAF connector PI14, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

INSTALL a new MAF sensor.

Mass Air Flow (MAF) Sensor (18.30.15) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p3 : ENGINE COOLANT TEMPERATURE (ECT) SENSOR CIRCUIT RANGE/PERFORMANCE, HIGH/LOW VOLTAGE

G531332t8 : CHECK THE ECT SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Disconnect the ECT sensor electrical connector, PI25. 4. Measure the resistance between:

ECM connector PI300, harness side	ECT sensor connector PI25, harness side
Pin 68	Pin 02

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t9.

G531332t9 : CHECK THE ECT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

ECT sensor connector PI25, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t10.

G531332t10 : CHECK THE ECT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Turn the ignition switch to the OFF position. 2. Measure the resistance between:

ECT sensor connector PI25, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new ECT sensor.

Engine Coolant Temperature (ECT) Sensor - 4.2L SC V8 - AJV8 (18.30.10)

Engine Coolant Temperature (ECT) Sensor - 4.2L NA V8 - AJV8 (18.30.10) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p4 : THROTTLE POSITION (TP) SENSOR RANGE/PERFORMANCE, HIGH/LOW VOLTAGE

G531332t11 : CHECK THE TP SENSOR SENSING CIRCUIT TP1 FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Disconnect the TP sensor electrical connector, PI26. 4. Measure the resistance between:

ECM connector PI300, harness side	TP sensor connector PI26, harness side
Pin 65	Pin 06

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t12.

G531332t12 : CHECK THE TP SENSOR SENSING CIRCUIT TP1 FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

TP sensor connector PI26, harness side	Battery
Pin 06	Negative terminal

Is the voltage greater than 5 volts?

-> Yes

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams.
CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t13.

G531332t13 : CHECK THE TP SENSOR SENSING CIRCUIT TP1 FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

TP sensor connector PI26, harness side	Battery
Pin 06	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

INSTALL a new TP sensor.

Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)

Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 (19.70.04) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p5 : THROTTLE POSITION (TP) SENSOR CIRCUIT TP2 HIGH/LOW VOLTAGE

G531332t14 : CHECK TP SENSOR SENSING CIRCUIT TP2 FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the TP sensor electrical connector, PI26. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

ECM connector PI300, harness side	TP sensor connector PI26, harness side
Pin 67	Pin 04

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t15.

G531332t15 : CHECK TP SENSOR SENSING CIRCUIT TP2 FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

TP sensor connector PI26, harness side	Battery
Pin 04	Positive terminal

Is the voltage greater than 5 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t16.

G531332t16 : CHECK TP SENSOR SENSING CIRCUIT TP2 FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

TP sensor connector PI26, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

INSTALL a new TP sensor.

Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)

Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 (19.70.04) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p6 : RIGHT-HAND H02S SENSING CIRCUIT LOW/HIGH CURRENT, SLOW RESPONSE, ECM CONTROL MALFUNCTION

G531332t17 : CHECK THE H02S VARIABLE CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the H02S electrical connector, PI10. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

ECM connector PI300, harness side	H02S connector PI10, harness side
Pin 28	Pin 04

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the

DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t18.

G531332t18 : CHECK THE H02S VARIABLE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

H02S connector PI10, harness side	Battery
Pin 04	Negative terminal

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams.
CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t19.

G531332t19 : CHECK THE H02S VARIABLE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

H02S connector PI10, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t20.

G531332t20 : CHECK THE H02S CONSTANT CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

ECM connector PI300, harness side	H02S connector PI10, harness side
Pin 29	Pin 03

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t21.

G531332t21 : CHECK THE H02S CONSTANT CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the voltage between:

H02S connector PI10, harness side	Battery
Pin 03	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t22.

G531332t22 : CHECK THE H02S CONSTANT CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

H02S connector PI10, harness side	Battery
--	----------------

Pin 03	Negative terminal
--------	-------------------

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new H02S.

Heated Oxygen Sensor (H02S) CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531332p7 : RIGHT-HAND H02S HEATER CONTROL CIRCUIT HIGH/LOW CURRENT

G531332t23 : CHECK H02S HEATER POWER SUPPLY CIRCUIT

1. Key off. 2. Disconnect the H02S electrical connector, PI10. 3. Key on, engine off. 4. Make sure the O2S heater relay is engaged. 5. Measure the voltage between:

H02S connector PI10, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G531332t24.

-> No

REPAIR the power supply circuit to the H02S heater. This circuit includes the H02S heater relay, fuse 34 of the front power distribution box, and the high power protection module. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

G531332t24 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Measure the resistance between:

H02S connector PI10, harness side	ECM connector PI300, harness side
Pin 02	Pin 76

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t25.

G531332t25 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

H02S connector PI10, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t26.

G531332t26 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

H02S connector PI10, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new H02S.

Heated Oxygen Sensor (H02S) CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531332p8 : RIGHT-HAND CATALYST MONITOR SENSOR SENSING CIRCUIT LOW/HIGH VOLTAGE, NO ACTIVITY

G531332t27 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the catalyst monitor sensor electrical connector, PI11. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

Catalyst monitor sensor connector PI11, harness side	ECM connector PI300, harness side
Pin 04	Pin 40

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t28.

G531332t28 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

Catalyst monitor sensor connector PI11, harness side	Battery
---	----------------

Pin 04	Negative terminal
--------	-------------------

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t29.

G531332t29 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Catalyst monitor sensor connector PI11, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t30.

G531332t30 : CHECK THE CATALYST MONITOR SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Catalyst monitor sensor connector PI11, harness side	ECM connector PI300, harness side
Pin 03	Pin 22

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new catalyst monitor sensor.

Catalyst Monitor Sensor (18.30.66) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p9 : RIGHT-HAND CATALYST MONITOR SENSOR HEATER CONTROL CIRCUIT LOW/HIGH RESISTANCE

G531332t31 : CHECK THE POWER SUPPLY TO THE CATALYST MONITOR HEATER

1. Key off.
2. Disconnect the catalyst monitor sensor electrical connector, PI11.
3. Key on, engine off.
4. Make sure the O2S heater relay is engaged.
5. Measure the voltage between:

Catalyst monitor sensor connector PI11, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G531332t32.

-> **No**

REPAIR the power supply circuit to the catalyst monitor sensor heater. This circuit includes the heater relay and fuse 33 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

G531332t32 : CHECK THE CATALYST MONITOR HEATER CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Key off.
2. Disconnect the ECM electrical connector, PI300.
3. Measure the resistance between:

Catalyst monitor sensor connector PI11, harness side	ECM connector PI300, harness side
---	--

Pin 02	Pin 88
--------	--------

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new catalyst monitor sensor.

Catalyst Monitor Sensor (18.30.66) CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531332p10 : LEFT-HAND H02S SENSING CIRCUIT LOW/HIGH CURRENT, SLOW RESPONSE, ECM CONTROL MALFUNCTION

G531332t33 : CHECK THE H02S VARIABLE CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the H02S electrical connector, PI12. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

H02S connector PI12, harness side	ECM connector PI300, harness side
Pin 04	Pin 26

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t34.

G531332t34 : CHECK THE H02S VARIABLE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

H02S connector PI12, harness side	Battery
Pin 04	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t35.

G531332t35 : CHECK THE H02S VARIABLE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

H02S connector PI12, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t36.

G531332t36 : CHECK THE H02S CONSTANT CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

H02S connector PI12, harness side	ECM connector PI300, harness side
--	--

Pin 03	Pin 27
--------	--------

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t37.

G531332t37 : CHECK THE H02S CONSTANT CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the voltage between:

H02S connector PI12, harness side	Battery
Pin 03	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t38.

G531332t38 : CHECK THE H02S CONSTANT CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

H02S connector PI12, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new H02S.

Heated Oxygen Sensor (H02S) CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531332p11 : LEFT-HAND H02S HEATER CONTROL CIRCUIT HIGH/LOW CURRENT

G531332t39 : CHECK H02S HEATER POWER SUPPLY CIRCUIT

1. Key off. 2. Disconnect the H02S electrical connector, PI12. 3. Key on, engine off. 4. Measure the voltage between:

H02S connector PI12, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G531332t40.

-> **No**

REPAIR the power supply circuit to the H02S heater. This circuit includes the heater relay and fuse 34 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

G531332t40 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Measure the resistance between:

H02S connector PI12, harness side	ECM connector PI300, harness side
Pin 02	Pin 77

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t41.

G531332t41 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

H02S connector PI12, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t42.

G531332t42 : CHECK H02S HEATER CONTROL CIRCUIT FROM ECM FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

H02S connector PI12, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new H02S.

Heated Oxygen Sensor (H02S) CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531332p12 : LEFT-HAND CATALYST MONITOR SENSOR HEATER CONTROL CIRCUIT LOW/HIGH RESISTANCE

G531332t43 : CHECK THE POWER SUPPLY TO THE CATALYST MONITOR SENSOR HEATER

1. Disconnect the catalyst monitor sensor electrical connector, PI13. 2. Key on, engine off. 3. Make sure the catalyst monitor sensor heater relay is engaged. 4. Measure the voltage between:

Catalyst monitor sensor connector PI13, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G531332t44.

-> **No**

REPAIR the power supply circuit to the H02S heater. This circuit includes the heater relay and fuse 34 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

G531332t44 : CHECK THE CATALYST MONITOR SENSOR HEATER CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Measure the resistance between:

Catalyst monitor sensor connector PI13, harness side	ECM connector PI300, harness side
Pin 01	Pin 89

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new catalyst monitor sensor.

Catalyst Monitor Sensor (18.30.66) CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531332p13 : ENGINE OIL TEMPERATURE (EOT) SENSOR RANGE/PERFORMANCE, HIGH/LOW VOLTAGE

G531332t45 : CHECK THE EOT SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the EOT sensor electrical connector, PI24. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

EOT sensor connector PI24, harness side	ECM connector PI300, harness side
Pin 02	Pin 23

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t46.

G531332t46 : CHECK THE EOT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

EOT sensor connector PI24, harness side	Battery
--	----------------

Pin 02	Negative terminal
--------	-------------------

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t47.

G531332t47 : CHECK THE EOT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

EOT sensor connector PI24, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t48.

G531332t48 : CHECK THE EOT SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

EOT sensor connector PI24, harness side	ECM connector PI300, harness side
Pin 01	Pin 10

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. This circuit includes harness splice, PIS49. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new EOT sensor.

Oil Temperature Sensor (18.31.01) CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531332p14 : LEFT-HAND CATALYST MONITOR SENSOR SENSING CIRCUIT LOW/HIGH VOLTAGE, NO ACTIVITY

G531332t49 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the catalyst monitor sensor electrical connector, PI13. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

Catalyst monitor sensor PI13, harness side	ECM connector PI300, harness side
Pin 04	Pin 41

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t50.

G531332t50 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

Catalyst monitor sensor PI13, harness side	Battery

Pin 04	Negative terminal
--------	-------------------

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t51.

G531332t51 : CHECK THE CATALYST MONITOR SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Catalyst monitor sensor PI13, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t52.

G531332t52 : CHECK THE CATALYST MONITOR SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between PI13, pin 03 (B) and PI300, pin 130 (BW).

Catalyst monitor sensor PI13, harness side	ECM connector PI300, harness side
Pin 03	Pin 45

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new catalyst monitor sensor.

Catalyst Monitor Sensor (18.30.66) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p15 : RIGHT-HAND KNOCK SENSOR (KS) HIGH/LOW VOLTAGE

G531332t53 : CHECK KS SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the KS electrical connector, PI19. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

KS connector PI19, harness side	ECM connector PI300, harness side
Pin 04	Pin 42

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t54.

G531332t54 : CHECK KS SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

KS connector PI19, harness side	Battery
Pin 04	Negative terminal

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t55.

G531332t55 : CHECK KS SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

KS connector PI19, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t56.

G531332t56 : CHECK KS GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

KS connector PI19, harness side	ECM connector PI300, harness side
Pin 03	Pin 19

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new KS.

Knock Sensor (KS) LH (18.30.92) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p16 : LEFT-HAND KNOCK SENSOR (KS) HIGH/LOW VOLTAGE

G531332t57 : CHECK KS SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the KS electrical connector, PI19. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

KS connector PI19, harness side	ECM connector PI300, harness side
Pin 02	Pin 43

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t58.

G531332t58 : CHECK KS SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

KS connector PI19, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t59.

G531332t59 : CHECK KS SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

KS connector PI19, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t60.

G531332t60 : CHECK KS GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

KS connector PI19, harness side	ECM connector PI300, harness side
Pin 01	Pin 20

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new KS.

Knock Sensor (KS) LH (18.30.92) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p17 : CRANKSHAFT POSITION (CKP) SENSOR CIRCUIT

RANGE/PERFORMANCE, CIRCUIT MALFUNCTION

G531332t61 : CHECK THE CKP SENSOR FOR CORRECT INSTALLATION

1. Key off. 2. Check the CKP sensor for correct installation.

Is the CKP sensor correctly installed?

-> **Yes**

GO to Pinpoint Test G531332t62.

-> **No**

INSTALL the CKP sensor correctly.

Crankshaft Position (CKP) Sensor (18.30.12) Reconnect the sensor. CLEAR the DTCs. TEST the system for normal operation.

G531332t62 : CHECK THE CKP SENSOR FOR DEBRIS

1. Remove the CKP sensor and inspect for debris.

Is the CKP sensor free of debris?

-> **Yes**

GO to Pinpoint Test G531332t63.

-> **No**

CLEAN the sensor and wheel. INSTALL the sensor.

Crankshaft Position (CKP) Sensor (18.30.12) Reconnect the sensor. CLEAR the DTCs. TEST the system for normal operation.

G531332t63 : CHECK THE CKP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, PI300. 2. Disconnect the CKP sensor electrical connector, PI21. 3. Measure the resistance between:

CKP sensor connector PI21, harness side	ECM connector PI300, harness side
Pin 02	Pin 30

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t64.

G531332t64 : CHECK THE CKP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

CKP sensor connector PI21, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t65.

G531332t65 : CHECK THE CKP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

CKP sensor connector PI21, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t66.

G531332t66 : CHECK THE CKP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

CKP sensor connector PI21, harness side	ECM connector PI300, harness side
Pin 01	Pin 06

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new CKP sensor.

Crankshaft Position (CKP) Sensor (18.30.12) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p18 : RIGHT-HAND CAMSHAFT POSITION (CMP) SENSOR CIRCUIT RANGE/PERFORMANCE, CIRCUIT MALFUNCTION

G531332t67 : CHECK THE CMP SENSOR FOR CORRECT INSTALLATION

1. Key off. 2. Check the CMP sensor for correct installation.

Is the CMP sensor correctly installed?

-> Yes

GO to Pinpoint Test G531332t68.

-> No

INSTALL the CMP sensor correctly.

Camshaft Position (CMP) Sensor RH (18.31.11) CLEAR the DTCs. TEST the system for normal operation.

G531332t68 : CHECK THE CMP SENSOR FOR FOREIGN DEBRIS

1. Remove the CMP sensor and inspect for foreign debris.

Is the CMP sensor free of foreign debris?

-> **Yes**

GO to Pinpoint Test G531332t69.

-> **No**

CLEAN the sensor and wheel. INSTALL the sensor.

Camshaft Position (CMP) Sensor RH (18.31.11) CLEAR the DTCs. TEST the system for normal operation.

G531332t69 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the CMP sensor electrical connector, PI23. 2. Disconnect the ECM electrical connector, PI300. 3. Measure the resistance between:

CMP sensor connector PI23, harness side	ECM connector PI300, harness side
Pin 02	Pin 34

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t69.

G531332t70 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

CMP sensor connector PI23, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t71.

G531332t71 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

CMP sensor connector PI23, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t72.

G531332t72 : CHECK THE CMP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

CMP sensor connector PI23, harness side	ECM connector PI300, harness side
Pin 01	Pin 07

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new CMP sensor.

Camshaft Position (CMP) Sensor RH (18.31.11) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p19 : RADIATOR COOLING FAN MODULE DRIVE CIRCUIT MALFUNCTION

G531332t73 : CHECK THE RADIATOR FAN MODULE PERMANENT SUPPLY

1. Disconnect the fan module electrical connector, GCU04. 2. Measure the voltage between:

Fan module connector GCU04, harness side	Battery
Single pin	Negative terminal

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the cooling fan module and battery. This circuit includes fuse 35 of the front power distribution box (80A). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

Reconnect electrical connector, GCU04. GO to Pinpoint Test G531332t74.

G531332t74 : CHECK THE RADIATOR FAN MODULE GROUND

1. Disconnect the fan module electrical connector, GCU03. 2. Measure the resistance between:

Fan module connector GCU03, harness side	Battery
Single pin	Negative terminal

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

Reconnect electrical connector, GCU03. GO to Pinpoint Test G531332t75.

G531332t75 : CHECK THE RADIATOR FAN MODULE EMS SWITCHED SUPPLY

1. Disconnect the fan module electrical connector, GCU01. 2. Key on, engine off. 3. Make sure the EMS relay is engaged. 4. Measure the voltage between:

Fan module connector GCU01, harness side	Battery
Pin 02	Negative terminal

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the cooling fan module and battery. This circuit includes the front power distribution box, (fuse 14) and the EMS control relay. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t76.

G531332t76 : CHECK THE ECM TO RADIATOR FAN MODULE CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Measure the resistance between:

Fan module connector GCU01, harness side	ECM connector PI300, harness side
Pin 01	Pin 49

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t77.

G531332t77 : CHECK THE ECM TO RADIATOR FAN MODULE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

Fan module connector GCU01, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t78.

G531332t78 : CHECK THE ECM TO RADIATOR FAN MODULE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Fan module connector GCU01, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

INSTALL a new radiator cooling fan module. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p20 : BATTERY POWER SUPPLY VOLTAGE MALFUNCTION

G531332t79 : CHECK THE BATTERY POWER SUPPLY TO THE ECM

1. Disconnect the ECM electrical connector, PI300. 2. Measure the voltage between:

ECM connector PI300, harness side	Battery
Pin 54	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

Recheck the DTCs.

-> No

REPAIR the battery power supply circuit. This circuit includes fuse 17 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p21 : MASS AIR FLOW (MAF) SENSOR GROUND MALFUNCTION

G531332t80 : CHECK THE MAF SENSOR GROUND

1. Disconnect the MAF sensor electrical connector, PI14. 2. Key on, engine off. 3. Measure the resistance between:

MAF sensor connector PI14, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 5 ohms?

-> Yes

GO to Pinpoint Test G531332t81.

-> No

INSTALL a new MAF sensor.

Mass Air Flow (MAF) Sensor (18.30.15) CLEAR the DTC. TEST the system for normal operation.

G531332t81 : CHECK THE MAF SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Measure the resistance between:

MAF sensor connector PI14, harness side	ECM connector PI300, harness side
Pin 02	Pin 18

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t82.

G531332t82 : CHECK THE MAF SENSOR GROUND CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

MAF sensor connector PI14, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

Refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531332p22 : ACCELERATOR PEDAL POSITION (APP) SENSOR SENSING CIRCUIT 1 HIGH/LOW VOLTAGE

G531332t83 : CHECK THE APP SENSOR SENSING CIRCUIT 1 FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Disconnect the APP sensor electrical connector, CR14. 4. Measure the resistance between:

ECM connector PI300, harness side	APP sensor connector CR14, harness side
Pin 01	Pin 38

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t84.

G531332t84 : CHECK THE APP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, ignition off. 2. Measure the voltage between:

APP sensor connector CR14, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t85.

G531332t85 : CHECK THE APP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

APP sensor connector CR14, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t86.

G531332t86 : CHECK THE APP SENSOR SUPPLY VOLTAGE AT THE SENSOR

1. Reconnect the ECM electrical connector, PI300. 2. Key on, ignition off. 3. Measure the voltage between:

APP sensor connector CR14, harness side	Battery
Pin 02	Negative terminal

Is the voltage less than 4 volts?

-> Yes

GO to Pinpoint Test G531332t87.

-> No

INSTALL a new APP sensor.

Accelerator Pedal (19.20.01) CLEAR the DTC. TEST the system for normal operation.

G531332t87 : CHECK THE APP SENSOR SUPPLY VOLTAGE CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Measure the resistance between:

APP sensor connector CR14, harness side	ECM connector PI300, harness side
Pin 02	Pin 32

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

Check the ECM power supplies (recheck DTCs. P1104 may be flagged).

PINPOINT TEST G531332p23 : ACCELERATOR PEDAL POSITION (APP) SENSOR SENSING CIRCUIT 2 HIGH/LOW VOLTAGE

G531332t88 : CHECK THE APP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the APP sensor electrical connector, CR14. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

APP sensor connector CR14, harness side	ECM connector PI300, harness side
Pin 04	Pin 24

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t89.

G531332t89 : CHECK THE APP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

APP sensor connector CR14, harness side	Battery
Pin 04	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t90.

G531332t90 : CHECK THE APP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

APP sensor connector CR14, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t91.

G531332t91 : CHECK THE APP SENSOR SUPPLY VOLTAGE AT THE SENSOR

1. Reconnect the ECM electrical connector, PI300. 2. Key on, engine off. 3. Measure the voltage between:

APP sensor connector CR14, harness side	Battery
Pin 05	Negative terminal

Is the voltage less than 4 volts?

-> Yes

GO to Pinpoint Test G531332t92.

-> **No**

INSTALL a new APP sensor.

Accelerator Pedal (19.20.01) CLEAR the DTC. TEST the system for normal operation.

G531332t92 : CHECK THE APP SENSOR SUPPLY VOLTAGE CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Measure the resistance between:

APP sensor connector CR14, harness side	ECM connector PI300, harness side
Pin 05	Pin 19

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

Check the ECM power supplies (recheck DTCs. P1104 may be flagged).

PINPOINT TEST G531332p24 : THROTTLE MOTOR CONTROL CIRCUIT MALFUNCTION

G531332t93 : CHECK THE THROTTLE MOTOR - TO ECM CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the throttle motor electrical connector, PI26. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

Throttle motor connector PI26, harness side	ECM connector PI300, harness side
Pin 02	Pin 74

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t94.

G531332t94 : CHECK THE THROTTLE MOTOR + TO ECM CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Throttle motor connector PI26, harness side	ECM connector PI300, harness side
Pin 01	Pin 75

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new throttle body.

Throttle Body - 4.2L NA V8 - AJV8/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 (19.70.04)

Throttle Body - 4.2L SC V8 - AJV8, VIN Range: G45704->G99999 (19.70.04) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p25 : SENSOR SUPPLY VOLTAGE MALFUNCTION, HIGH/LOW VOLTAGE

G531332t95 : CHECK THE SUPPLY VOLTAGE AT THE MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

1. Disconnect the MAP sensor electrical connector, PI301. 2. Key on, engine off. 3. Measure the voltage between:

MAP sensor connector PI301, harness side	Battery
Pin 02	Negative terminal

Is the voltage less than 5 volts?

-> **Yes**

REPAIR the circuit between the MAP sensor and battery. This circuit includes splice PIS84. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t96.

G531332t96 : CHECK THE SUPPLY VOLTAGE AT THE FUEL RAIL PRESSURE (FRP) SENSOR

1. Disconnect the FRP sensor electrical connector, PI28. 2. Measure the resistance between:

FRP sensor connector PI28, harness side	Battery
Pin 01	Negative terminal

Is the voltage less than 5 volts?

-> **Yes**

REPAIR the circuit between the FRP sensor and battery. This circuit includes splice PIS84. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

CHECK for DTCs indicating a sensor fault. Refer to the DTC index.

PINPOINT TEST G531332p26 : SENSOR GROUND CIRCUITS OPEN CIRCUIT

G531332t115 : CHECK THE SENSOR GROUND AT THE MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR (VEHICLES WITH SUPERCHARGER)

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Disconnect the MAP sensor electrical connector, PI301. 4. Measure the resistance between:

MAP sensor electrical connector PI301, harness side	ECM connector PI300, harness side
Pin 04	Pin 12

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t116.

G531332t116 : CHECK THE SENSOR GROUND AT THE ENGINE COOLANT TEMPERATURE (ECT) SENSOR

1. Disconnect the ECT sensor electrical connector, PI25. 2. Measure the resistance between:

ECT sensor electrical connector PI25, harness side	ECM connector PI300, harness side
Pin 01	Pin 12

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t117.

G531332t117 : CHECK THE SENSOR GROUND AT THE MASS AIR FLOW (MAF) SENSOR

1. Disconnect the MAF sensor electrical connector, PI14. 2. Measure the resistance between:

MAF sensor electrical connector PI14, harness side	ECM connector PI300, harness side
Pin 05	Pin 12

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

CHECK for DTCs indicating a sensor fault. Refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531332p27 : STARTER RELAY SIGNAL

G531332t111 : CHECK THE STARTER RELAY TO ECM CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Remove the starter relay. 3. Measure the resistance between:

Starter relay base	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531332t112.

G531332t112 : CHECK THE STARTER RELAY TO ECM CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Starter relay base	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

GO to Pinpoint Test G531332t133.

G531332t133 : CHECK THE STARTER RELAY TO ECM CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

Starter relay base	ECM connector EC300, harness side
Pin 02	Pin 51

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new starter relay. Clear the DTC and test the system for normal operation. If the DTC resets, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531332p28 : LEFT-HAND CAMSHAFT POSITION (CMP) SENSOR CIRCUIT MALFUNCTION RANGE/PERFORMANCE

G531332t135 : CHECK THE CMP SENSOR FOR CORRECT INSTALLATION

1. Check the CMP sensor for correct installation.

Is the CMP sensor correctly installed?

-> Yes

GO to Pinpoint Test G531332t136.

-> No

INSTALL the CMP sensor correctly.

Camshaft Position (CMP) Sensor LH (18.31.12) CLEAR the DTCs. TEST the system for normal operation.

G531332t136 : CHECK THE CMP SENSOR FOR FOREIGN DEBRIS

1. Remove the CMP sensor and inspect for foreign debris.

Is the CMP sensor free of foreign debris?

-> Yes

GO to Pinpoint Test G531332t137.

-> No

CLEAN the sensor and wheel. INSTALL the sensor.

Camshaft Position (CMP) Sensor LH (18.31.12) CLEAR the DTCs. TEST the system for normal operation.

G531332t137 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the CMP sensor electrical connector, PI22. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

CMP sensor connector PI22, harness side	ECM connector PI300, harness side
Pin 01	Pin 33

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t138.

G531332t138 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

CMP sensor connector PI22, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t139.

G531332t139 : CHECK THE CMP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

CMP sensor connector PI22, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

INSTALL a new CMP sensor.

Camshaft Position (CMP) Sensor LH (18.31.12) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p29 : RIGHT-HAND VARIABLE CAMSHAFT TIMING (VCT) OIL CONTROL SOLENOID MALFUNCTION, CIRCUIT MALFUNCTION

G531332t140 : CHECK ECM TO VCT SOLENOID CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the VCT electrical connector, PI16. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

VCT connector PI16, harness side	ECM connector PI300, harness side
---	--

Pin 01	Pin 86
--------	--------

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t141.

G531332t141 : CHECK ECM TO VCT SOLENOID CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

VCT connector PI16, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t141.

G531332t142 : CHECK ECM TO VCT SOLENOID CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

VCT connector PI16, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t143.

G531332t143 : CHECK VCT SOLENOID POWER

1. Measure the voltage between:

VCT connector PI16, harness side	Battery
Pin 02	Negative terminal

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the VCT solenoid and battery. This circuit includes splices PIS11 and ECS72, and fuse 12 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new VCT solenoid.

Variable Camshaft Timing (VCT) Oil Control Solenoid (18.30.90) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p30 : LEFT-HAND VARIABLE CAMSHAFT TIMING (VCT) OIL CONTROL SOLENOID MALFUNCTION, CIRCUIT MALFUNCTION

G531332t144 : CHECK ECM TO VCT SOLENOID CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the VCT electrical connector, PI17. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

VCT connector PI17, harness side	ECM connector PI300, harness side
---	--

Pin 01	Pin 87
--------	--------

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t145.

G531332t145 : CHECK ECM TO VCT SOLENOID CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

VCT connector PI17, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t146.

G531332t146 : CHECK ECM TO VCT SOLENOID CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key on, engine off. 2. Measure the resistance between:

VCT connector PI17, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t147.

G531332t147 : CHECK VCT SOLENOID POWER

1. Measure the voltage between:

VCT connector PI17, harness side	Battery
Pin 02	Negative terminal

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the VCT solenoid and battery. This circuit includes splices PIS11 and ECS72, and fuse 12 of the front power distribution box. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new VCT solenoid.

Variable Camshaft Timing (VCT) Oil Control Solenoid (18.30.90) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p31 : "FLIGHT RECORDER" DATA IS STORED IF ANY ONE OF FIVE CONDITIONS OCCUR

G531332t148 : CHECK THE INERTIA SWITCH TO ECM CIRCUIT FOR SHORT CIRCUIT TO POWER VOLTAGE

1. Make sure the inertia switch is not tripped. 2. Disconnect the inertia switch electrical connector, CR02. 3. Disconnect the ECM electrical connector, EC300. 4. Measure the voltage between:

Inertia switch connector CR02, harness side	ECM connector EC300, harness side
Pin 03	Pin 42

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new inertia switch. CLEAR the DTC. CLEAR the flight recorder information. TEST the system for normal operation.

PINPOINT TEST G531332p32 : EMS CONTROL RELAY MALFUNCTION

G531332t149 : CHECK THE EMS RELAY PERMANENT SUPPLY

1. Key off. 2. Remove the EMS relay. 3. Measure the voltage between:

Relay base	Battery
Pin 01	Negative terminal
Pin 05	

Are both voltages greater than 10 volts?

-> Yes

GO to Pinpoint Test G531332t150.

-> No

REPAIR the circuit between the relay base and battery. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

G531332t150 : CHECK THE ECM TO EMS RELAY CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

Relay base	ECM connector EC300, harness side
Pin 02	Pin 16

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t151.

G531332t151 : CHECK THE EMS RELAY TO ECM SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Relay base	ECM connector EC300, harness side
Pin 03	Pin 04
	Pin 06

Is either resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new EMS relay. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p33 : MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR SENSING CIRCUIT MALFUNCTION, HIGH/LOW VOLTAGE (VEHICLES WITHOUT SUPERCHARGER)

G531332t152 : CHECK THE MAP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the MAP sensor electrical connector, PI29. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

MAP sensor connector PI29, harness side	ECM connector PI300, harness side
Pin 01	Pin 69

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t153.

G531332t153 : CHECK THE MAP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the voltage between:

MAP sensor connector PI29, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t154.

G531332t154 : CHECK THE MAP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

MAP sensor connector PI29, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new MAP sensor.

Manifold Absolute Pressure (MAP) Sensor - 4.2L NA V8 - AJV8 (18.30.86) CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531332p34 : ENGINE FUEL TEMPERATURE (EFT) SENSOR RANGE/PERFORMANCE, LOW/HIGH VOLTAGE

G531332t155 : CHECK THE EFT SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the EFT sensor electrical connector, PI27. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

EFT sensor connector PI27, harness side	ECM connector PI300, harness side
Pin 02	Pin 46

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t156.

G531332t156 : CHECK THE EFT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

EFT sensor connector PI27, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t157.

G531332t157 : CHECK THE EFT SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

EFT sensor connector PI27, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

INSTALL a new EFT sensor.

Fuel Temperature Sensor (18.30.99) CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p35 : AIR CONDITIONING (A/C) PRESSURE SENSOR CIRCUIT LOW/HIGH VOLTAGE

G531332t158 : CHECK THE A/C PRESSURE SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the A/C pressure sensor electrical connector, EC11. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

A/C pressure sensor connector EC11, harness side	ECM connector PI300, harness side
Pin 02	Pin 12

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t159.

G531332t159 : CHECK THE A/C PRESSURE SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

A/C pressure sensor connector EC11, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t160.

G531332t160 : CHECK THE A/C PRESSURE SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

A/C pressure sensor connector EC11, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new A/C pressure sensor.

Pressure Cutoff Switch - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (82.10.32)

PINPOINT TEST G531332p37 : MANIFOLD ABSOLUTE PRESSURE SENSOR/TEMPERATURE (MAPT) SENSOR, INTAKE AIR TEMPERATURE (IAT2) SENSING CIRCUIT

G531332t166 : CHECK THE MAPT SENSOR IAT2 SENSING CIRCUIT FOR HIGH RESISTANCE

1. key off. 2. Disconnect the MAPT sensor electrical connector, PI301. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

MAPT sensor connector PI301, harness side	ECM connector PI300, harness side
Pin 03	Pin 39

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t167.

G531332t167 : CHECK THE MAPT SENSOR IAT2 SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

MAPT sensor connector PI301, harness side	Battery
Pin 03	Negative terminal

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t168.

G531332t168 : CHECK THE MAPT SENSOR IAT2 SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

MAPT sensor connector PI301, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

INSTALL a new MAPT sensor. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p38 : AIR CLEANER SOLENOID VALVE DRIVE CIRCUIT MALFUNCTION

G531332t169 : CHECK THE POWER SUPPLY TO THE AIR CLEANER SOLENOID VALVE

1. Key off. 2. Disconnect the air cleaner solenoid valve electrical connector, EC37. 3. Key on, engine off. 4. Make sure the EMS relay is engaged. 5. Measure the voltage between:

Air cleaner solenoid valve connector EC37, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G531332t170.

-> **No**

REPAIR the circuit between the air cleaner solenoid valve and battery. This circuit includes splice ECS20, fuse 14 of the front power distribution box and the EMS relay. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

G531332t170 : CHECK THE AIR CLEANER SOLENOID VALVE TO ECM CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM electrical connector, PI300. 3. Measure the resistance between:

Air cleaner solenoid valve connector EC37, harness side	ECM connector PI300, harness side
Pin 02	Pin 49

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t171.

G531332t171 : CHECK THE AIR CLEANER SOLENOID VALVE TO ECM CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the voltage between:

Air cleaner solenoid valve connector EC37, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t172.

G531332t172 : CHECK THE AIR CLEANER SOLENOID VALVE TO ECM CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Air cleaner solenoid valve connector EC37, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

INSTALL a new air cleaner solenoid valve. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p39 : CHECK THE AUXILIARY COOLANT PUMP FUNCTION

G531332t173 : CHECK THE POWER SUPPLY TO THE AUXILIARY COOLANT PUMP

1. Key off. 2. Disconnect the auxiliary coolant pump electrical connector, CP02. 3. Key on, engine off. 4. Make sure the EMS relay is engaged. 5. Make sure the auxiliary coolant pump relay is engaged. 6. Measure the voltage between:

Auxiliary coolant pump connector CP02, harness side	Battery
Pin 02	Negative terminal

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between CP02, pin 02 and battery. This circuit includes fuse 17 of the front power distribution box, the auxiliary coolant pump relay and the EMS relay. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t174.

G531332t174 : CHECK THE AUXILIARY COOLANT PUMP GROUND

1. Measure the resistance between:

Auxiliary coolant pump connector CP02, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

INSTALL a new auxiliary coolant pump.

Water Pump CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p40 : FUEL RAIL PRESSURE (FRP) SENSOR CIRCUIT

G531332t175 : CHECK THE FRP SENSOR SUPPLY CIRCUIT VOLTAGE

1. Key off. 2. Disconnect the FRP sensor electrical connector, PI28. 3. Key on, engine off. 4. Measure the voltage between:

FRP sensor connector PI28, harness side	Battery
Pin 01	Negative terminal

Is the voltage less than 4 volts?

-> **Yes**

REPAIR the 5 volt supply circuit between the FRP sensor and the ECM. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t177.

G531332t177 : CHECK THE FRP SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

FRP sensor connector PI28, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t178.

G531332t178 : CHECK THE FRP SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

FRP sensor connector PI28, harness side	Battery
Pin 03	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t179.

G531332t179 : CHECK THE FRP SENSOR SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM sensor electrical connector, PI300. 2. Measure the resistance between:

FRP sensor connector PI28, harness side	ECM connector PI300, harness side
Pin 03	Pin 71

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t180.

G531332t180 : CHECK THE FRP SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

FRP sensor connector PI28, harness side	ECM connector PI300, harness side
Pin 02	Pin 10

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. This circuit includes splice PIS49. For additional information, refer to the wiring diagrams. CLEAR the DTC and test the system for normal operation.

-> No

INSTALL a new FRP sensor.

Fuel Rail Pressure (FRP) Sensor (18.30.98) CLEAR the DTC and test the system for normal operation.

PINPOINT TEST G531332p36 : MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR SENSING CIRCUIT MALFUNCTION, HIGH/LOW VOLTAGE (VEHICLES WITH SUPERCHARGER)

G531332t97 : CHECK THE MAP SENSOR SENSING CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the MAP sensor electrical connector, PI301. 3. Disconnect the ECM electrical connector, PI300. 4. Measure the resistance between:

MAP sensor connector PI301, harness side	ECM connector PI300, harness side
Pin 01	Pin 38

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t98.

G531332t98 : CHECK THE MAP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the voltage between:

MAP sensor connector PI301, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t99.

G531332t99 : CHECK THE MAP SENSOR SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

MAP sensor connector PI301, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

INSTALL a new MAP sensor.

Manifold Absolute Pressure (MAP) Sensor - 4.2L SC V8 - AJV8 (18.30.86) CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, refer to the warranty policy and procedures manual if an ECM is suspect.

PINPOINT TEST G531332p41 : MANIFOLD ABSOLUTE

PRESSURE/TEMPERATURE (MAPT) SENSOR PRESSURE SENSING CIRCUIT

G531332t101 : CHECK THE POWER SUPPLY TO THE MAPT SENSOR

1. Key off. 2. Disconnect the MAPT connector, PI310. 3. Key on, engine off. 4. Measure the voltage between:

MAPT sensor connector PI310, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 4 volts?

-> **Yes**

GO to Pinpoint Test G531332t102.

-> **No**

CHECK the circuit between the MAPT sensor, pin 02 and the ECM. Refer to the warranty policy and procedures manual if an ECM is suspect.

G531332t102 : CHECK THE GROUND TO THE MAPT SENSOR

1. Key off. 2. Measure the resistance between:

MAPT sensor connector PI310, harness side	Battery
Pin 04	Negative terminal

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. This circuit includes splice PIS49 and the ECM. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation. Refer to the warranty policy and procedures manual if an ECM is suspect.

-> **No**

GO to Pinpoint Test G531332t100.

G531332t100 : CHECK THE MAPT PRESSURE SENSING CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the ECM connector, PI300. 2. Measure the resistance between:

MAPT sensor connector PI310, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t103.

G531332t103 : CHECK THE MAPT PRESSURE SENSING CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

MAPT sensor connector PI310, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G531332t104.

G531332t104 : CHECK THE MAPT PRESSURE SENSING CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

MAPT sensor connector PI310, harness side	ECM connector PI300, harness side
--	--

Pin 01	Pin 69
--------	--------

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation. Refer to the warranty policy and procedures manual if an ECM is suspect.

-> No

INSTALL a new MAPT sensor. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G531332p42 : BRAKE SWITCH

G531332t105 : CHECK THE OPERATION OF THE BRAKE SWITCH (PEDAL RELEASED)

1. Key off. 2. Disconnect the brake switch electrical connector, CR78. 3. Make sure the brake pedal is not pressed. 4. Measure the resistance between:

Brake switch connector CR78, component side	Brake switch connector CR78, component side
Pin 01	Pin 02

Is the resistance greater than 10 ohms?

-> Yes

GO to Pinpoint Test G531332t106.

-> No

INSTALL a new brake switch. CLEAR the DTC, test the system for normal operation.

G531332t106 : CHECK THE OPERATION OF THE BRAKE SWITCH (PEDAL PRESSED)

1. Press the brake pedal. 2. Measure the resistance between:

Brake switch connector CR78, component side	Brake switch connector CR78, component side

Pin 01	Pin 02
--------	--------

Is the resistance greater than 10 ohms?

-> Yes

INSTALL a new brake switch. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G531332t107.

G531332t107 : CHECK THE POWER SUPPLY TO THE BRAKE PEDAL SWITCH

1. Key on, engine off. 2. Measure the voltage between:

Brake switch connector CR78, harness side	Battery
Pin 01	Negative terminal

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the brake switch and battery. This circuit includes fuse 44 of the primary junction box. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G531332t108.

G531332t108 : CHECK THE BRAKE SWITCH SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Brake switch connector CR78, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t109.

G531332t109 : CHECK THE BRAKE SWITCH SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Brake switch connector CR78, harness side	Battery
Pin 02	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G531332t110.

G531332t110 : CHECK THE BRAKE SWITCH SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

Brake switch connector CR78, harness side	ECM connector EC300, harness side
Pin 02	Pin 41

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

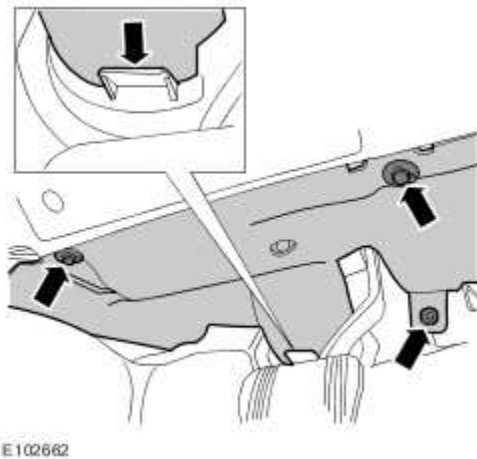
REFER to the warranty policy and procedures manual if an ECM is suspect.

Brake Pedal Position (BPP) Switch

Removal

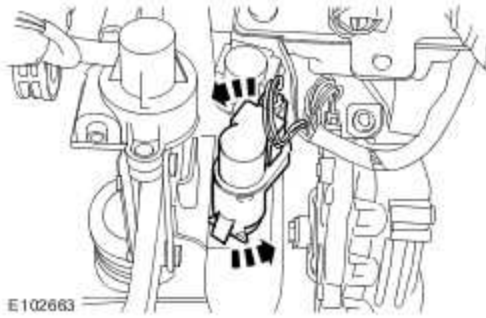
- 1 . Switch the ignition on.
- 2 . Position the front seat fully rearwards.
- 3 . Switch the ignition off.
- 4 . Remove the driver's side footwell trim panel.

▶ Release the 3 clips.



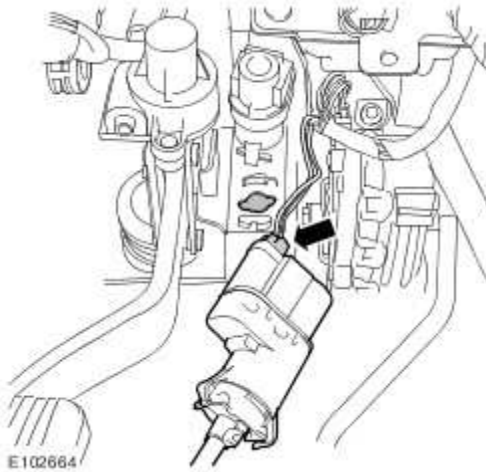
- 5 . Release the brake pedal position (BPP) switch.

▶ Rotate the BPP switch 45 degrees counter-clockwise.





6 . Remove the BPP switch.

▶ Disconnect the electrical connector.



Installation

- 1  **CAUTION:** Make sure that the brake pedal remains in the rest position during this procedure.

 **CAUTION:** The bracket is keyed to avoid incorrect orientation. Failure to correctly align the switch may result in damage to the vehicle.



CAUTION: Make sure that the pedal box, booster-to-brake pedal assembly and switch bracket are all installed correctly before installing the switch.

Install the BPP switch.

- ▶ Locate the BPP switch in the bracket.
- ▶ Rotate the BPP switch 45 degrees clockwise.

2 . Connect the electrical connector.

3 . Install the driver's side footwell trim panel.

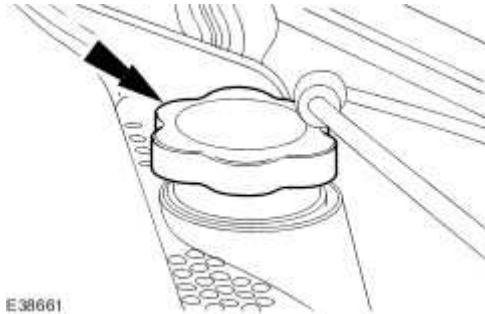
- ▶ Align the trim panel with the guide.
- ▶ Install the 3 clips.

Camshaft Position (CMP) Sensor LH (18.31.12)

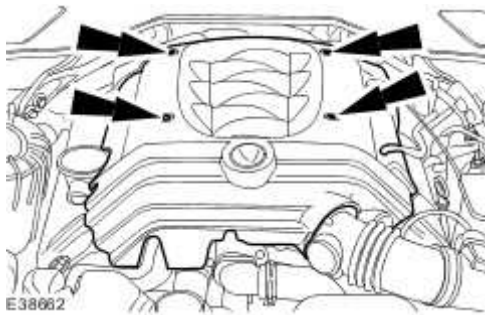
Removal

Vehicles with 3.5L or 4.2L engine without supercharger

- 1 . Remove the oil filler cap.

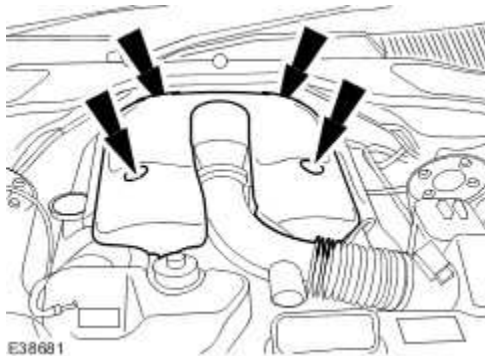


- 2 . Remove the engine cover.



Vehicles with supercharger

- 3 . Remove the engine cover.



All vehicles

4 . Remove the cowl vent screen. <<501-02>>

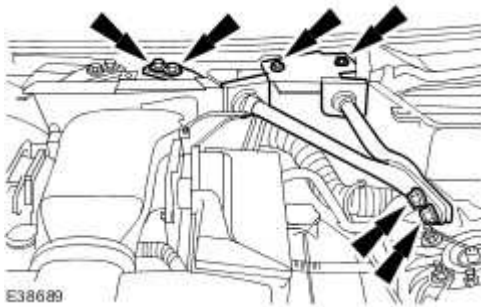
5 NOTE:

Vehicles with supercharger shown, vehicles with 3.5L or 4.2L engine without supercharger similar.

NOTE:

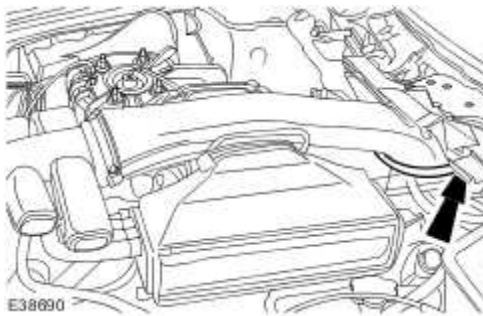
Left-hand shown, right-hand similar.

Remove the engine compartment supports.

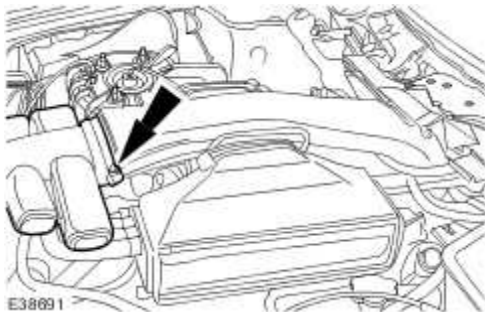


Vehicles with supercharger

6 . Loosen the throttle body intake pipe retaining clip.



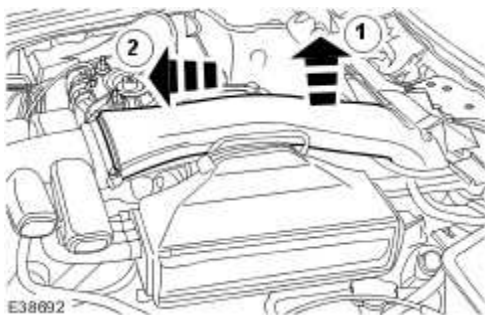
7 . Detach the air filter outlet pipe



8 . Remove the throttle body intake pipe.

1) Detach the throttle body intake pipe.

2) Remove the throttle body intake pipe.

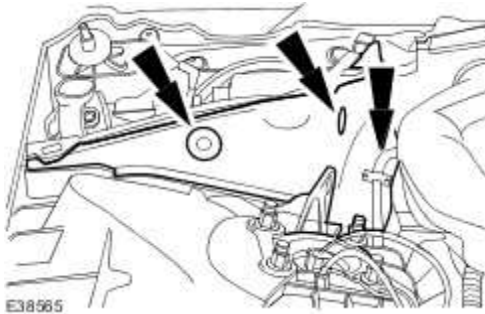


All vehicles

9 . **NOTE:**

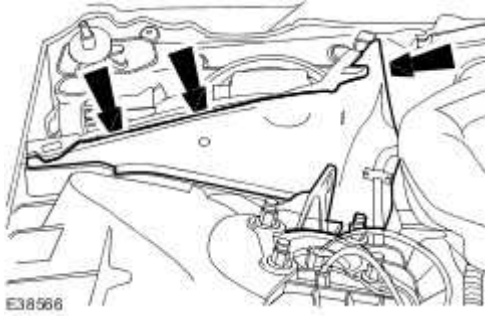
Right-hand drive vehicles shown, left-hand drive vehicles similar.

Remove the engine compartment outer panel insulation.



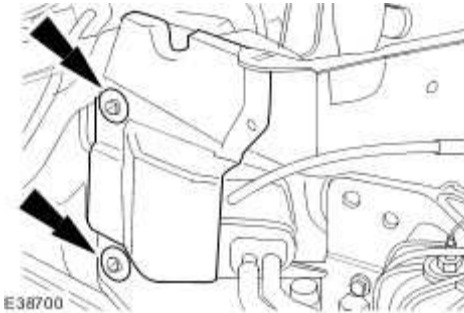
Right-hand drive vehicles

10 . Remove the engine compartment outer panel.



Left-hand drive vehicles

11 . Remove the engine compartment outer access panel.



All vehicles

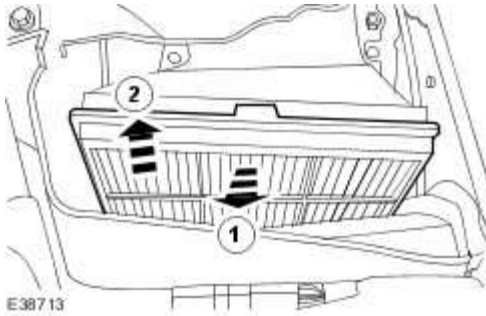
12 . **NOTE:**

Right-hand drive vehicles shown, left-hand drive vehicles similar.

Remove the cabin air filter.

1) Detach the cabin air filter.

2) Remove the cabin air filter.



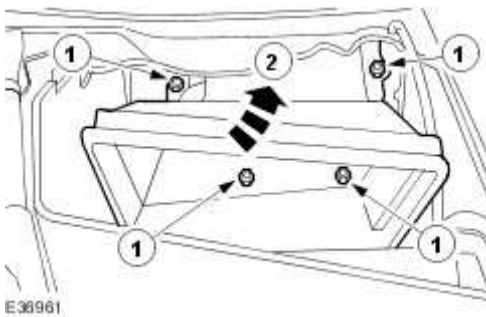
13 . NOTE:

Right-hand drive vehicles shown, left-hand drive vehicles similar.

Remove the cabin filter housing.

1) Remove the cabin filter housing retaining nuts.

2) Remove the cabin filter housing.



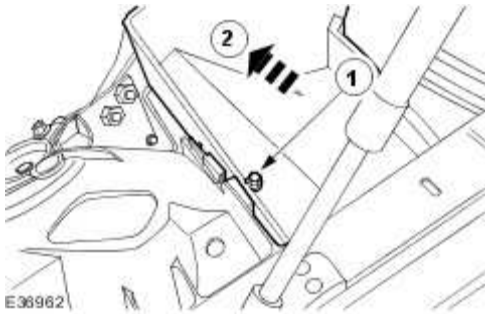
14 . NOTE:

Right-hand drive vehicles shown, left-hand drive vehicles similar.

Detach the engine compartment outer panel.

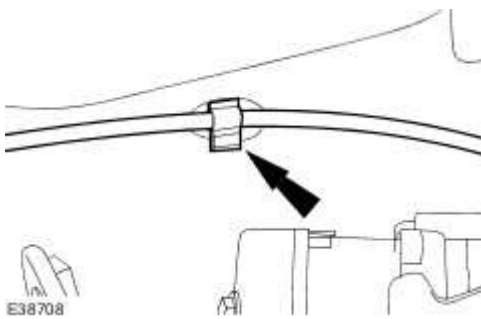
1) Remove the engine compartment outer panel retaining bolt.

2) Detach the engine compartment outer panel.

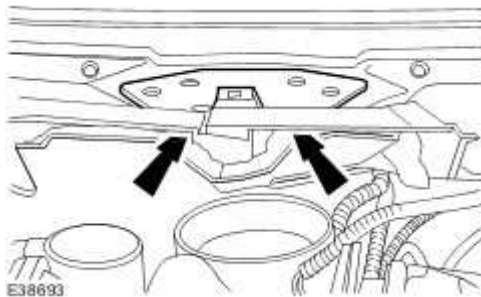


15 . Remove the engine compartment outer panel.

▶ Detach the hood release cable.



16 . Remove the engine compartment supports spacing plate.



17 **NOTE:**

Vehicles with supercharger shown, vehicles with 3.5L or 4.2L engine without supercharger similar.

Detach the engine compartment inner panel insulation.



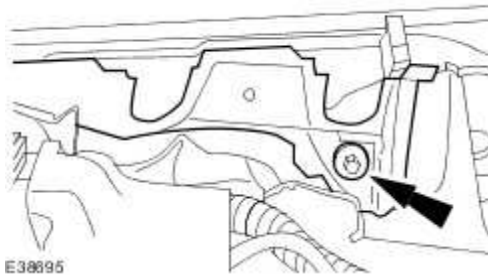
18 **NOTE:**

Vehicles with supercharger shown, vehicles with 3.5L or 4.2L engine without supercharger similar.

NOTE:

Right-hand drive vehicles shown, left-hand drive vehicles similar.

Remove the left-hand engine compartment inner panel.



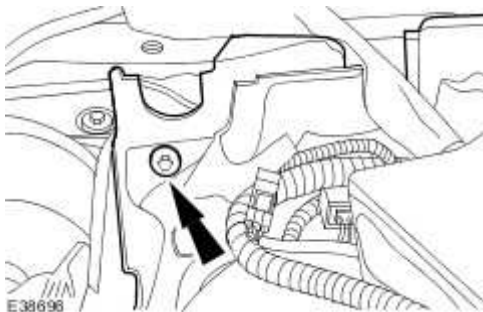
19 **NOTE:**

Vehicles with supercharger shown, vehicles with 3.5L or 4.2L engine without supercharger similar.

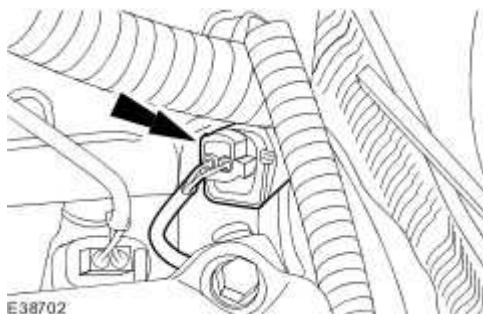
NOTE:

Left-hand drive vehicles shown, right-hand drive vehicles similar.

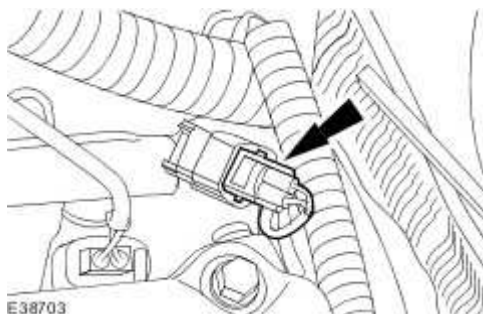
Remove the right-hand engine compartment inner panel.



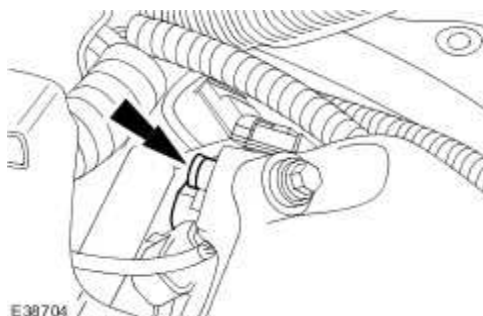
20 . Detach the camshaft position (CMP) sensor electrical connector.



21 . Disconnect the CMP sensor electrical connector.



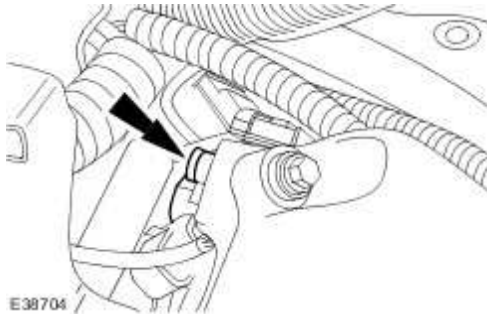
22 . Remove the CMP sensor.



Installation

- 1 . To install, reverse the removal procedure.

▶ Tighten to 7 Nm.



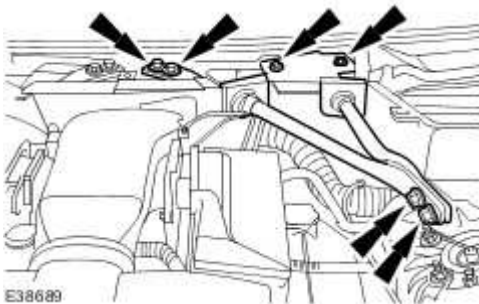
2 NOTE:

Vehicles with supercharger shown, vehicles with 3.5L or 4.2L engine without supercharger similar.

NOTE:

Left-hand shown, right-hand similar.

Tighten to 25 Nm.

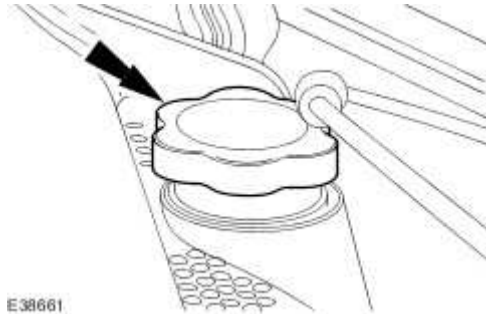


Camshaft Position (CMP) Sensor RH (18.31.11)

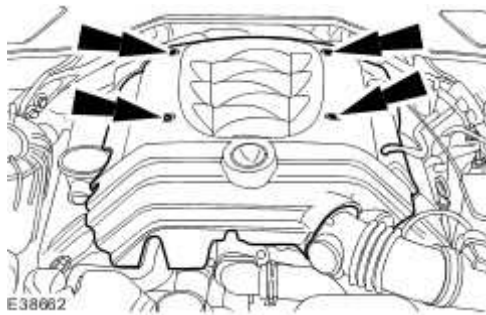
Removal

Vehicles with 3.5L or 4.2L engine without supercharger

- 1 . Remove the oil filler cap.

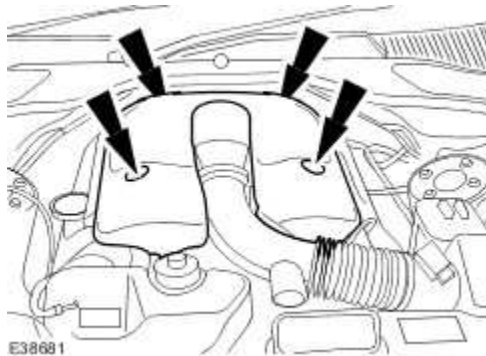


- 2 . Remove the engine cover.



Vehicles with supercharger

- 3 . Remove the engine cover.



All vehicles

4 . Remove the cowl vent screen. <<501-02>>

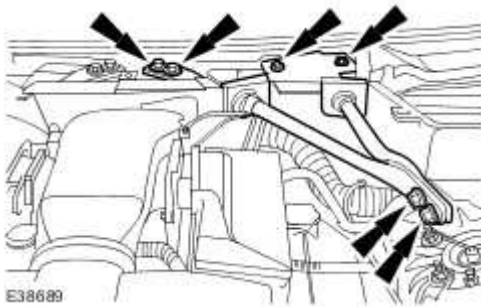
5 NOTE:

Vehicles with supercharger shown, vehicles with 3.5L or 4.2L engine without supercharger similar.

NOTE:

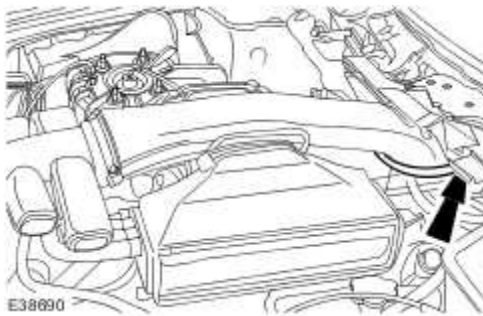
Left-hand shown, right-hand similar.

Remove the engine compartment supports.

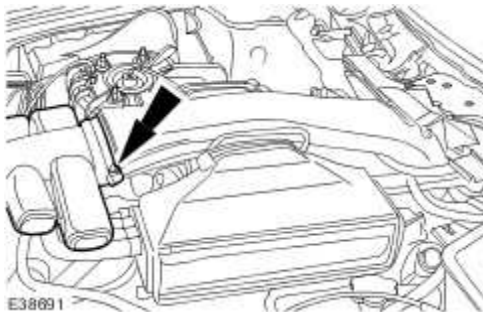


Vehicles with supercharger

6 . Loosen the throttle body intake pipe retaining clip.



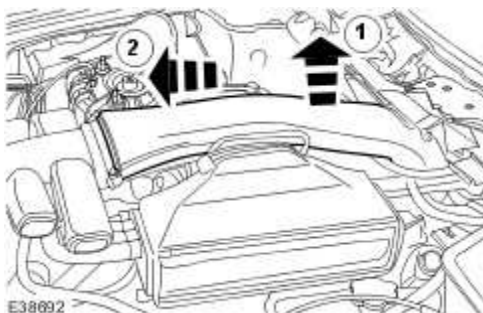
7 . Detach the air filter outlet pipe



8 . Remove the throttle body intake pipe.

1) Detach the throttle body intake pipe.

2) Remove the throttle body intake pipe.

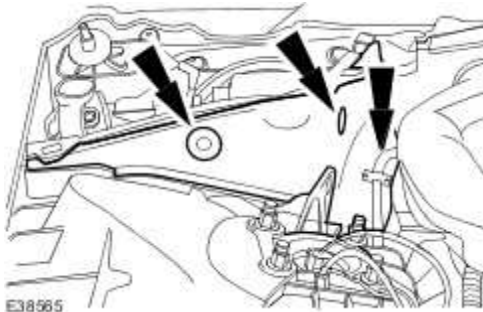


All vehicles

9 . **NOTE:**

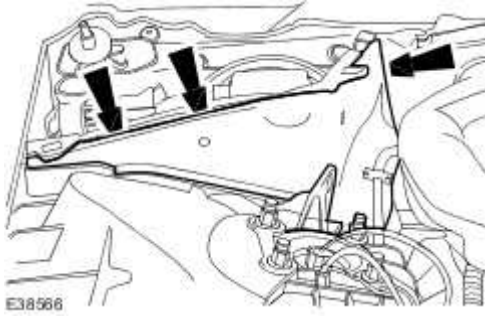
Right-hand drive vehicles shown, left-hand drive vehicles similar.

Remove the engine compartment outer panel insulation.



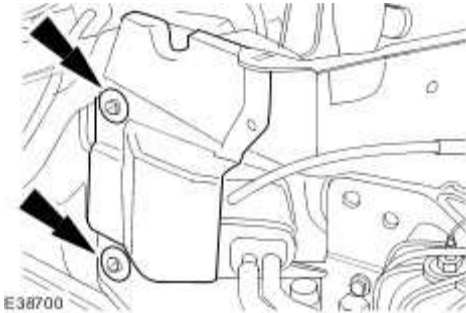
Right-hand drive vehicles

10 . Remove the engine compartment outer panel.



Left-hand drive vehicles

11 . Remove the engine compartment outer access panel.



All vehicles

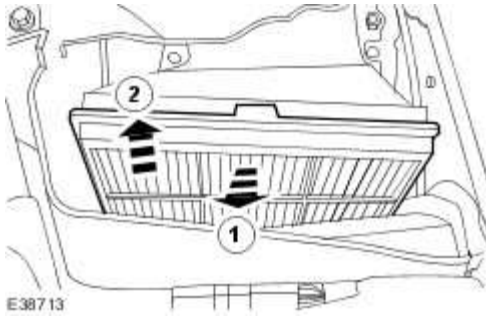
12 . **NOTE:**

Right-hand drive vehicles shown, left-hand drive vehicles similar.

Remove the cabin air filter.

1) Detach the cabin air filter.

2) Remove the cabin air filter.



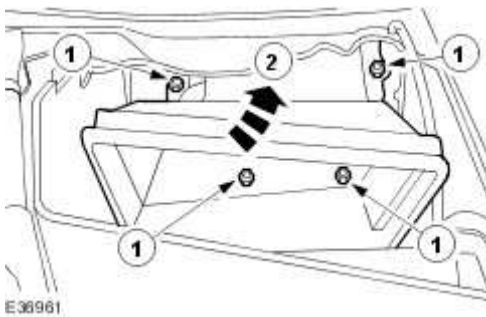
13 . NOTE:

Right-hand drive vehicles shown, left-hand drive vehicles similar.

Remove the cabin filter housing.

1) Remove the cabin filter housing retaining nuts.

2) Remove the cabin filter housing.



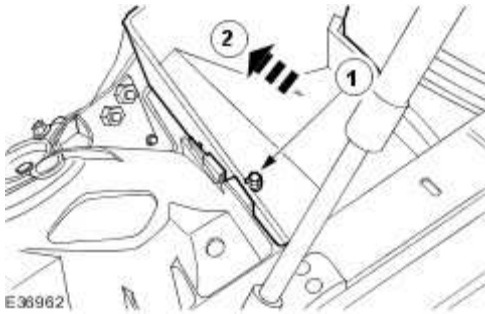
14 . NOTE:

Right-hand drive vehicles shown, left-hand drive vehicles similar.

Detach the engine compartment outer panel.

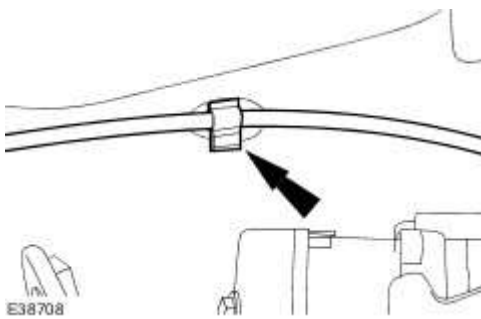
1) Remove the engine compartment outer panel retaining bolt.

2) Detach the engine compartment outer panel.

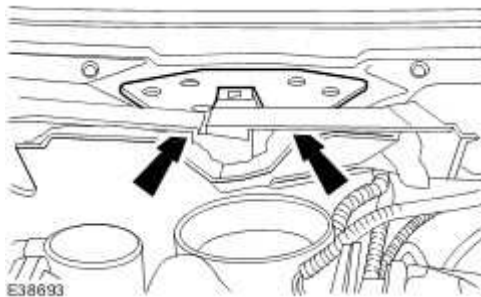


15 . Remove the engine compartment outer panel.

▶ Detach the hood release cable.



16 . Remove the engine compartment support spacing plate.



17 **NOTE:**

Vehicles with supercharger shown, vehicles with 3.5L or 4.2L engine without supercharger similar.

Detach the engine compartment inner panel insulation.



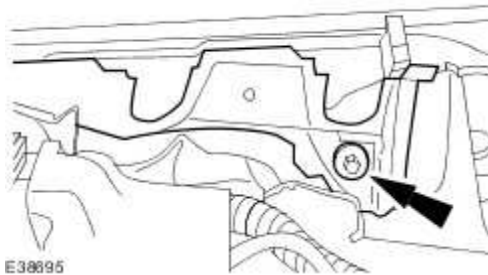
18 NOTE:

Vehicles with supercharger shown, vehicles with 3.5L or 4.2L engine without supercharger similar.

NOTE:

Right-hand drive vehicles shown, left-hand drive vehicles similar.

Remove the left-hand engine compartment inner panel.



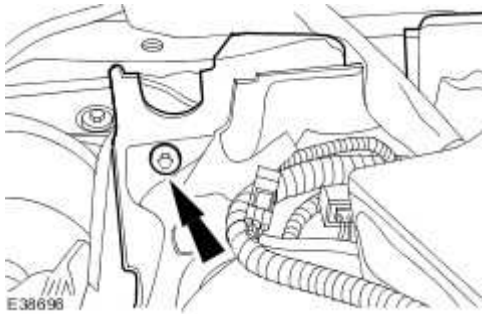
19 NOTE:

Vehicles with supercharger shown, vehicles with 3.5L or 4.2L engine without supercharger similar.

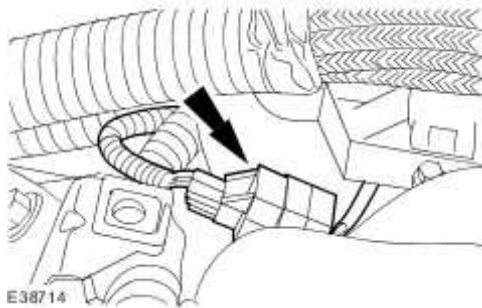
NOTE:

Left-hand drive vehicles shown, right-hand drive vehicles similar.

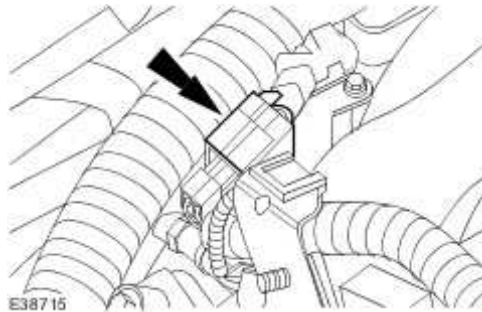
Remove the right-hand engine compartment inner panel.



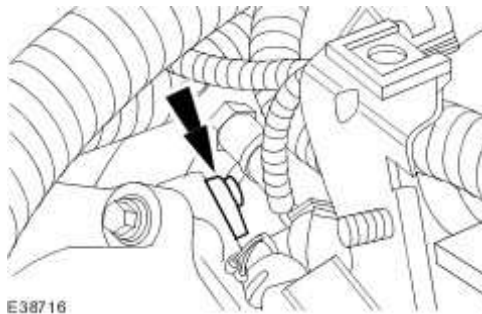
20 . Detach the camshaft position (CMP) sensor electrical connector.



21 . Disconnect the CMP sensor electrical connector.



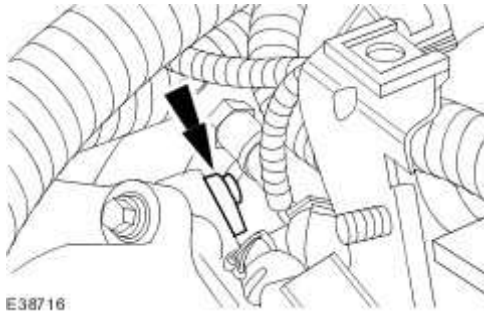
22 . Remove the CMP sensor.



Installation

- 1 . To install, reverse the removal procedure.

▶ Tighten to 7 Nm.



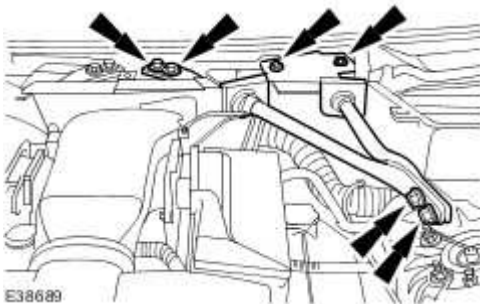
2 NOTE:

Vehicles with supercharger shown, vehicles with 3.5L or 4.2L engine without supercharger similar.

NOTE:

Left-hand shown, right-hand similar.

Tighten to 25 Nm.

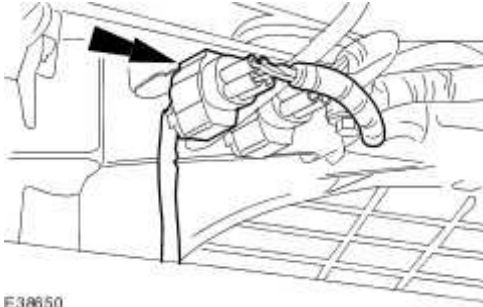


Catalyst Monitor Sensor (18.30.66)

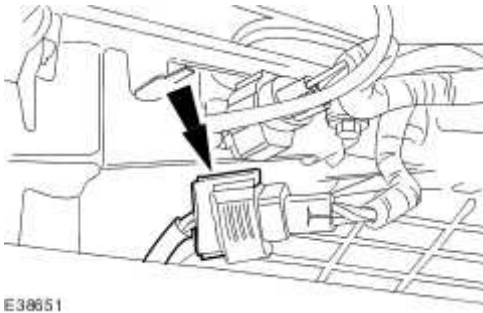
Removal

- 1 . Raise and support the vehicle.
For additional information, refer to

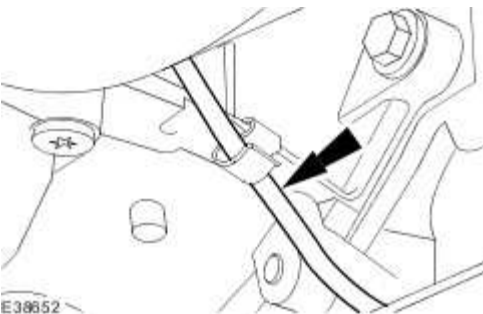
- 2 . Detach the catalyst monitor sensor electrical connector.



- 3 . Disconnect the catalyst monitor sensor electrical connector.



- 4 Detach the catalyst monitor sensor wiring harness from the retaining clip on the automatic transmission.

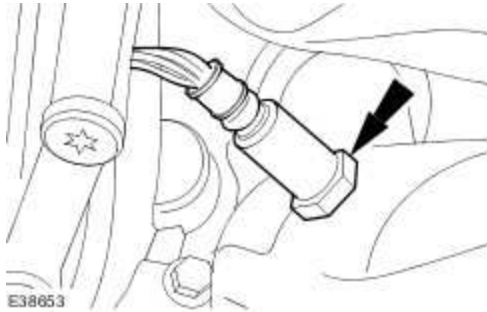


5



- **CAUTION:** Do not twist the catalyst monitor sensor wiring harness on removal. Failure to follow this instruction may result in damage to the component.

Remove the catalyst monitor sensor.



Installation

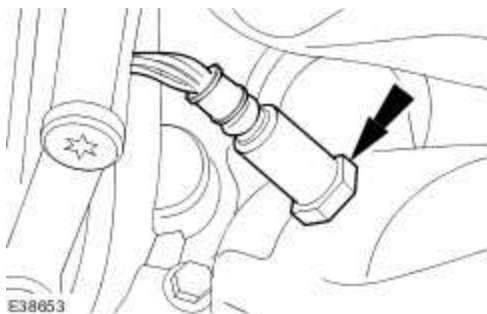
1



- **CAUTION:** Do not twist the catalyst monitor sensor wiring harness on installation. Failure to follow this instruction may result in damage to the component.

To install, reverse the removal procedure.

► Tighten to 40 Nm.



2 **NOTE:**

- For NAS vehicles only.

If required, carry out a long drive cycle.

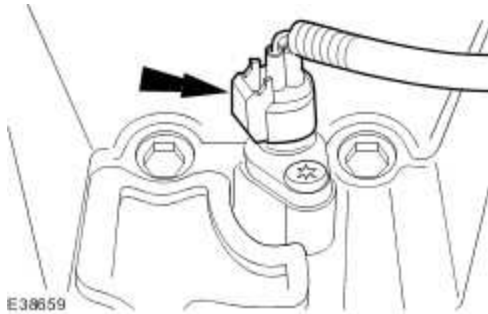
For additional information, refer to Powertrain Control Module (PCM) Long Drive Cycle Self-

Test

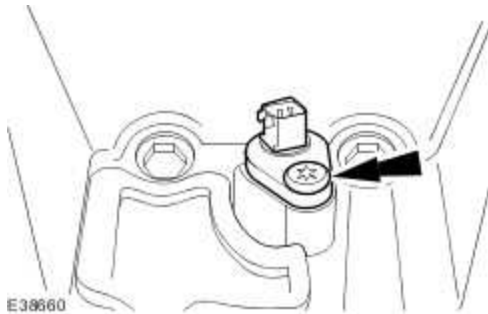
Crankshaft Position (CKP) Sensor (18.30.12)

Removal

- 1 . Remove the air deflector. <<501-02>>
- 2 . Disconnect the crankshaft position (CKP) sensor electrical connector.



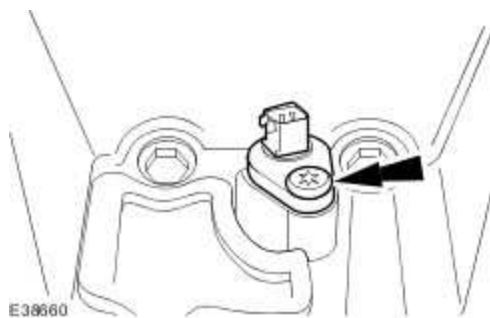
- 3 . Remove the CKP sensor.



Installation

- 1 . To install, reverse removal procedure.

 Tighten to 7 Nm.



E38660

Engine Control Module (ECM) (18.30.01)

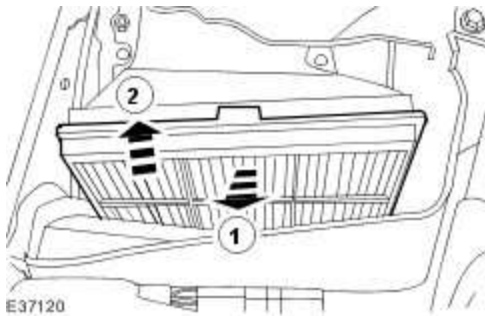
Special Service Tools



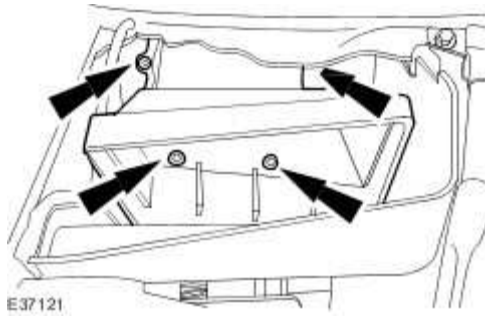
5 Point Security Torx Bit
418-535

Removal

- 1 . Disconnect the battery ground cable. <<414-01>>
- 2 . Remove the cowl vent screen. <<501-02>>
- 3 . Remove the cabin air filter.
 - 1) Detach the cabin air filter.
 - 2) Remove the cabin air filter.



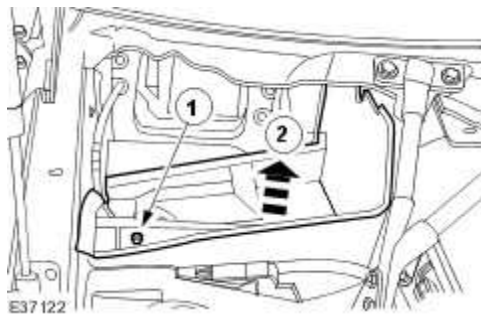
- 4 . Remove the cabin air filter housing.



5 . Remove the engine compartment panel.

1) Remove the engine compartment panel retaining bolt.

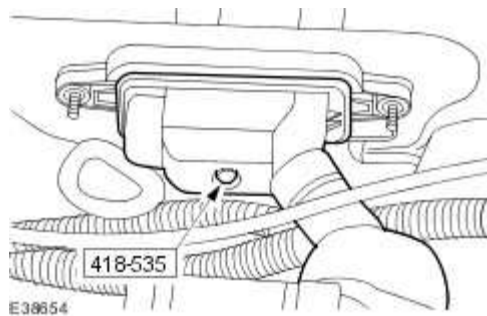
2) Remove the engine compartment panel.



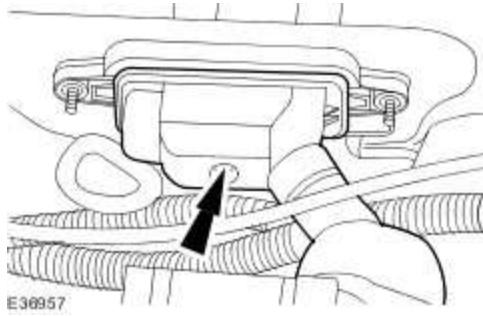
6 **NOTE:**

The engine control module (ECM) electrical connector retaining bolt remains captive in the electrical connector.

Using the special tool, loosen the ECM electrical connector retaining bolt.



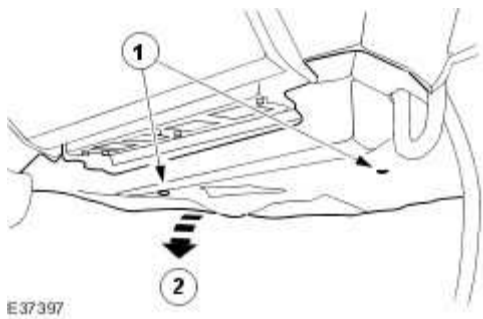
7 . Disconnect the ECM electrical connector.



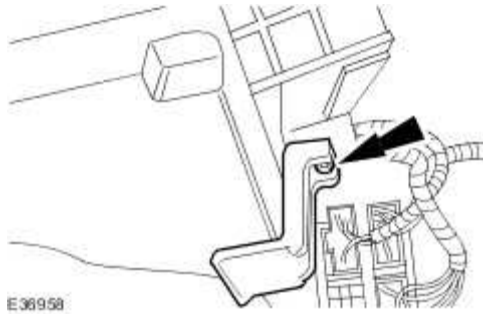
8 . Remove the instrument panel lower trim panel.

1) Remove the retaining clips.

2) Remove the instrument panel lower trim panel.



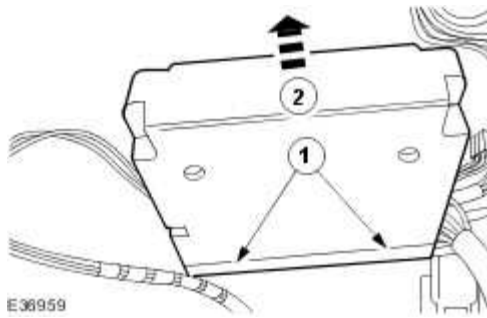
9 . Remove the ECM retaining bracket.



10 . Remove the ECM.

1) Detach the retaining clips.

2) Remove the ECM.



Installation

1



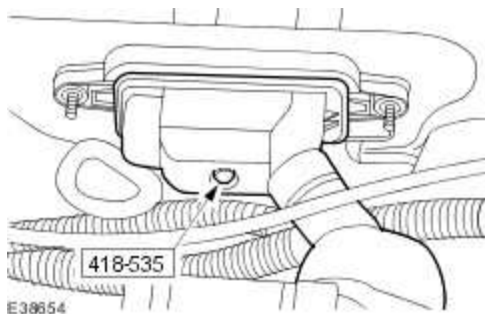
- CAUTION: Make sure that the electrical connector is located correctly in the ECM. Do not force or overtighten the electrical connector. Failure to follow this instruction may result in damage to the component.



CAUTION: Make sure the ECM support bracket is located correctly.

To install, reverse the removal procedure.

▶ Tighten to 5 Nm.



Engine Coolant Temperature (ECT) Sensor - 4.2L SC V8 - AJV8 (18.30.10)

Removal

1



WARNING: Never remove the coolant expansion tank pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury.



WARNING: To avoid hot coolant or steam blowing out of the cooling system, use extreme care when removing the coolant expansion tank pressure cap. Wait until the engine has cooled down, then insulate the coolant pressure cap with a suitable cloth and slowly loosen the coolant expansion tank pressure cap until the cooling system pressure is released. Do not remove the coolant expansion tank pressure cap. Step back while the pressure is released from the system. When all of the pressure has been released slowly remove the coolant expansion tank pressure cap (still with the suitable cloth in position) from the coolant expansion tank. Failure to follow this instruction may result in personal injury.

Release the cooling system pressure.

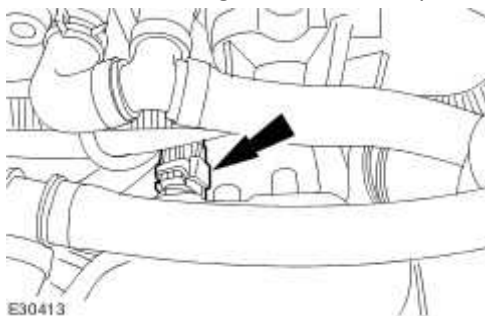


Remove the coolant expansion tank pressure cap.

2 . Remove the air cleaner outlet pipe.

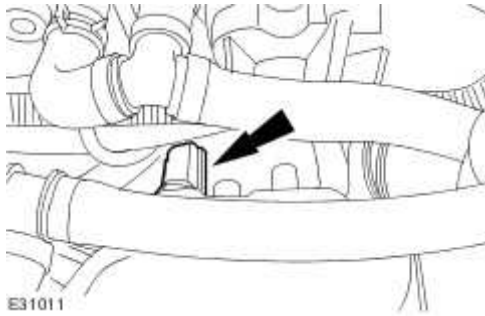
For additional information, refer to Air Cleaner Outlet Pipe (19.10.31)

3 . Disconnect the engine coolant temperature (ECT) sensor electrical connector.



4 . Remove the ECT sensor.

▶ Remove and discard the ECT sensor O-ring seal.

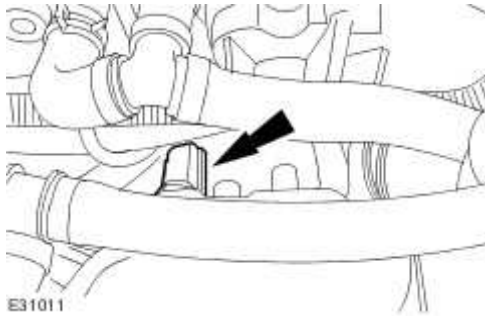


Installation

1 . To install, reverse the removal procedure.

▶ Install a new ECT sensor O-ring seal.

▶ Tighten to 17 Nm.



2 . Fill the cooling system up to the MAX mark on the coolant expansion tank.

Engine Coolant Temperature (ECT) Sensor - 4.2L NA V8 - AJV8 (18.30.10)

Removal

1



WARNING: Never remove the coolant expansion tank pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury.



WARNING: To avoid hot coolant or steam blowing out of the cooling system, use extreme care when removing the coolant expansion tank pressure cap. Wait until the engine has cooled down, then insulate the coolant pressure cap with a suitable cloth and slowly loosen the coolant expansion tank pressure cap until the cooling system pressure is released. Do not remove the coolant expansion tank pressure cap. Step back while the pressure is released from the system. When all of the pressure has been released slowly remove the coolant expansion tank pressure cap (still with the suitable cloth in position) from the coolant expansion tank. Failure to follow this instruction may result in personal injury.

Release the cooling system pressure.



Remove the coolant expansion tank pressure cap.

2 . Remove the air cleaner outlet pipe. <<303-12B>>

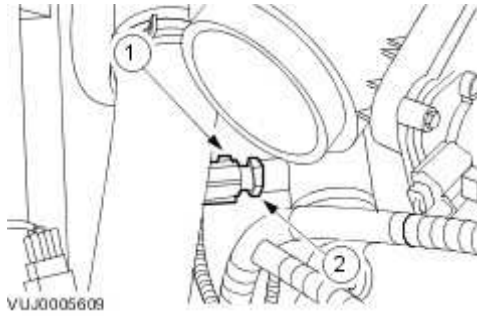
3 . Remove the engine coolant temperature (ECT) sensor electrical connector.

1) Disconnect the ECT sensor electrical connector.

2) Remove the ECT sensor.



Remove and discard the ECT sensor sealing washer.

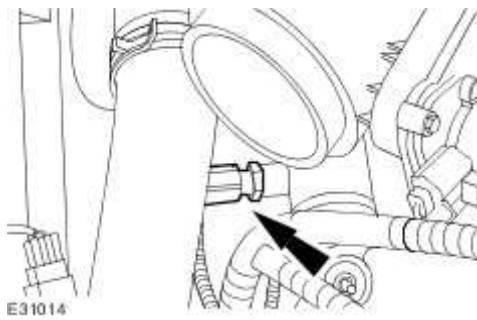


Installation

1 . To install, reverse the removal procedure.

▶ Install a new ECT sensor sealing washer.

▶ Tighten to 17 Nm.



2 . Fill the cooling system up to the MAX mark on the coolant expansion tank.

Fuel Rail Pressure (FRP) Sensor (18.30.98)

Removal

All vehicles

1



- **WARNING:** Do not smoke, carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

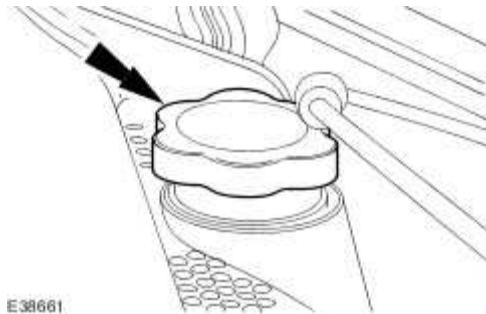


WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

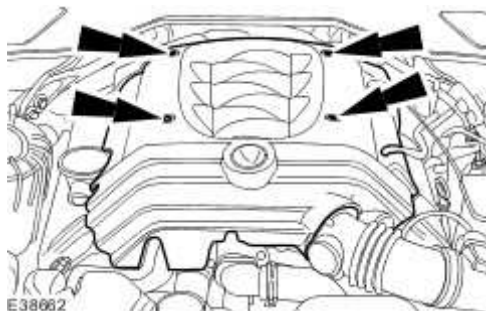
Depressurize the fuel system. <<310-00>>

Vehicles with 3.5L or 4.2L engine without supercharger

- 2 . Remove the oil filler cap.

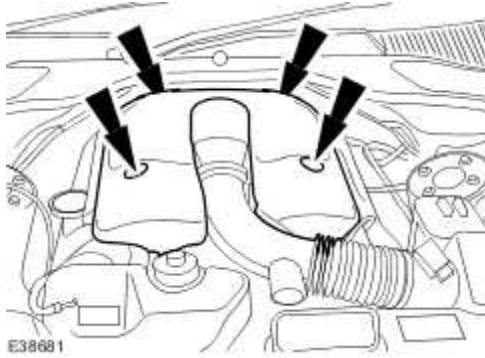


- 3 . Remove the engine cover.



Vehicles with supercharger

4 . Remove the engine cover.



All vehicles

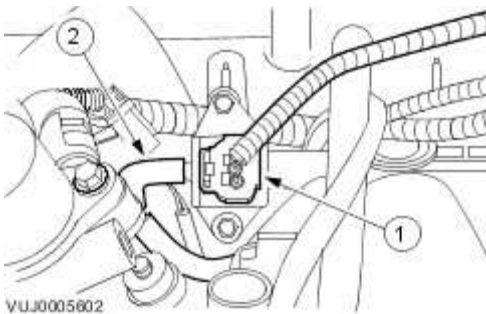
5 **NOTE:**

Vehicles with 3.5L or 4.2L engine without supercharger shown, vehicles with supercharger similar.

Disconnect the fuel rail pressure (FRP) sensor vacuum hose.

1) Disconnect the FRP sensor electrical connector.

2) Disconnect the FRP sensor vacuum hose.

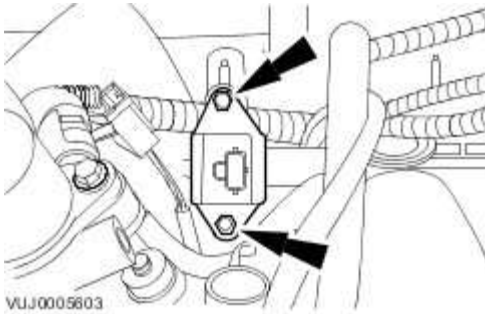


6 **NOTE:**

Vehicles with 3.5L or 4.2L engine without supercharger shown, vehicles with supercharger similar.

Remove the FRP sensor.

- ▶ Remove and discard the O-ring seals.



Installation

1



WARNING: Do not smoke, carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

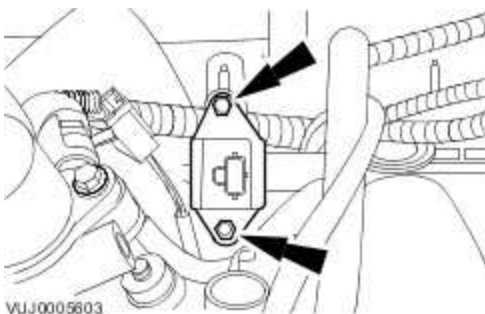


WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

To install, reverse the removal procedure.

- ▶ Install a new O-ring seals.

- ▶ Tighten to 5 Nm.

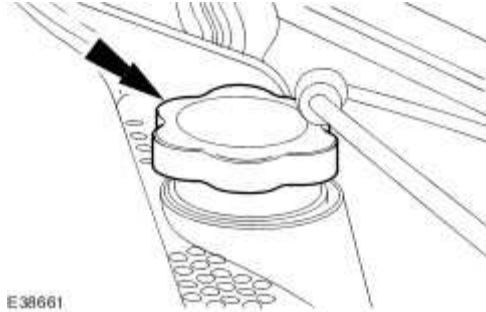


Fuel Temperature Sensor (18.30.99)

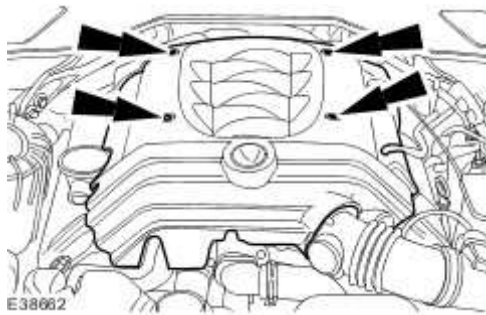
Removal

Vehicles with 3.5L or 4.2L engine without supercharger

- 1 . Remove the oil filler cap.

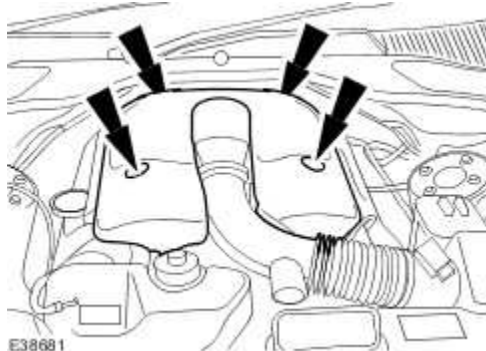


- 2 . Remove the engine cover.



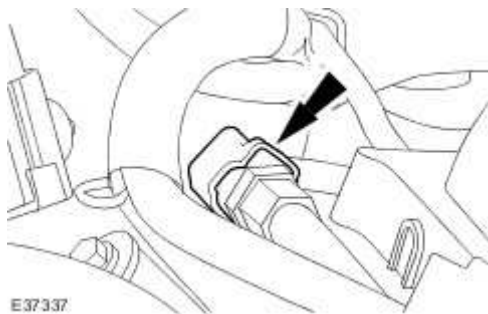
Vehicles with supercharger

- 3 . Remove the engine cover.

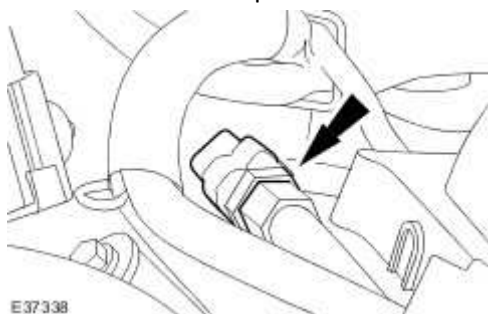


All vehicles

- 4 . Disconnect the fuel temperature sensor electrical connector.



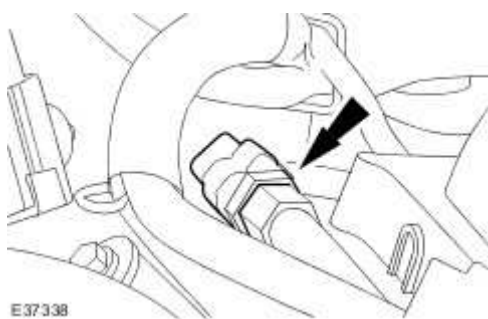
5 . Remove the fuel temperature sensor.



Installation

1 . To install, reverse the removal procedure.

► Tighten to 7 Nm.

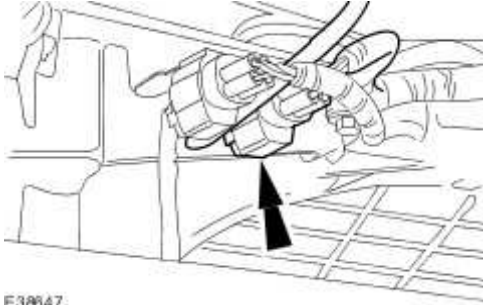


Heated Oxygen Sensor (HO2S)

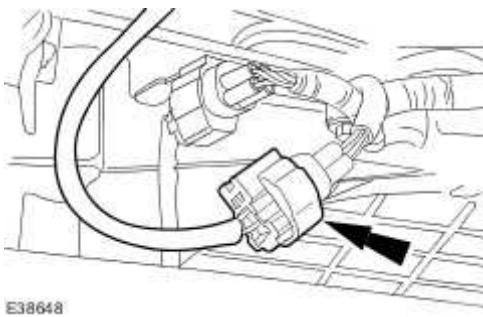
Removal


1 . Raise and support the vehicle. <<100-02>>

2 . Detach the heated oxygen sensor (HO2S) electrical connector.

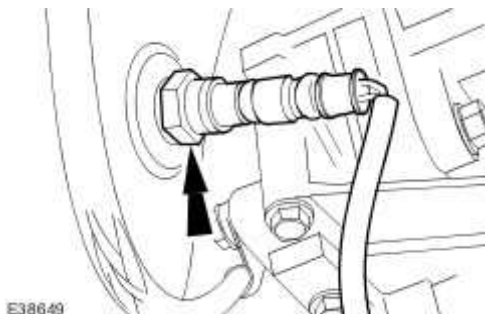


3 . Disconnect the HO2S electrical connector.



4  **CAUTION:** Do not twist the HO2S wiring harness on removal. Failure to follow this instruction may result in damage to the component.

Remove the HO2S.



Installation

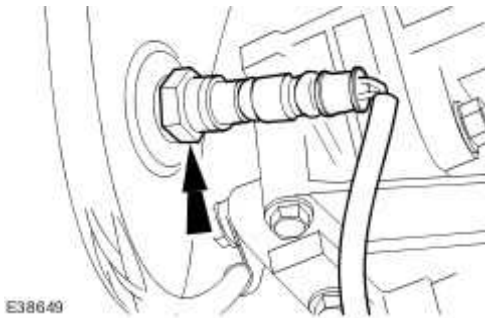
1



- CAUTION: Do not twist the H02S wiring harness on installation. Failure to follow this instruction may result in damage to the component.

To install, reverse the removal procedure.

▶ Tighten to 40 Nm.

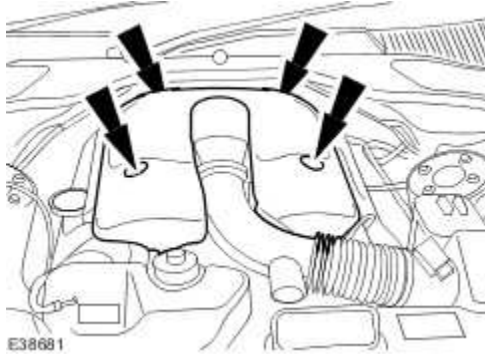


E38649

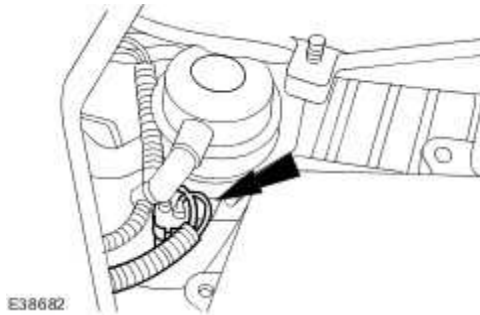
Intake Air Temperature (IAT) Sensor - 4.2L SC V8 - AJV8 (18.30.52)

Removal

- 1 . Remove the engine cover.

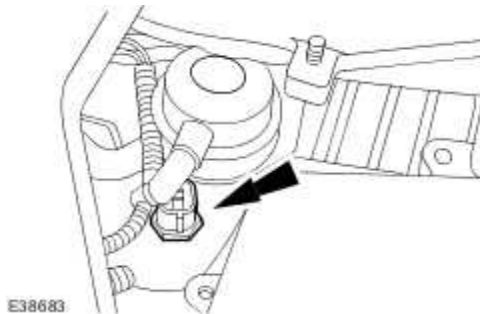


- 2 . Disconnect the intake air temperature (IAT) sensor electrical connector.



- 3 . Remove the IAT sensor.

▶ Remove and discard the IAT sensor sealing washer.

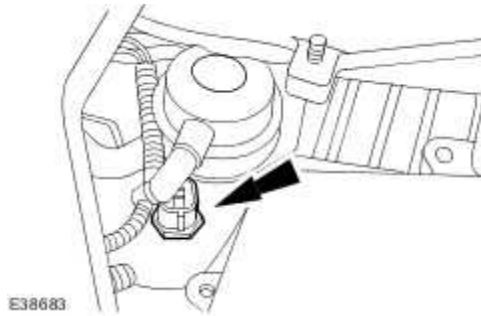


Installation

1 . To install, reverse the removal procedure.

▶ Install a new IAT sensor sealing washer.

▶ Tighten to 35 Nm.



Knock Sensor (KS) LH (18.30.92)

Removal

Vehicles with supercharger

- 1 . Remove the supercharger.
For additional information, refer to
For additional information, refer to

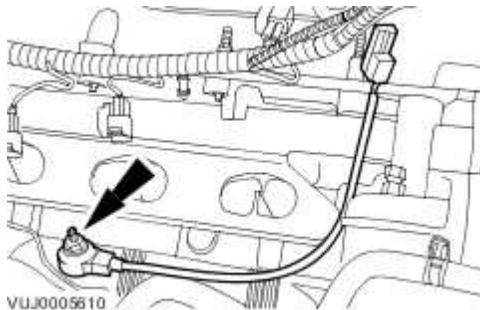
- 2 . Remove the noise isolator.

Vehicles without supercharger

- 3 . Remove the intake manifold.
For additional information, refer to
For additional information, refer to

All vehicles

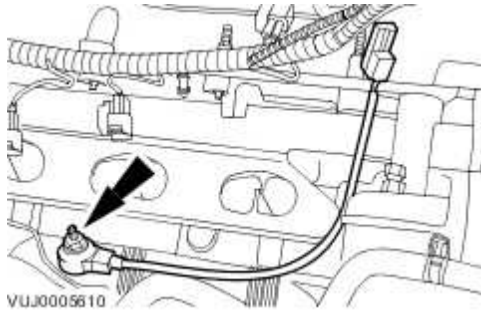
- 4 . Remove the knock sensor (KS).



Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 25 Nm.

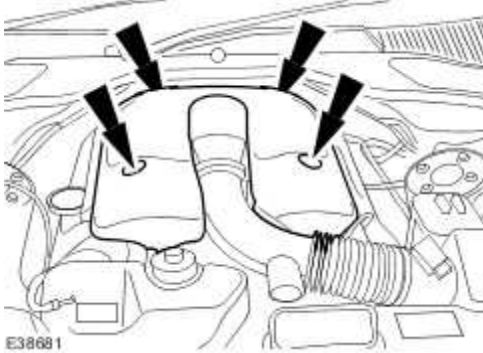


Manifold Absolute Pressure (MAP) Sensor - 4.2L SC V8 - AJV8 (18.30.86)

Removal

All vehicles

- 1 . Remove the engine cover.



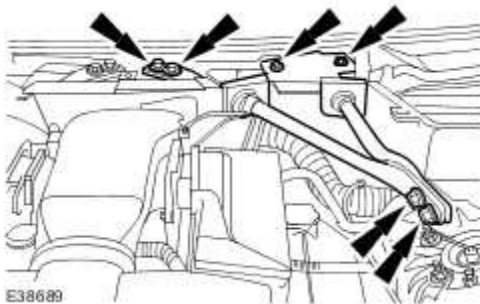
- 2 . Remove the cowl vent screen.

For additional information, refer to Cowl Vent Screen (76.10.01)

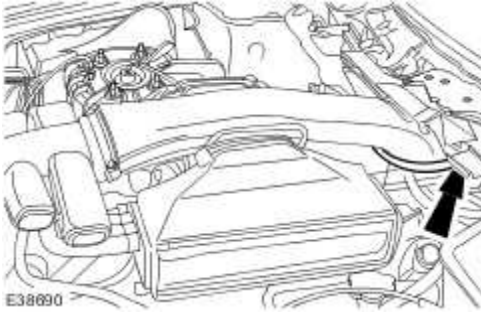
- 3 . **NOTE:**

Left-hand shown, right-hand similar.

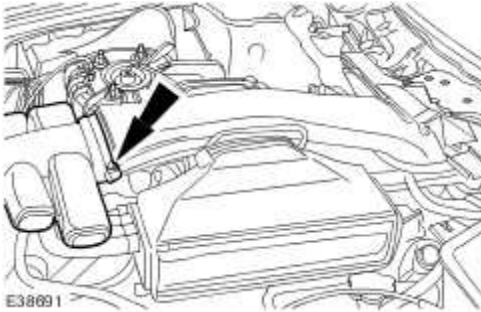
Remove the engine compartment supports.



- 4 . Loosen the throttle body intake pipe retaining clip.



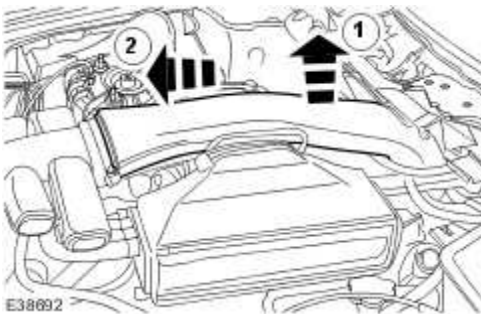
5 . Detach the air filter outlet pipe



6 . Remove the throttle body intake pipe.

1) Detach the throttle body intake pipe.

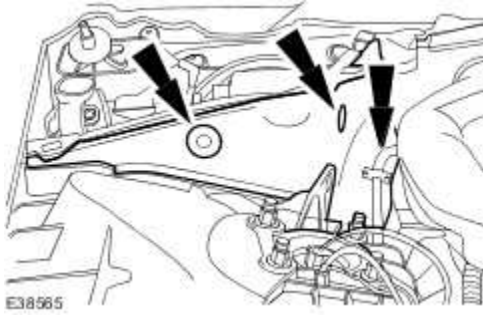
2) Remove the throttle body intake pipe.



7 . **NOTE:**

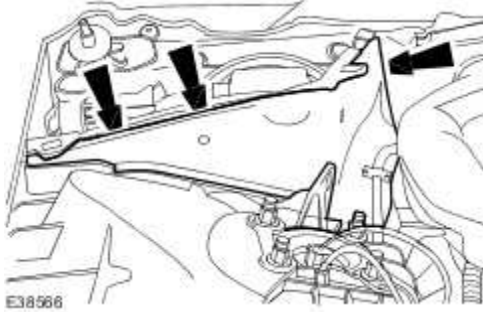
Right-hand drive vehicles shown, left-hand drive vehicles similar.

Remove the engine compartment outer panel insulation.



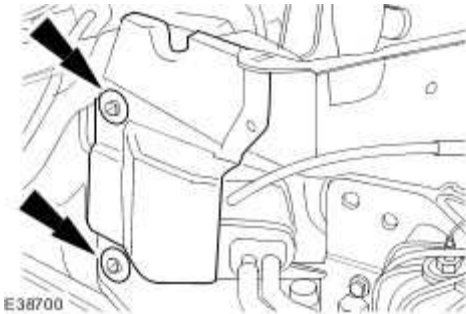
Right-hand drive vehicles

8 . Remove the engine compartment outer panel.



Left-hand drive vehicles

9 . Remove the engine compartment outer access panel.



All vehicles

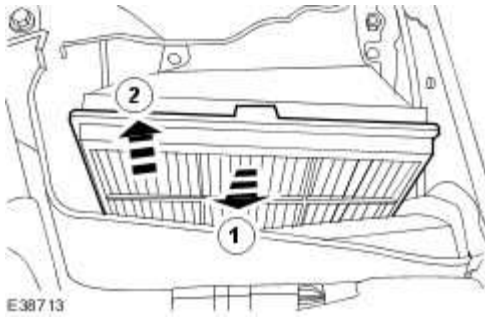
10 . **NOTE:**

Right-hand drive vehicles shown, left-hand drive vehicles similar.

Remove the cabin air filter.

1) Detach the cabin air filter.

2) Remove the cabin air filter.



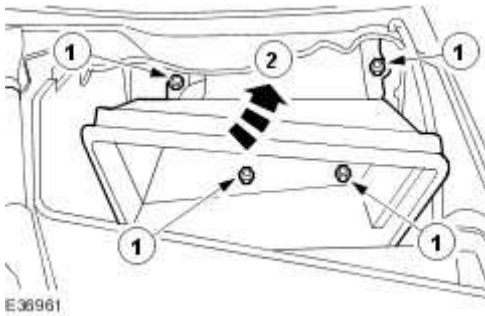
11 . NOTE:

Right-hand drive vehicles shown, left-hand drive vehicles similar.

Remove the cabin filter housing.

1) Remove the cabin filter housing retaining nuts.

2) Remove the cabin filter housing.



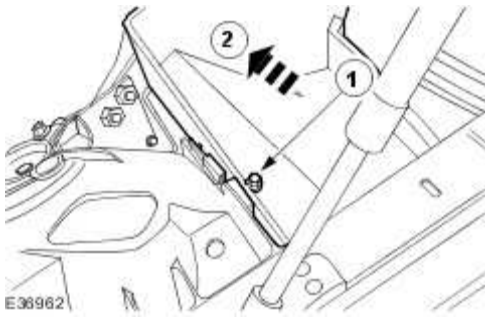
12 . NOTE:

Right-hand drive vehicles shown, left-hand drive vehicles similar.

Detach the engine compartment outer panel.

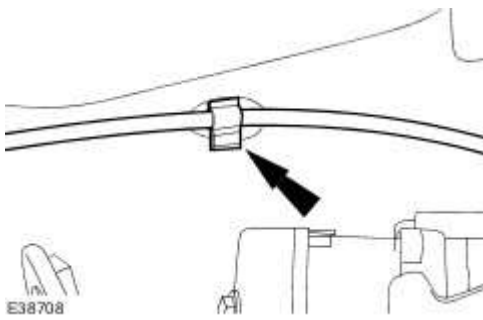
1) Remove the engine compartment outer panel retaining bolt.

2) Detach the engine compartment outer panel.

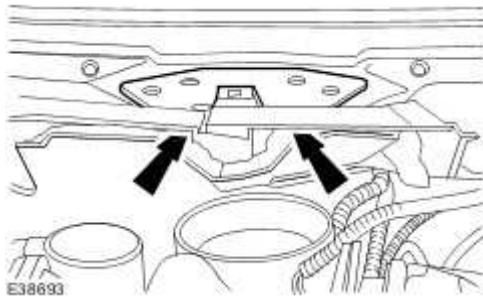


13 . Remove the engine compartment outer panel.

▶ Detach the hood release cable.



14 . Remove the engine compartment supports spacing plate.



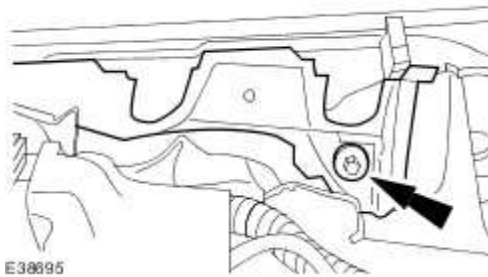
15 . Detach the engine compartment inner panel insulation.



16 . NOTE:

Right-hand drive vehicles shown, left-hand drive vehicles similar.

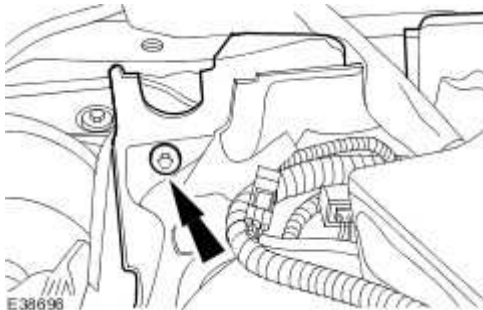
Remove the left-hand engine compartment inner panel.



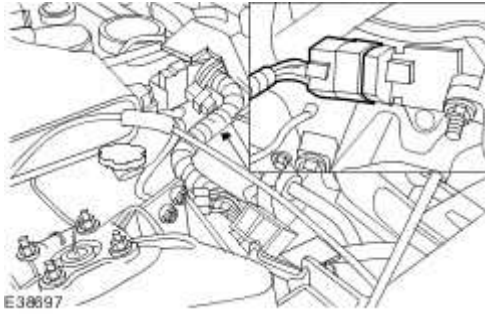
17 . NOTE:

Left-hand drive vehicles shown, right-hand drive vehicles similar.

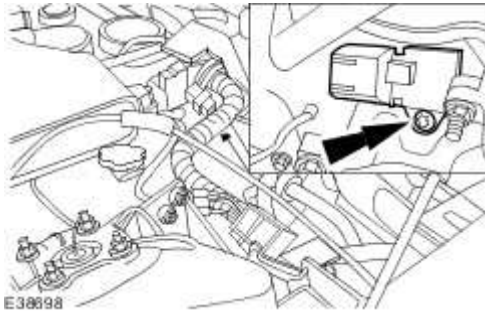
Remove the right-hand engine compartment inner panel.



18 . Disconnect the manifold absolute pressure (MAP) sensor electrical connector.



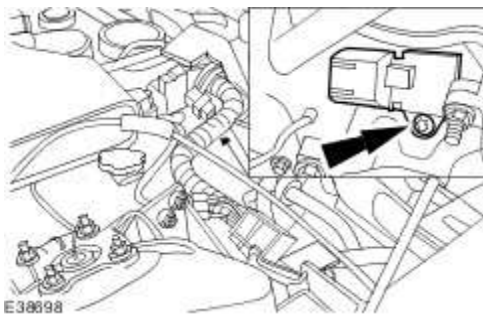
19 . Remove the MAP sensor.



Installation

1 . To install, reverse the removal procedure.

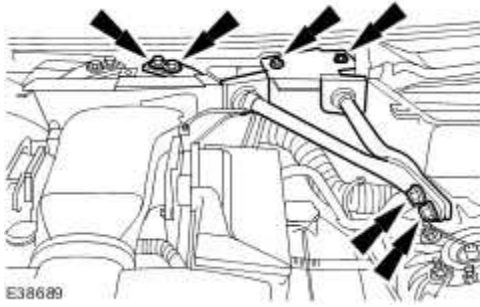
► Tighten to 10 Nm.



2 . **NOTE:**

Left-hand shown, right-hand similar.

Tighten to 25 Nm.



3 **NOTE:**

.

For NAS vehicles only.

If required, carry out a short drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Short Drive Cycle Self-Test

Manifold Absolute Pressure (MAP) Sensor - 4.2L NA V8 - AJV8 (18.30.86)

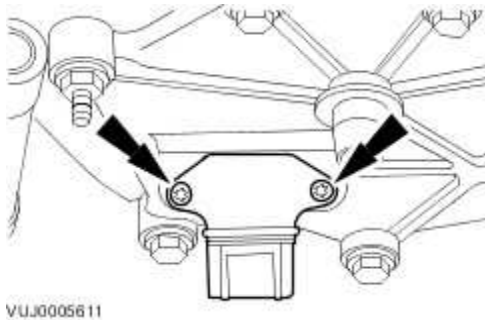
Removal

- 1 . Remove the intake manifold.

For additional information, refer to Intake Manifold - VIN Range: G00442->G45703 (30.15.01)

For additional information, refer to Intake Manifold - VIN Range: G45704->G99999 (30.15.01)

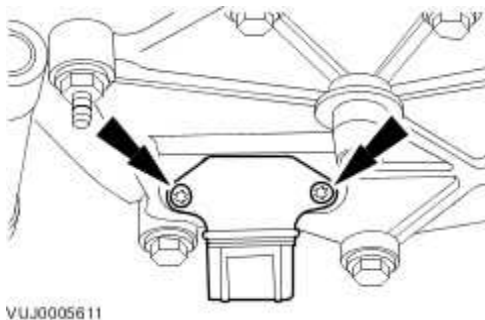
- 2 . Remove the manifold absolute pressure (MAP) sensor.



Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 10 Nm.



- 2 . **NOTE:**

For NAS vehicles only.

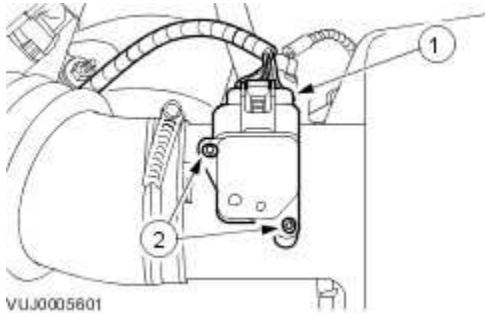
Mass Air Flow (MAF) Sensor (18.30.15)

Removal

1 . Remove the mass airflow (MAF) sensor.

1) Disconnect the MAF sensor electrical connector.

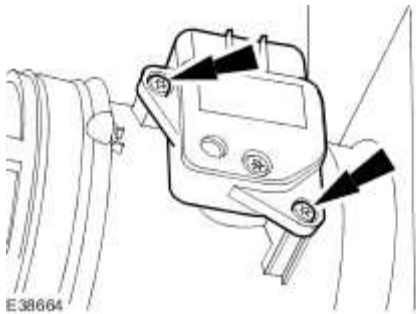
2) Remove the mass airflow MAF sensor.



Installation

1 . To install, reverse the removal procedure.

▶ Tighten to 2 Nm.



2 NOTE:

For NAS vehicles only.

If required, carry out a short drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Short Drive Cycle Self-

Test

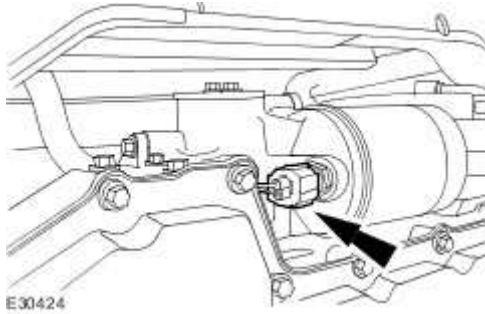
Oil Temperature Sensor (18.31.01)

Removal

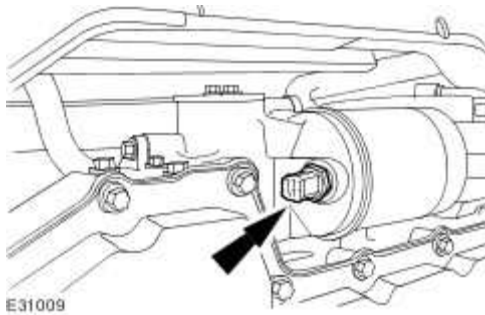
- 1 . Remove the air deflector.

For additional information, refer to

- 2 . Disconnect the oil temperature sensor electrical connector.



- 3 . Remove the oil temperature sensor.



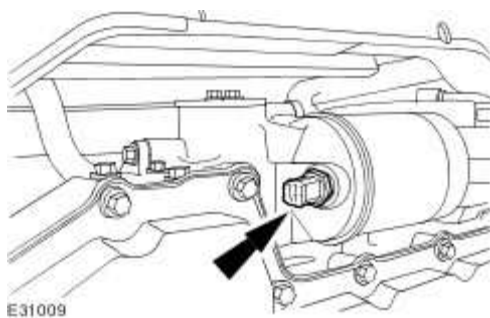
Installation

- 1 **NOTE:**

Apply a small bead of sealant meeting Jaguar specification on the first three threads of the oil temperature sensor.

To install, reverse the removal procedure

► Tighten to 15 Nm.



E31009

Variable Camshaft Timing (VCT) Oil Control Solenoid (18.30.90)

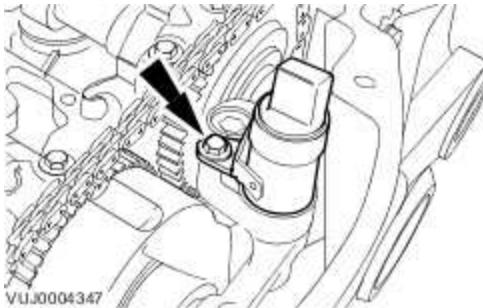
Removal

- 1 . Remove the valve cover.

For additional information, refer to

For additional information, refer to

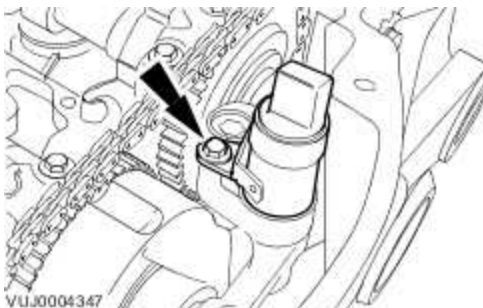
- 2 . Remove the variable camshaft timing (VCT) oil control solenoid.



Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 10 Nm.



2 NOTE:

.

For NAS vehicles only.

If required, carry out a short drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Short Drive Cycle Self-Test

303-14C : Electronic Engine Controls – 2.7L V6 – TdV6

Specifications

Specifications

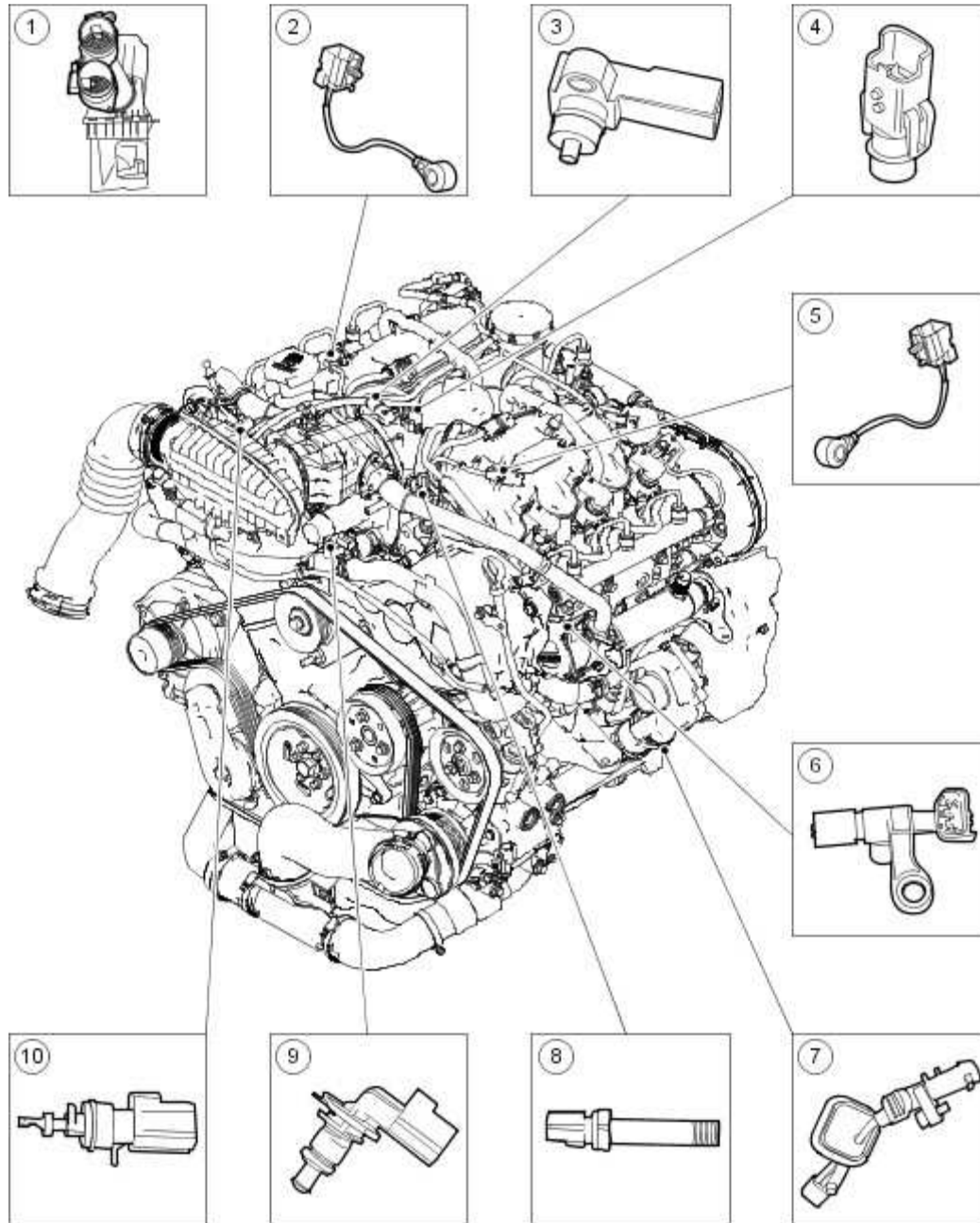
Torque Specifications

Description	Nm	lb-ft	lb-in
Camshaft position (CMP) sensor retaining bolt	10	-	89
Crankshaft position (CKP) sensor retaining bolt	5	-	44
Engine control module (ECM) retaining bolt	6	-	53
Engine control module (ECM) retaining nuts	3	-	26
Engine oil pressure (EOP) sensor	15	11	-
Knock sensor (KS) Left-Hand retaining bolt	20	15	-
Knock Sensor (KS) Right-Hand retaining bolt	20	15	-
Manifold absolute pressure (MAP) sensor	3	-	26
Mass air flow (MAF) sensor retaining screws	2	-	18

Brake Pedal Position (BPP) Switch Adjustment

No Data Available

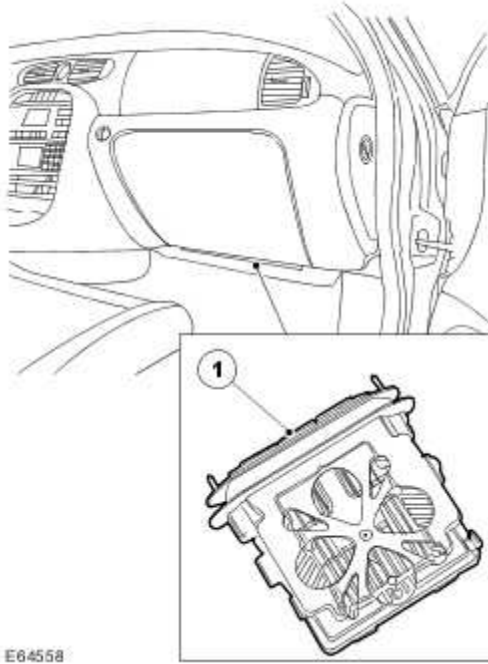
Electronic Engine Controls



E52346

Item	Part Number	Description
1		Mass air flow (MAF) sensor(s)
2		Knock sensor (KS) Right-hand

3		Manifold absolute pressure (MAP) sensor
4		Fuel temperature sensor
5		Knock sensor (KS) Left-hand
6		Camshaft position (CMP) sensor
7		Crankshaft position (CKP) sensor
8		Engine oil pressure (EOP) sensor
9		Engine coolant temperature (ECT) sensor
10		Charge air temperature sensor



Item	Part Number	Description
1		Engine control module (ECM)

System Components

All engine functions are controlled by the Siemens common rail ECM.

ECM

The ECM is a high capacity processor which employs advanced software strategies that continuously control the engines operating parameters. It gathers information from a number of sensors and provides output to the actuators. The ECM also operates a port deactivation system, which closes or opens flaps in the inlet system to provide the optimum swirl and flow conditions throughout the operating range of the engine.

In addition, the ECM controls the actuation of the exhaust gas recirculation (EGR) system, the variable geometry turbochargers and the throttle, giving faster and more accurate response. A full torque-based strategy supports multiple injection control and integration with transmission and braking controllers. Transient torque and boost control enables vehicle performance to be optimised without compromising engine durability.

CKP Sensor

The CKP sensor signal is used to determine:

- the quantity of fuel to be injected
- the start of fuel delivery
- the quantity of exhaust gases to be recirculated

The CKP sensor is located at the rear of the crankshaft behind the flywheel.

The CKP sensor is a Hall effect sensor which scans a magnetic disc on the crankshaft. The air gap between the magnetic disc and the CKP is predetermined by the mounting of the sensor.

CMP Sensor

The CMP is located on the cylinder head behind the left-hand camshaft timing belt pulley.

The CMP sensor is Hall effect type and is required to identify cylinder number 1. (This is to synchronise engine to camshaft timing). The sensor scans a web incorporated into the left-hand camshaft timing belt pulley. The air gap between the magnetic ring and the CMP sensor is predetermined by the mounting of the sensor.

ECT Sensor

The ECT sensor is a NTC type sensor and is fitted into the top water outlet hose. The sensor has a bayonet type fitting.

KS

The KS registers increased vibrations which occur due to increased combustion noise. The ECM uses the signal as a correction factor for calculating the quantity and timing of the fuel to be injected during the injection phase.

There are two KS fitted to each bank of the cylinder block.

MAF Sensor

The MAF sensor is used to calculate the air mass. The MAF sensor is capable of detecting the mass air flow extremely precisely.

On engines with a variable turbocharger, the MAF sensor is used solely to control the EGR and not the fuel metering. The MAF sensor also incorporates the intake air temperature (IAT) sensor.

MAP Sensor

The MAP sensor is located in the top of the throttle valve.

The MAP sensor measures the charging pressure in the intake pipe and sends the ECM an analog voltage signal.

Charge Air Temperature Sensor

The charge air temperature sensor measures the intake air or the charge air temperature and supplies the ECM with an analog signal.

The charge air temperature sensor is located in the air intake plenum chamber.

Intake Air Temperature (IAT) Sensor

The IAT sensor measures the intake air temperature and supplies the ECM with an analog signal.

There are two IAT sensors incorporated into the MAF sensor, the Left-hand bank IAT sensor is not monitored by the ECM.

Fuel Rail Pressure (FRP) Sensor

The FRP sensor measures the instantaneous fuel pressure in the fuel rail very precisely within a very short time and supplies a voltage signal according to the pressure. The FRP is located on the the fuel diverter rail and must not be removed from the diverter rail. For additional information, refer to Fuel Charging and Controls (303-04C Fuel Charging and Controls - 2.7L Diesel)

Fuel Temperature Sensor

The fuel temperature sensor measures the temperature of the fuel in the low-pressure system. Air and excessive heat in the fuel system can have an adverse effect on the operation of the sensor.

The fuel temperature sensor is located in the low-pressure side return line behind the throttle body housing.

EOP Sensor

The engine oil pressure (EOP) sensor is located in the left-hand cylinder head. The EOP is connected to the instrument cluster and is not directly part of the electronic engine control system.

Electronic Engine Controls

Overview

2006MY sees the introduction of diesel to X350 and is accompanied by a diesel particulate filter (DPF) system to comply with strict stage four emissions requirements. Active engine mounts are also fitted and reduce transmitted vibration from the engine to the chassis when operating between 600 and 850rpm.

For more information on these systems,
Exhaust System and
Engine

The engine management system (EMS) on 2006MY diesel makes use of 7-digit diagnostic trouble codes (DTCs) rather than the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Engine oil level	Battery charge and condition
Cooling system coolant level	Fuses
Fuel level	Wiring harness
Fuel contamination/grade/quality	Electrical connector(s)
Fuel leaks	5 volt sensor supply
Accessory drive belt	Sensor(s)
	Engine control module (ECM)
	Transmission control module (TCM)

- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible)

before proceeding to the next step.

4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC index, or the symptom chart if no DTCs are set.

Symptom Chart

Symptom	Possible source	Action
Engine cranks, but does not start	Inertia fuel shutoff (IFS) switch Low/contaminated fuel Air leakage Fuel system low pressure circuit fault Fuel pump module fault Blocked fuel filter Fuel volume control valve (FVCV) blocked/contaminated Fuel pressure control valve (FPCV) blocked/contaminated Fuel injection pump failure Crankshaft position (CKP) sensor ECM fault	Check that the inertia switch has not tripped. Check the fuel level/condition, Fuel Charging and Controls For air intake system, Intake Air Distribution and Filtering Check the fuel pump module operation, check the fuel system low pressure circuit for leaks/damage, Fuel Tank and Lines - 2.7L V6 - TdV6 Check the fuel filter, check the FVCV and FPCV, Fuel Charging and Controls Check the fuel injection pump, Fuel Injection Pump For CKP sensor circuit tests, GO to Pinpoint Test G549822p14. Refer to the warranty policy and procedures manual if an ECM is suspect.
Difficult to start	Glow plug system fault (very cold conditions) Low/contaminated fuel Air leakage Fuel pump module fault Fuel system low pressure circuit fault Blocked fuel filter	Check the glow plug circuits, Glow Plug System Check the fuel level/condition, Fuel Charging and Controls For air intake system, Intake Air Distribution and Filtering Check the fuel pump module operation, check the fuel system low pressure circuit for leaks/damage, Fuel Tank and Lines - 2.7L V6 - TdV6 Check the fuel filter, check the FVCV and FPCV, Fuel Charging and Controls For EGR tests,

	<p>Fuel volume control valve (FVCV) blocked/contaminated</p> <p>Fuel pressure control valve (FPCV) blocked/contaminated</p> <p>Exhaust gas recirculation (EGR) valve(s) fault</p>	Engine Emission Control
Rough idle	<p>Air ingress</p> <p>Low/contaminated fuel</p> <p>Fuel system low pressure circuit fault</p> <p>Blocked fuel filter</p> <p>Fuel volume control valve (FVCV) blocked/contaminated</p> <p>Fuel pressure control valve (FPCV) blocked/contaminated</p> <p>Exhaust gas recirculation (EGR) valve(s) fault</p>	<p>Check the air intake system, Intake Air Distribution and Filtering Check the fuel level/condition, Fuel Charging and Controls Check the fuel system low pressure circuit for leaks/damage, Fuel Tank and Lines - 2.7L V6 - TdV6 Check the fuel filter, check the FVCV and FPCV, Fuel Charging and Controls For EGR tests, Engine Emission Control</p>
Lack of power when accelerating	<p>Air intake system fault</p> <p>Diesel particulate filter (DPF) blocked/restricted</p> <p>Restricted exhaust system</p> <p>Low fuel pressure</p> <p>Exhaust gas recirculation (EGR) valve(s) fault</p> <p>Variable geometry turbocharger (VGT) actuator fault</p>	<p>Check the air intake system, Intake Air Distribution and Filtering Check for a blocked DPF or catalytic converter, install new components as necessary. Diesel Particulate Filter (DPF) or Catalytic Converter - 2.7L V6 - TdV6 (17.50.05) Check the fuel pressure, Fuel Charging and Controls For EGR tests, Engine Emission Control For VGT actuator tests, Turbocharger</p>
Engine stops/stalls	<p>Low/contaminated fuel</p> <p>Air ingress</p> <p>Fuel system low pressure</p>	<p>Check the fuel level/condition, Fuel Charging and Controls Check the fuel system low pressure circuit for leaks/damage, Fuel Tank and Lines - 2.7L V6 - TdV6 Check for fuel system leaks, check the FVCV and</p>

	<p>circuit fault</p> <p>Fuel volume control valve (FVCV) blocked/contaminated</p> <p>Fuel pressure control valve (FPCV) blocked/contaminated</p> <p>High pressure fuel leak</p> <p>Exhaust gas recirculation (EGR) valve(s) fault</p>	<p>FPCV, Fuel Charging and Controls For EGR tests, Engine Emission Control</p>
Engine judders	<p>Low/contaminated fuel</p> <p>Air ingress</p> <p>Fuel system low pressure circuit fault</p> <p>Fuel metering valve blocked/contaminated</p> <p>Fuel volume control valve (FVCV) blocked/contaminated</p> <p>Fuel pressure control valve (FPCV) blocked/contaminated</p> <p>High pressure fuel leak</p> <p>Fuel injection pump fault</p>	<p>Check the fuel level/condition, Fuel Charging and Controls Check the fuel system low pressure circuit for leaks/damage, Fuel Tank and Lines - 2.7L V6 - TdV6 Check for fuel system leaks, check the FVCV and FPCV, Fuel Charging and Controls Check the fuel injection pump, Fuel Injection Pump</p>
Excessive fuel consumption	<p>Fuel system low pressure circuit fault</p> <p>Fuel volume control valve (FVCV) blocked/contaminated</p> <p>Fuel pressure control valve (FPCV) blocked/contaminated</p> <p>Fuel temperature sensor leak</p> <p>High pressure fuel leak</p>	<p>Check the fuel system low pressure circuit for leaks/damage, Fuel Tank and Lines - 2.7L V6 - TdV6 Check the FVCV and FPCV, Fuel Charging and Controls Check the fuel temperature sensor, fuel injection pump, etc for leaks, Fuel Charging and Controls Check for injector DTCs. For EGR tests, Engine Emission Control</p>

	Injector(s) failure	
	Exhaust gas recirculation (EGR) valve(s) fault	

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

DTC	Description	Possible causes	Action
P000100	Fuel volume control valve (FVCV) control circuit open	FVCV circuit: high resistance FVCV circuit: short circuit to ground FVCV failure ECM failure	For FVCV and circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P000200	Fuel volume control valve (FVCV) circuit range/performance	FVCV circuit: high resistance FVCV circuit: short circuit to ground FVCV circuit: short circuit to power FVCV failure ECM failure	For FVCV and circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P000300	Fuel volume control valve (FVCV) control circuit low	FVCV circuit: high resistance FVCV circuit: short circuit to ground FVCV failure ECM failure	For FVCV and circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P000400	Fuel volume control valve	FVCV circuit: short circuit	For FVCV and circuit tests,

	(FVCV) control circuit high	to power FVCV failure ECM failure	Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P004500	Variable geometry turbocharger (VGT) actuator open circuit (right hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to ground VGT actuator failure ECM failure	For right hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.
P004700	Variable geometry turbocharger (VGT) actuator circuit low (right hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to ground VGT actuator failure ECM failure	For right hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.
P004800	Variable geometry turbocharger (VGT) actuator circuit high (right hand bank)	VGT actuator circuit: short circuit to power VGT actuator failure ECM failure	For right hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.
P004A00	Variable geometry turbocharger (VGT) actuator open circuit (left hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to ground VGT actuator failure ECM failure	For left hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.
P004C00	Variable geometry turbocharger (VGT) actuator circuit low (left hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to	For left hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is

		<p>ground</p> <p>VGT actuator failure</p> <p>ECM failure</p>	suspect.
P004D00	Variable geometry turbocharger (VGT) actuator circuit high (left hand bank)	<p>VGT actuator circuit: short circuit to power</p> <p>VGT actuator failure</p> <p>ECM failure</p>	For left hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.
P006900	Manifold absolute pressure (MAP) sensor correlation	<p>Air leakage in intake path between turbocharger and engine</p> <p>MAP sensor circuit: high resistance</p> <p>MAP sensor circuit: short circuit to ground</p> <p>MAP sensor circuit: short circuit to power</p> <p>MAP sensor failure</p> <p>ECM failure</p>	For MAP sensor tests, GO to Pinpoint Test G549822p12. Refer to the warranty policy and procedures manual if an ECM is suspect.
P006A00	Manifold absolute pressure (MAP) - mass or volume air flow correlation	<p>Air leakage in intake path between turbocharger and engine</p> <p>MAP sensor circuit: high resistance</p> <p>MAP sensor circuit: short circuit to ground</p> <p>MAP sensor circuit: short circuit to power</p> <p>MAP sensor failure</p> <p>ECM failure</p>	For air intake system information, Intake Air Distribution and Filtering For MAP sensor tests, GO to Pinpoint Test G549822p12. Refer to the warranty policy and procedures manual if an ECM is suspect.
P008700	Fuel rail/system pressure too low	Fuel rail pressure (FRP) sensor disconnected	For FRP sensor circuit tests, Fuel Charging and Controls

		FRP sensor to ECM sensing circuit: short circuit to ground FRP sensor supply circuit: high resistance FRP sensor failure Fuel line leak Restricted fuel line Fuel pump module circuit: high resistance Fuel pump module circuit: short circuit to ground Fuel pump module failure	Check the fuel lines, check the fuel pressure and check the fuel pump module circuits, Fuel Tank and Lines - 2.7L V6 - TdV6
P008800	Fuel rail/system pressure too high	Fuel rail pressure (FRP) sensor to ECM wiring (supply/sense): short circuit to each other FRP sensor to ECM sense circuit: short circuit to power FRP sensor failure Fuel pressure control valve (FPCV) fault Fuel pump module circuit: short circuit to power Fuel pump module failure	For FRP sensor circuit tests and FPCV tests, Fuel Charging and Controls For fuel pump module circuit tests, Fuel Tank and Lines - 2.7L V6 - TdV6
P009000	Fuel pressure control valve (FPCV) control circuit open	FPCV circuit: high resistance FPCV circuit: short circuit to ground	For FPCV tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.

		FPCV failure ECM failure	
P009100	Fuel pressure control valve (FPCV) control circuit low	FPCV circuit: high resistance FPCV circuit: short circuit to ground FPCV failure ECM failure	For FPCV tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P009200	Fuel pressure control valve (FPCV) control circuit high	FPCV circuit: short circuit to power FPCV failure ECM failure	For FPCV tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P009700	Air charge temperature (ACT) sensor circuit low input	ACT sensor circuit: high resistance ACT sensor circuit: short circuit to ground ACT sensor failure ECM failure	For ACT sensor circuit tests, GO to Pinpoint Test G549822p6. Refer to the warranty policy and procedures manual if an ECM is suspect.
P009800	Air charge temperature (ACT) sensor circuit high input	ACT sensor circuit: short circuit to power ACT sensor failure ECM failure	For ACT sensor circuit tests, GO to Pinpoint Test G549822p6. Refer to the warranty policy and procedures manual if an ECM is suspect.
P009900	Air charge temperature (ACT) sensor circuit intermittent/erratic	ACT sensor circuit: high resistance ACT sensor circuit: short circuit to ground ACT sensor circuit: short circuit to power ACT sensor failure ECM failure	For ACT sensor circuit tests, GO to Pinpoint Test G549822p6. Refer to the warranty policy and procedures manual if an ECM is suspect.
P010000	Mass air flow (MAF) sensor range/performance (right	MAF sensor circuit: high resistance	For right hand bank MAF sensor circuit tests, GO to

	hand bank)	<p>MAF sensor circuit: short circuit to ground</p> <p>MAF sensor circuit: short circuit to power</p> <p>MAF sensor failure</p> <p>ECM failure</p>	Pinpoint Test G549822p10. Refer to the warranty policy and procedures manual if an ECM is suspect.
P010200	Mass air flow (MAF) too low (right hand bank)	<p>Air leakage</p> <p>MAF sensor circuit: high resistance</p> <p>MAF sensor circuit: short circuit to ground</p> <p>MAF sensor failure</p> <p>Exhaust gas recirculation (EGR) valve stuck open/closed</p> <p>VGT actuator fault</p> <p>ECM failure</p>	For air intake system information, Intake Air Distribution and Filtering For right hand bank MAF sensor circuit tests, GO to Pinpoint Test G549822p10. For EGR valve tests, Engine Emission Control Check for DTCs indicating VGT actuator, EGR, cylinder balance or ECU piezo injector drive faults. Refer to the DTC index for pinpoint tests for DTC set. Refer to the warranty policy and procedures manual if an ECM is suspect.
P010300	Mass air flow (MAF) too high (right hand bank)	<p>Air leakage</p> <p>MAF sensor circuit: short circuit to power</p> <p>MAF sensor failure</p> <p>VGT actuator fault</p> <p>ECM failure</p>	For air intake system information, Intake Air Distribution and Filtering For right hand bank MAF sensor circuit tests, GO to Pinpoint Test G549822p10. Check for DTCs indicating VGT actuator, EGR, cylinder balance, fuel system or ECU piezo injector drive faults. Refer to the DTC index for pinpoint tests for DTC set. Refer to the warranty policy and procedures manual if an ECM is suspect.
P010400	Mass air flow (MAF) sensor circuit intermittent/erratic (right hand bank)	<p>Air leakage</p> <p>MAF sensor circuit: high</p>	For air intake system information, Intake Air Distribution and

		<p>resistance</p> <p>MAF sensor circuit: short circuit to ground</p> <p>MAF sensor circuit: short circuit to power</p> <p>MAF sensor failure</p> <p>ECM failure</p>	<p>Filtering For right hand bank MAF sensor circuit tests, GO to Pinpoint Test G549822p10. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P010600	Manifold absolute pressure (MAP) sensor range/performance	<p>MAP sensor circuit: high resistance</p> <p>MAP sensor circuit: short circuit to ground</p> <p>MAP sensor circuit: short circuit to power</p> <p>MAP sensor failure</p> <p>ECM failure</p>	<p>For MAP sensor tests, GO to Pinpoint Test G549822p12. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P010700	Manifold absolute pressure (MAP) sensor circuit low input	<p>MAP sensor circuit: high resistance</p> <p>MAP sensor circuit: short circuit to ground</p> <p>MAP sensor failure</p> <p>ECM failure</p>	<p>For MAP sensor tests, GO to Pinpoint Test G549822p12. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P010800	Manifold absolute pressure (MAP) sensor circuit high input	<p>MAP sensor circuit: short circuit to power</p> <p>MAP sensor failure</p> <p>ECM failure</p>	<p>For MAP sensor tests, GO to Pinpoint Test G549822p12. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P010900	Manifold absolute pressure (MAP) sensor circuit intermittent	<p>MAP sensor circuit: high resistance</p> <p>MAP sensor circuit: short circuit to ground</p> <p>MAP sensor circuit: short circuit to power</p> <p>MAP sensor failure</p>	<p>For MAP sensor tests, GO to Pinpoint Test G549822p12. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

		ECM failure	
P010A00	Mass air flow (MAF) sensor range/performance (left hand bank)	MAF sensor circuit: high resistance MAF sensor circuit: short circuit to ground MAF sensor circuit: short circuit to power MAF sensor failure ECM failure	For left hand bank MAF sensor circuit tests, GO to Pinpoint Test G549822p11. Refer to the warranty policy and procedures manual if an ECM is suspect.
P010C00	Mass air flow (MAF) too low (left hand bank)	Air leakage MAF sensor circuit: high resistance MAF sensor circuit: short circuit to ground MAF sensor failure Exhaust gas recirculation (EGR) valve stuck open/closed VGT actuator fault ECM failure	For air intake system information, Intake Air Distribution and Filtering For left hand bank MAF sensor circuit tests, GO to Pinpoint Test G549822p11. For EGR valve tests, Engine Emission Control Check for DTCs indicating VGT actuator, EGR, cylinder balance or ECU piezo injector drive faults. Refer to the DTC index for pinpoint tests for DTC set. Refer to the warranty policy and procedures manual if an ECM is suspect.
P010D00	Mass air flow (MAF) too high (left hand bank)	Air leakage MAF sensor circuit: short circuit to power MAF sensor failure VGT actuator fault ECM failure	For air intake system information, Intake Air Distribution and Filtering For left hand bank MAF sensor circuit tests, GO to Pinpoint Test G549822p11. Check for DTCs indicating VGT actuator, EGR, cylinder balance, fuel system or ECU piezo injector drive faults. Refer to the DTC index for pinpoint tests for DTC set. Refer to the warranty policy and procedures manual if an ECM is suspect.

P010E00	Mass air flow (MAF) sensor intermittent/erratic (left hand bank)	<p>Air leakage</p> <p>MAF sensor circuit: high resistance</p> <p>MAF sensor circuit: short circuit to ground</p> <p>MAF sensor circuit: short circuit to power</p> <p>MAF sensor failure</p> <p>ECM failure</p>	<p>For air intake system information, Intake Air Distribution and Filtering For left hand bank MAF sensor circuit tests, GO to Pinpoint Test G549822p11. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P010F00	Mass air flow (MAF) sensor left and right hand bank correlation	<p>Air leakage (post turbocharger)</p> <p>MAF sensor(s) circuit: high resistance</p> <p>MAF sensor(s) circuit: short circuit to ground</p> <p>MAF sensor(s) circuit: short circuit to power</p> <p>MAF sensor failure</p> <p>VGT actuator(s) circuit: high resistance</p> <p>VGT actuator(s) circuit: short circuit to ground</p> <p>VGT actuator(s) circuit: short circuit to power</p> <p>VGT actuator failure</p> <p>ECM failure</p>	<p>For air intake system information, Intake Air Distribution and Filtering For MAF sensor circuit tests, GO to Pinpoint Test G549822p10. and GO to Pinpoint Test G549822p11. For VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P011200	Intake air temperature (IAT) sensor circuit low input	<p>IAT sensor circuit: high resistance</p> <p>IAT sensor circuit: short circuit to ground</p>	<p>For IAT sensor circuit tests, GO to Pinpoint Test G549822p9. Refer to the warranty policy and procedures manual if an</p>

		IAT sensor failure ECM failure	ECM is suspect.
P011300	Intake air temperature (IAT) sensor circuit high input	IAT sensor circuit: short circuit to power IAT sensor failure ECM failure	For IAT sensor circuit tests, GO to Pinpoint Test G549822p9. Refer to the warranty policy and procedures manual if an ECM is suspect.
P011400	Intake air temperature (IAT) sensor intermittent/erratic	IAT sensor circuit: high resistance IAT sensor circuit: short circuit to ground IAT sensor circuit: short circuit to power IAT sensor failure ECM failure	For IAT sensor circuit tests, GO to Pinpoint Test G549822p9. Refer to the warranty policy and procedures manual if an ECM is suspect.
P011600	Engine coolant temperature (ECT) sensor circuit range/performance	ECT sensor circuit: high resistance ECT sensor circuit: short circuit to ground ECT sensor circuit: short circuit to power ECT sensor failure ECM failure	For ECT sensor and circuit tests, GO to Pinpoint Test G549822p1. Refer to the warranty policy and procedures manual if an ECM is suspect.
P011700	Engine coolant temperature (ECT) sensor circuit low input	ECT sensor circuit: high resistance ECT sensor circuit: short circuit to ground ECT sensor failure ECM failure	For ECT sensor and circuit tests, GO to Pinpoint Test G549822p1. Refer to the warranty policy and procedures manual if an ECM is suspect.
P011800	Engine coolant temperature (ECT) sensor circuit high input	ECT sensor circuit: short circuit to power ECT sensor failure ECM failure	For ECT sensor and circuit tests, GO to Pinpoint Test G549822p1. Refer to the warranty policy and procedures manual if an

			ECM is suspect.
P011900	Engine coolant temperature (ECT) sensor circuit intermittent/erratic	<p>ECT sensor circuit: high resistance</p> <p>ECT sensor circuit: short circuit to ground</p> <p>ECT sensor circuit: short circuit to power</p> <p>ECT sensor failure</p> <p>ECM failure</p>	<p>For ECT sensor and circuit tests, GO to Pinpoint Test G549822p1.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P018100	Fuel temperature sensor circuit range/performance	<p>Fuel temperature sensor circuit: high resistance</p> <p>Fuel temperature sensor circuit: short circuit to ground</p> <p>Fuel temperature sensor circuit: short circuit to power</p> <p>Fuel temperature sensor failure</p> <p>ECM failure</p>	<p>For fuel temperature sensor and circuit tests, GO to Pinpoint Test G549822p2.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P018200	Fuel temperature sensor circuit low input	<p>Fuel temperature sensor circuit: high resistance</p> <p>Fuel temperature sensor circuit: short circuit to ground</p> <p>Fuel temperature sensor failure</p> <p>ECM failure</p>	<p>For fuel temperature sensor and circuit tests, GO to Pinpoint Test G549822p2.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P018300	Fuel temperature sensor circuit high input	<p>Fuel temperature sensor circuit: short circuit to power</p> <p>Fuel temperature sensor failure</p>	<p>For fuel temperature sensor and circuit tests, GO to Pinpoint Test G549822p2.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

		ECM failure	
P018400	Fuel temperature sensor circuit intermittent	<p>Fuel temperature sensor circuit: high resistance</p> <p>Fuel temperature sensor circuit: short circuit to ground</p> <p>Fuel temperature sensor circuit: short circuit to power</p> <p>Fuel temperature sensor failure</p> <p>ECM failure</p>	<p>For fuel temperature sensor and circuit tests, GO to Pinpoint Test G549822p2.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P019100	Fuel rail pressure (FRP) sensor circuit range/performance	<p>FRP sensor circuit: high resistance</p> <p>FRP sensor circuit: short circuit to ground</p> <p>FRP sensor circuit: short circuit to power</p> <p>FRP sensor failure</p> <p>ECM failure</p>	<p>For FRP sensor and circuit tests,</p> <p>Fuel Charging and Controls</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P019200	Fuel rail pressure (FRP) sensor circuit low input	<p>FRP sensor circuit: high resistance</p> <p>FRP sensor circuit: short circuit to ground</p> <p>FRP sensor failure</p> <p>ECM failure</p>	<p>For FRP sensor and circuit tests,</p> <p>Fuel Charging and Controls</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P019300	Fuel rail pressure (FRP) sensor circuit high input	<p>FRP sensor circuit: short circuit to power</p> <p>FRP sensor failure</p> <p>ECM failure</p>	<p>For FRP sensor and circuit tests,</p> <p>Fuel Charging and Controls</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P019400	Fuel rail pressure (FRP) sensor circuit	FRP sensor circuit: high resistance	<p>For FRP sensor and circuit tests,</p> <p>Fuel Charging and Controls</p>

	intermittent/erratic	FRP sensor circuit: short circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure ECM failure	Refer to the warranty policy and procedures manual if an ECM is suspect.
P019500	Engine oil temperature (EOT) sensor circuit, no synchronization of PWM signal/PWM signal time out	EOT sensor circuit: high resistance EOT sensor circuit: short circuit to ground EOT sensor circuit: short circuit to power EOT sensor failure ECM failure	For EOT sensor circuit tests, GO to Pinpoint Test G549822p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P019600	Engine oil temperature (EOT) sensor circuit range/performance	EOT sensor circuit: high resistance EOT sensor circuit: short circuit to ground EOT sensor circuit: short circuit to power EOT sensor failure ECM failure	For EOT sensor circuit tests, GO to Pinpoint Test G549822p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P019700	Engine oil temperature (EOT) sensor circuit low input	EOT sensor circuit: high resistance EOT sensor circuit: short circuit to ground EOT sensor failure ECM failure	For EOT sensor circuit tests, GO to Pinpoint Test G549822p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P019800	Engine oil temperature (EOT) sensor circuit high input	EOT sensor circuit: short circuit to power EOT sensor failure ECM failure	For EOT sensor circuit tests, GO to Pinpoint Test G549822p3. Refer to the warranty policy and procedures manual if an ECM is suspect.

P019900	Engine oil temperature (EOT) sensor circuit intermittent	<p>EOT sensor circuit: high resistance</p> <p>EOT sensor circuit: short circuit to ground</p> <p>EOT sensor circuit: short circuit to power</p> <p>EOT sensor failure</p> <p>ECM failure</p>	For EOT sensor circuit tests, GO to Pinpoint Test G549822p3. Refer to the warranty policy and procedures manual if an ECM is suspect.
P020100	Fuel injector open circuit, cylinder 1	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector failure</p> <p>ECM failure</p>	For fuel injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P020200	Fuel injector open circuit, cylinder 2	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector failure</p> <p>ECM failure</p>	For fuel injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P020300	Fuel injector open circuit, cylinder 3	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector failure</p> <p>ECM failure</p>	For fuel injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P020400	Fuel injector open circuit, cylinder 4	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p>	For fuel injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.

		Fuel injector failure ECM failure	
P020500	Fuel injector open circuit, cylinder 5	Fuel injector circuit: high resistance Fuel injector circuit: short circuit to ground Fuel injector failure ECM failure	For fuel injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P020600	Fuel injector open circuit, cylinder 6	Fuel injector circuit: high resistance Fuel injector circuit: short circuit to ground Fuel injector failure ECM failure	For fuel injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P020A00	Fuel injection timing, cylinder 1	Fuel injector circuit: high resistance Fuel injector circuit: short circuit to ground Fuel injector circuit: short circuit to power Fuel injector failure ECM failure	For fuel injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P020B00	Fuel injection timing, cylinder 2	Fuel injector circuit: high resistance Fuel injector circuit: short circuit to ground Fuel injector circuit: short circuit to power	For fuel injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.

		Fuel injector failure ECM failure	
P020C00	Fuel injection timing, cylinder 3	Fuel injector circuit: high resistance Fuel injector circuit: short circuit to ground Fuel injector circuit: short circuit to power Fuel injector failure ECM failure	For fuel injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P020D00	Fuel injection timing, cylinder 4	Fuel injector circuit: high resistance Fuel injector circuit: short circuit to ground Fuel injector circuit: short circuit to power Fuel injector failure ECM failure	For fuel injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P020E00	Fuel injection timing, cylinder 5	Fuel injector circuit: high resistance Fuel injector circuit: short circuit to ground Fuel injector circuit: short circuit to power Fuel injector failure ECM failure	For fuel injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P020F00	Fuel injection timing, cylinder 6	Fuel injector circuit: high resistance Fuel injector circuit:	For fuel injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an

		<p>short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector failure</p> <p>ECM failure</p>	ECM is suspect.
P021900	Crankshaft/Camshaft position (CKP/CMP) sensor, engine overspeed	<p>CKP sensor circuit: high resistance</p> <p>CKP sensor circuit: short circuit to ground</p> <p>CKP sensor circuit: short circuit to power</p> <p>CMP sensor circuit: high resistance</p> <p>CMP sensor circuit: short circuit to ground</p> <p>CMP sensor circuit: short circuit to power</p> <p>CKP sensor failure</p> <p>CMP sensor failure</p> <p>ECM failure</p>	<p>For CKP and CMP sensor circuit tests, GO to Pinpoint Test G549822p16.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P023400	Turbocharger overboost condition, manifold absolute pressure (MAP) sensor control deviation	<p>Air leakage</p> <p>MAP sensor circuit: high resistance</p> <p>MAP sensor circuit: short circuit to ground</p> <p>MAP sensor circuit: short circuit to power</p> <p>MAP sensor failure</p> <p>Air leakage</p> <p>Exhaust gas recirculation</p>	<p>For air intake system information, Intake Air Distribution and Filtering For MAP sensor circuit tests, GO to Pinpoint Test G549822p12.</p> <p>For EGR valve tests, Engine Emission Control Check for DTCs indicating EGR or VGT actuator faults. Refer to the DTC index for pinpoint tests for DTC set. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

		(EGR) fault VGT actuator fault ECM failure	
P023600	Variable geometry turbocharger (VGT) actuator circuit range/performance (right hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to ground VGT actuator circuit: short circuit to power VGT actuator failure ECM failure	For right hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.
P023700	Variable geometry turbocharger (VGT) actuator reached minimum threshold (right hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to ground VGT actuator failure ECM failure	For right hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.
P023800	Variable geometry turbocharger (VGT) actuator reached maximum threshold (right hand bank)	VGT actuator circuit: short circuit to power VGT actuator failure ECM failure	For right hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.
P024000	Variable geometry turbocharger (VGT) actuator circuit range/performance (left hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to ground VGT actuator circuit: short circuit to power VGT actuator failure	For left hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.

		ECM failure	
P024100	Variable geometry turbocharger (VGT) actuator reached minimum threshold (left hand bank)	VGT actuator circuit: high resistance VGT actuator circuit: short circuit to ground VGT actuator failure ECM failure	For left hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.
P024200	Variable geometry turbocharger (VGT) actuator reached maximum threshold (left hand bank)	VGT actuator circuit: short circuit to power VGT actuator failure ECM failure	For left hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.
P024B00	Diesel particulate filter (DPF) temperature sensor - catalyst downstream circuit range/performance (right hand bank)	Temperature sensor - catalyst downstream circuit: high resistance Temperature sensor - catalyst downstream circuit: short circuit to ground Temperature sensor - catalyst downstream circuit: short circuit to power Temperature sensor - catalyst downstream failure	For temperature sensor - catalyst downstream circuit tests, Exhaust System
P029900	Turbocharger underboost condition, manifold absolute pressure (MAP) sensor control deviation	Air leakage MAP sensor circuit: high resistance MAP sensor circuit: short circuit to ground MAP sensor circuit: short circuit to power MAP sensor failure	For air intake system information, Intake Air Distribution and Filtering For MAP sensor circuit tests, GO to Pinpoint Test G549822p12. For EGR valve tests, Engine Emission Control Check for DTCs indicating EGR or VGT actuator faults. Refer to the DTC index for pinpoint tests for

		<p>Exhaust gas recirculation (EGR) fault</p> <p>VGT fault</p> <p>ECM failure</p>	<p>DTC set. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P029A00	Fuel trim maximum limit reached, cylinder 1	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector leaking</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For fuel injector tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P029B00	Fuel trim minimum limit reached, cylinder 1	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector leaking</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For fuel injector tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P029E00	Fuel trim maximum limit reached, cylinder 2	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p>	<p>For fuel injector tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

		<p>Fuel injector leaking</p> <p>Fuel injector failure</p> <p>ECM failure</p>	
P029F00	Fuel trim minimum limit reached, cylinder 2	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector leaking</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For fuel injector tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P02A200	Fuel trim maximum limit reached, cylinder 3	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector leaking</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For fuel injector tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P02A300	Fuel trim minimum limit reached, cylinder 3	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector leaking</p>	<p>For fuel injector tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

		Fuel injector failure ECM failure	
P02A600	Fuel trim maximum limit reached, cylinder 4	Fuel injector circuit: high resistance Fuel injector circuit: short circuit to ground Fuel injector circuit: short circuit to power Fuel injector leaking Fuel injector failure ECM failure	For fuel injector tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P02A700	Fuel trim minimum limit reached, cylinder 4	Fuel injector circuit: high resistance Fuel injector circuit: short circuit to ground Fuel injector circuit: short circuit to power Fuel injector leaking Fuel injector failure ECM failure	For fuel injector tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.
P02AA00	Fuel trim maximum limit reached, cylinder 5	Fuel injector circuit: high resistance Fuel injector circuit: short circuit to ground Fuel injector circuit: short circuit to power Fuel injector leaking Fuel injector failure	For fuel injector tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.

		ECM failure	
P02AB00	Fuel trim minimum limit reached, cylinder 5	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector leaking</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For fuel injector tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P02AE00	Fuel trim maximum limit reached, cylinder 6	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector leaking</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For fuel injector tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P02AF00	Fuel trim minimum limit reached, cylinder 6	<p>Fuel injector circuit: high resistance</p> <p>Fuel injector circuit: short circuit to ground</p> <p>Fuel injector circuit: short circuit to power</p> <p>Fuel injector leaking</p> <p>Fuel injector failure</p> <p>ECM failure</p>	<p>For fuel injector tests, Fuel Charging and Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

P032600	Knock sensor (KS) circuit range/performance (right hand bank)	KS circuit: high resistance KS circuit: short circuit to ground KS circuit: short circuit to power KS failure ECM failure	For right hand bank KS circuit tests, GO to Pinpoint Test G549822p7. Refer to the warranty policy and procedures manual if an ECM is suspect.
P033100	Knock sensor (KS) circuit range/performance (left hand bank)	KS circuit: high resistance KS circuit: short circuit to ground KS circuit: short circuit to power KS failure ECM failure	For left hand bank KS circuit tests, GO to Pinpoint Test G549822p8. Refer to the warranty policy and procedures manual if an ECM is suspect.
P033500	Crankshaft position (CKP) sensor synchronisation failure	CKP sensor gap incorrect/ foreign matter on sensor face /damaged teeth on rotor CKP sensor circuit: high resistance CKP sensor circuit: short circuit to ground CKP sensor circuit: short circuit to power CKP sensor failure ECM failure	For CKP sensor tests, GO to Pinpoint Test G549822p14. Refer to the warranty policy and procedures manual if an ECM is suspect.
P033600	Crankshaft position (CKP) sensor circuit range/performance	CKP sensor gap incorrect/ foreign matter on sensor face /damaged teeth on rotor CKP sensor circuit: high resistance CKP sensor circuit: short	For CKP sensor tests, GO to Pinpoint Test G549822p14. Refer to the warranty policy and procedures manual if an ECM is suspect.

		<p>circuit to ground</p> <p>CKP sensor circuit: short circuit to power</p> <p>CKP sensor failure</p> <p>ECM failure</p>	
P033700	Crankshaft position (CKP) sensor circuit low input	<p>CKP sensor gap incorrect/ foreign matter on sensor face /damaged teeth on rotor</p> <p>CKP sensor circuit: high resistance</p> <p>CKP sensor circuit: short circuit to ground</p> <p>CKP sensor failure</p> <p>ECM failure</p>	<p>For CKP sensor tests, GO to Pinpoint Test G549822p14. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P034100	Camshaft position (CMP) sensor circuit range/performance	<p>CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor</p> <p>CMP sensor circuit: high resistance</p> <p>CMP sensor circuit: short circuit to ground</p> <p>CMP sensor circuit: short circuit to power</p> <p>CMP sensor failure</p> <p>ECM failure</p>	<p>For CMP sensor tests, GO to Pinpoint Test G549822p15. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P034200	Camshaft position (CMP) sensor circuit low input	<p>CMP sensor gap incorrect/ foreign matter on sensor face /damaged rotor</p> <p>CMP sensor circuit: high resistance</p> <p>CMP sensor circuit: short</p>	<p>For CMP sensor tests, GO to Pinpoint Test G549822p15. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

		<p>circuit to ground</p> <p>CMP sensor failure</p> <p>ECM failure</p>	
P038000	Glow plug control module on, glow plugs not powered	<p>Glow plug control circuit: high resistance</p> <p>Glow plug control circuit: short circuit to ground</p> <p>Glow plug monitor circuit: high resistance</p> <p>Glow plug monitor circuit: short circuit to ground</p> <p>Glow plug failure</p> <p>Glow plug control module failure</p>	For glow plug system circuit tests, Glow Plug System
P038200	Glow plug control module off, glow plugs powered	<p>Glow plug control circuit: short circuit to power</p> <p>Glow plug monitor circuit: short circuit to power</p> <p>Glow plug failure</p> <p>Glow plug control module failure</p>	For glow plug system circuit tests, Glow Plug System
P038300	Glow plug control module - control circuit low	<p>Glow plug control module, control circuit: high resistance</p> <p>Glow plug control module, control circuit: short circuit to ground</p> <p>Glow plug control module failure</p>	For glow plug system circuit tests, Glow Plug System

P038400	Glow plug control module - control circuit high	Glow plug control module, control circuit: short circuit to power Glow plug control module failure	For glow plug system circuit tests, Glow Plug System
P040100	Exhaust gas recirculation (EGR) insufficient flow detected	EGR valve incorrectly fitted or loose EGR pipe blocked EGR valve stuck closed, blocked EGR coolers blocked EGR valve failure MAF sensor fault	For EGR system, Engine Emission Control For MAF sensor circuit tests, GO to Pinpoint Test G549822p10. and GO to Pinpoint Test G549822p11.
P040200	Exhaust gas recirculation (EGR) excessive flow detected	EGR valve incorrectly fitted or loose EGR pipe blocked EGR valve stuck closed, blocked EGR coolers blocked EGR valve failure MAF sensor fault	For EGR system, Engine Emission Control For MAF sensor circuit tests, GO to Pinpoint Test G549822p10. and GO to Pinpoint Test G549822p11.
P040300	Exhaust gas recirculation (EGR) valve H-bridges (right hand bank)	EGR valve circuit(s): high resistance EGR valve circuit(s): short circuit to ground EGR valve circuit(s): short circuit to power EGR valve failure ECM failure	For right hand bank EGR valve and circuit tests, Engine Emission Control Refer to the warranty policy and procedure manual if an ECM is suspect.
P040400	Exhaust gas recirculation (EGR) control circuit	IAT sensor fault	For IAT sensor circuit tests, GO to Pinpoint Test G549822p9.

	range/performance (right hand bank)	<p>MAP sensor fault</p> <p>MAF sensor fault</p> <p>EGR valve stuck closed, blocked</p> <p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>EGR valve failure</p>	<p>For MAP sensor circuit tests, GO to Pinpoint Test G549822p12.</p> <p>For MAF sensor circuit tests, GO to Pinpoint Test G549822p10. and GO to Pinpoint Test G549822p11.</p> <p>For right hand bank EGR valve and circuit tests, Engine Emission Control</p>
P040500	Exhaust gas recirculation (EGR) valve circuit low (right hand bank)	<p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve failure</p>	<p>For right hand bank EGR valve and circuit tests, Engine Emission Control</p>
P040600	Exhaust gas recirculation (EGR) valve circuit high (right hand bank)	<p>EGR valve circuit(s): short circuit to power</p> <p>EGR valve failure</p>	<p>For right hand bank EGR valve and circuit tests, Engine Emission Control</p>
P040700	Exhaust gas recirculation (EGR) - intake air shut off throttle circuit low	<p>Intake air shut off throttle circuit(s): high resistance</p> <p>Intake air shut off throttle circuit(s): short circuit to ground</p> <p>Intake air shut off throttle failure</p>	<p>For intake air shut off throttle and circuit tests, Engine Emission Control</p>
P040800	Exhaust gas recirculation (EGR) - intake air shut off throttle circuit high	<p>Intake air shut off throttle circuit(s): short circuit to power</p> <p>Intake air shut off</p>	<p>For intake air shut off throttle and circuit tests, Engine Emission Control</p>

		throttle failure	
P042600	Diesel particulate filter (DPF) temperature sensor - catalyst upstream circuit range/performance (right hand bank)	<p>Temperature sensor - catalyst upstream circuit: high resistance</p> <p>Temperature sensor - catalyst upstream circuit: short circuit to ground</p> <p>Temperature sensor - catalyst upstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst upstream failure</p>	For temperature sensor - catalyst upstream circuit tests, Exhaust System
P042700	Diesel particulate filter (DPF) temperature sensor - catalyst upstream circuit low (right hand bank)	<p>Temperature sensor - catalyst upstream circuit: high resistance</p> <p>Temperature sensor - catalyst upstream circuit: short circuit to ground</p> <p>Temperature sensor - catalyst upstream failure</p>	For temperature sensor - catalyst upstream circuit tests, Exhaust System
P042800	Diesel particulate filter (DPF) temperature sensor - catalyst upstream circuit high (right hand bank)	<p>Temperature sensor - catalyst upstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst upstream failure</p>	For temperature sensor - catalyst upstream circuit tests, Exhaust System
P042C00	Diesel particulate filter (DPF) temperature sensor - catalyst downstream circuit low (right hand bank)	<p>Temperature sensor - catalyst downstream circuit: high resistance</p> <p>Temperature sensor - catalyst downstream circuit: short circuit to ground</p>	For temperature sensor - catalyst downstream circuit tests, Exhaust System

		Temperature sensor - catalyst downstream failure	
P042D00	Diesel particulate filter (DPF) temperature sensor - catalyst downstream circuit high (right hand bank)	<p>Temperature sensor - catalyst downstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst downstream failure</p>	For temperature sensor - catalyst downstream circuit tests, Exhaust System
P043600	Diesel particulate filter (DPF) temperature sensor - catalyst upstream circuit range/performance (left hand bank)	<p>Temperature sensor - catalyst upstream circuit: high resistance</p> <p>Temperature sensor - catalyst upstream circuit: short circuit to ground</p> <p>Temperature sensor - catalyst upstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst upstream failure</p>	For temperature sensor - catalyst upstream circuit tests, Exhaust System
P043700	Diesel particulate filter (DPF) temperature sensor - catalyst upstream circuit low (left hand bank)	<p>Temperature sensor - catalyst upstream circuit: high resistance</p> <p>Temperature sensor - catalyst upstream circuit: short circuit to ground</p> <p>Temperature sensor - catalyst upstream failure</p>	For temperature sensor - catalyst upstream circuit tests, Exhaust System
P043800	Diesel particulate filter (DPF) temperature sensor - catalyst upstream circuit high (left hand bank)	<p>Temperature sensor - catalyst upstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst upstream failure</p>	For temperature sensor - catalyst upstream circuit tests, Exhaust System

P043B00	Diesel particulate filter (DPF) temperature sensor - catalyst downstream circuit range/performance (left hand bank)	<p>Temperature sensor - catalyst downstream circuit: high resistance</p> <p>Temperature sensor - catalyst downstream circuit: short circuit to ground</p> <p>Temperature sensor - catalyst downstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst downstream failure</p>	For temperature sensor - catalyst downstream circuit tests, Exhaust System
P043C00	Diesel particulate filter (DPF) temperature sensor - catalyst downstream circuit low (left hand bank)	<p>Temperature sensor - catalyst downstream circuit: high resistance</p> <p>Temperature sensor - catalyst downstream circuit: short circuit to ground</p> <p>Temperature sensor - catalyst downstream failure</p>	For temperature sensor - catalyst downstream circuit tests, Exhaust System
P043D00	Diesel particulate filter (DPF) temperature sensor - catalyst downstream circuit high (left hand bank)	<p>Temperature sensor - catalyst downstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst downstream failure</p>	For temperature sensor - catalyst downstream circuit tests, Exhaust System
P046000	Fuel level sensor, signal range high	<p>Fuel level sensor signal circuit: high resistance</p> <p>Fuel level sensor signal circuit: short circuit to power</p> <p>Fuel level sensor failure</p> <p>ECM failure</p>	For fuel level sensor and circuit tests, Fuel Tank and Lines - 2.7L V6 - TdV6 Refer to the warranty policy and procedures manual if an ECM is suspect.

P046100	Fuel level sensor, signal range low	<p>Fuel level sensor signal circuit: high resistance</p> <p>Fuel level sensor signal circuit: short circuit to ground</p> <p>Fuel level sensor failure</p> <p>ECM failure</p>	<p>For fuel level sensor and circuit tests,</p> <p>Fuel Tank and Lines - 2.7L V6 - TdV6 Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P048300	Cooling fan rationality	<p>Cooling fan rotor jammed/blocked</p> <p>Cooling fan motor damage/fault</p>	<p>Clear any obstruction, replace the fan as necessary.</p>
P048400	Cooling fan current over load	<p>Cooling fan seizure</p> <p>Cooling fan rotor jammed/blocked</p> <p>Cooling fan motor damage/fault</p>	<p>Clear any obstruction, replace the fan as necessary.</p>
P048700	Exhaust gas recirculation (EGR) valve H-bridges (left hand bank)	<p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>EGR valve failure</p> <p>ECM failure</p>	<p>For left hand bank EGR valve circuit tests,</p> <p>Engine Emission Control Refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P049300	Cooling fan overspeed (clutch locked)	<p>Cooling fan signal circuit: high resistance</p> <p>Cooling fan motor fault</p>	<p>For cooling fan circuit tests, GO to Pinpoint Test G549822p21.</p>
P049400	Cooling fan speed low	<p>Cooling fan signal circuit: high resistance</p> <p>Cooling fan signal circuit: short circuit to ground</p> <p>Cooling fan motor fault</p>	<p>For cooling fan circuit tests, GO to Pinpoint Test G549822p21.</p>

P049500	Cooling fan speed high	<p>Cooling fan signal circuit: short circuit to power</p> <p>Cooling fan motor fault</p>	For cooling fan circuit tests, GO to Pinpoint Test G549822p21.
P050100	Vehicle speed sensor A range/performance - signal plausibility failure	Vehicle speed: range performance	Check for ABS/TCM DTCs.
P050400	Brake switch A/B correlation	<p>The brake pressure reading does not agree with the brake light switch value</p> <p>Brake switch failure</p> <p>ECM failure</p>	<p>Check the brake switch function, GO to Pinpoint Test G549822p18.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P051300	Incorrect immobilizer key	Security key invalid	Programme keys using the Jaguar approved diagnostic system.
P053100	Air conditioning (A/C) refrigerant pressure sensor A circuit range/performance	<p>A/C refrigerant pressure sensor circuit: high resistance</p> <p>A/C refrigerant pressure sensor circuit: short circuit to ground</p> <p>A/C refrigerant pressure sensor circuit: short circuit to power</p> <p>A/C refrigerant pressure sensor failure</p>	For A/C refrigerant pressure sensor tests, GO to Pinpoint Test G549822p19.
P053200	Air conditioning (A/C) refrigerant pressure sensor A circuit low input	<p>A/C refrigerant pressure sensor circuit: short circuit to ground</p> <p>A/C refrigerant pressure sensor failure</p>	For A/C refrigerant pressure sensor tests, GO to Pinpoint Test G549822p19.
P053300	Air conditioning (A/C) refrigerant pressure sensor A circuit high input	<p>A/C refrigerant pressure sensor circuit: high resistance</p> <p>A/C refrigerant pressure sensor circuit: short</p>	For A/C refrigerant pressure sensor tests, GO to Pinpoint Test G549822p19.

		circuit to power A/C refrigerant pressure sensor failure	
P056200	System voltage low	Battery voltage low Battery ground cable: high resistance Battery connections loose/corroded Battery current drain	For battery information, Battery
P056300	System voltage high	System boosted from high voltage Battery voltage high Generator over charge condition	For battery information, Battery For charging system information, Charging System - 2.7L V6 - TdV6
P056600	Speed control cancel switch stuck closed	Speed control cancel switch signal circuit: short circuit to power Speed control cancel switch stuck/jammed Speed control cancel switch failure	For speed control, Speed Control - VIN Range: G45704->G99999
P056700	Speed control resume switch stuck closed	Speed control resume switch signal circuit: short circuit to power Speed control resume switch stuck/jammed Speed control resume switch failure	For speed control, Speed Control - VIN Range: G45704->G99999
P056900	Speed control minus switch stuck closed	Speed control minus switch signal circuit: short circuit to power Speed control minus switch	For speed control, Speed Control - VIN Range: G45704->G99999

		<p>stuck/jammed</p> <p>Speed control minus switch failure</p>	
P056A00	Speed control headway plus switch stuck closed	<p>Speed control headway plus switch signal circuit: short circuit to power</p> <p>Speed control headway plus switch stuck/jammed</p> <p>Speed control headway plus switch failure</p>	<p>For speed control, Speed Control - VIN Range: G45704->G99999</p>
P056B00	Speed control headway minus switch stuck closed	<p>Speed control headway minus switch signal circuit: short circuit to power</p> <p>Speed control headway minus switch stuck/jammed</p> <p>Speed control headway minus switch failure</p>	<p>For speed control, Speed Control - VIN Range: G45704->G99999</p>
P057000	Speed control plus switch stuck closed	<p>Speed control plus switch signal circuit: short circuit to power</p> <p>Speed control plus switch stuck/jammed</p> <p>Speed control plus switch failure</p>	<p>For speed control, Speed Control - VIN Range: G45704->G99999</p>
P057100	Brake switch A circuit plausibility	<p>The brake pressure reading does not agree with the brake light switch value</p> <p>Brake switch failure</p> <p>ECM failure</p>	<p>Check the brake switch function, GO to Pinpoint Test G549822p18.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P057800	Speed control multi-function input A circuit stuck	<p>Speed control multi-function input A circuit: high</p>	<p>For speed control, Speed Control - VIN Range: G45704->G99999</p>

		<p>resistance</p> <p>Speed control multi-function input A circuit: short circuit to ground</p> <p>Speed control multi-function input A circuit: short circuit to power</p> <p>Speed control switch stuck</p>	
P057900	Speed control multi-function input A circuit range/performance	<p>Speed control multi-function input A circuit: high resistance</p> <p>Speed control multi-function input A circuit: short circuit to ground</p> <p>Speed control multi-function input A circuit: short circuit to power</p> <p>Speed control switch stuck</p>	For speed control, Speed Control - VIN Range: G45704->G99999
P060600	ECM processor fault	<p>Internal ECM monitoring</p> <p>ECM failure</p>	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P060A00	Internal control module monitoring processor performance	Internal control module monitoring processor performance	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P060B00	Internal control module A/D processing performance	Internal control module A/D processing performance	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer

			to the warranty policy and procedure manual if an ECM is suspect.
P060D00	Internal control module accelerator pedal position performance	Pedal value not plausible	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P061000	Control module vehicle options error	VID block fault	Configure the module using the Jaguar approved diagnostic system.
P061100	Fuel injection pump control module requesting engine stop	Internal control module monitoring performance	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P061700	Starter relay circuit high	Starter relay drive circuit: short circuit to power Starter relay failure	For starter relay and circuit tests, GO to Pinpoint Test G549822p22.
P061A00	Internal control module torque performance - signal plausibility failure	Absolute engine torque calculation failure	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P061C00	Internal control module engine RPM performance	Processor monitoring speed not plausible	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P061E00	Internal control module brake signal performance	Cruise intervention not plausible	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and

			procedure manual if an ECM is suspect.
P062200	Generator monitor circuit plausibility	PWM signal failure	For generator monitor circuit tests, Charging System - 2.7L V6 - TdV6
P062500	Generator monitor circuit low	Generator monitor circuit: high resistance Generator monitor circuit: short circuit to ground	For generator monitor circuit tests, Charging System - 2.7L V6 - TdV6
P062600	Generator monitor circuit high	Generator monitor circuit: short circuit to power	For generator monitor circuit tests, Charging System - 2.7L V6 - TdV6
P062700	Fuel pump module relay control circuit high	Fuel pump module relay control circuit: short circuit to power Fuel pump module relay failure	For fuel pump module relay and circuit tests, Fuel Tank and Lines - 2.7L V6 - TdV6
P062800	Fuel pump module relay control circuit low	Fuel pump module relay control circuit: high resistance Fuel pump module relay control circuit: short circuit to ground Fuel pump module relay failure	For fuel pump module relay and circuit tests, Fuel Tank and Lines - 2.7L V6 - TdV6
P062900	Fuel pump module relay control circuit/open	Fuel pump module relay control circuit: high resistance Fuel pump module relay failure	For fuel pump module relay and circuit tests, Fuel Tank and Lines - 2.7L V6 - TdV6
P062B00	Internal control module - fuel injector control performance	Internal control module - fuel injector control performance	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is

			suspect.
P062D00	Fuel injector driver circuit performance (right hand bank)	<p>Injector(s) disconnected</p> <p>Injector circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>Injector failure</p> <p>ECM failure</p>	For injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedure manual if an ECM is suspect.
P062E00	Fuel injector driver circuit performance (left hand bank)	<p>Injector(s) disconnected</p> <p>Injector circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>Injector failure</p> <p>ECM failure</p>	For injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedure manual if an ECM is suspect.
P063400	ECM internal temperature too high	ECM internal temperature too high	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P064200	ECM internal 5 volt sensor supply circuit A low	<p>ECM power supply circuit: high resistance</p> <p>ECM power supply circuit: short circuit to ground</p> <p>ECM ground circuit: high resistance</p> <p>5 Volt supply</p> <p>ECM relay malfunction</p> <p>ECM failure</p>	For ECM power supply tests, GO to Pinpoint Test G549822p23. and GO to Pinpoint Test G549822p20. For ECM relay tests, GO to Pinpoint Test G549822p26. Refer to the circuit diagrams for the 5 volt sensor supply. Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.

P064300	ECM internal 5 volt sensor supply circuit A high	<p>ECM power supply circuit: short circuit to power</p> <p>ECM ground circuit: short circuit to power</p> <p>5 Volt supply</p> <p>ECM relay malfunction</p> <p>ECM failure</p>	<p>For ECM power supply tests, GO to Pinpoint Test G549822p23. and GO to Pinpoint Test G549822p20.</p> <p>For ECM relay tests, GO to Pinpoint Test G549822p26. Refer to the circuit diagrams for the 5 volt sensor supply. Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P065200	ECM internal 5 volt sensor supply circuit B low	<p>ECM power supply circuit: high resistance</p> <p>ECM power supply circuit: short circuit to ground</p> <p>ECM ground circuit: high resistance</p> <p>5 Volt supply</p> <p>ECM relay malfunction</p> <p>ECM failure</p>	<p>For ECM power supply tests, GO to Pinpoint Test G549822p23. and GO to Pinpoint Test G549822p20.</p> <p>For ECM relay tests, GO to Pinpoint Test G549822p26. Refer to the circuit diagrams for the 5 volt sensor supply. Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P065300	ECM internal 5 volt sensor supply circuit B high	<p>ECM power supply circuit: short circuit to power</p> <p>ECM ground circuit: short circuit to power</p> <p>5 Volt supply</p> <p>ECM relay malfunction</p> <p>ECM failure</p>	<p>For ECM power supply tests, GO to Pinpoint Test G549822p23. and GO to Pinpoint Test G549822p20.</p> <p>For ECM relay tests, GO to Pinpoint Test G549822p26. Refer to the circuit diagrams for the 5 volt sensor supply. Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and</p>

			procedure manual if an ECM is suspect.
P066700	ECM internal temperature sensor range/performance	ECM internal temperature sensor range/performance	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P066800	ECM internal temperature sensor circuit low	ECM internal temperature sensor circuit low	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P066900	ECM internal temperature sensor circuit high	ECM internal temperature sensor circuit high	Cycle the ignition and allow power latch. Clear the DTC and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P067000	Glow plug control module - control circuit open	<p>Glow plug control module, control circuit: high resistance</p> <p>Glow plug control module, control circuit: short circuit to ground</p> <p>Glow plug control module failure</p>	For glow plug control module circuit tests, Glow Plug System
P069100	Cooling fan control circuit low	<p>Cooling fan control circuit: short circuit to ground</p> <p>Cooling fan control circuit: high resistance</p>	For cooling fan circuit tests, GO to Pinpoint Test G549822p21.
P069200	Cooling fan control circuit high	Cooling fan control circuit: short circuit to power	For cooling fan circuit tests, GO to Pinpoint Test G549822p21.

P085000	Park/Neutral switch input circuit plausibility	Park/Neutral switch input circuit: high resistance Park/Neutral switch input circuit: short circuit to ground Park/Neutral switch input circuit: short circuit to power Park/Neutral switch failure	For Park/Neutral switch tests, External Controls
P0A0900	DC/DC converter circuit low	DC/DC converter circuit low	Clear the DTC. Cycle the ignition, allow power latch and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P0A1000	DC/DC converter circuit high	DC/DC converter circuit high	Clear the DTC. Cycle the ignition, allow power latch and retest. If the DTC resets, refer to the warranty policy and procedure manual if an ECM is suspect.
P0A1400	Active engine mount control circuit open (right hand)	Active engine mount control circuit: high resistance Active engine mount control circuit: short circuit to ground Active engine mount actuator failure	For active engine mount circuit tests, Engine
P0A1500	Active engine mount control circuit low (right hand)	Active engine mount control circuit: high resistance Active engine mount control circuit: short circuit to ground Active engine mount actuator failure	For active engine mount circuit tests, Engine

POA1600	Active engine mount control circuit high (right hand)	Active engine mount control circuit: short circuit to power Active engine mount actuator failure	For active engine mount circuit tests, Engine
POAB600	Active engine mount control circuit open (left hand)	Active engine mount control circuit: high resistance Active engine mount control circuit: short circuit to ground Active engine mount actuator failure	For active engine mount circuit tests, Engine
POAB700	Active engine mount control circuit low (left hand)	Active engine mount control circuit: high resistance Active engine mount control circuit: short circuit to ground Active engine mount actuator failure	For active engine mount circuit tests, Engine
POAB800	Active engine mount control circuit high (left hand)	Active engine mount control circuit: short circuit to power Active engine mount actuator failure	For active engine mount circuit tests, Engine
P115A00	Low fuel level - forced limited power	Fuel reserve signal range Low level fuel condition Critical fuel level switch signal circuit: high resistance Critical fuel level switch signal circuit: short circuit to ground Critical fuel level switch failure Fuel level sensor signal circuit: high	Check the fuel level. If there is sufficient fuel check the critical fuel level switch and fuel level sensor circuits, Fuel Tank and Lines - 2.7L V6 - TdV6 Refer to the warranty policy and procedures manual if an ECM is suspect.

		<p>resistance</p> <p>Fuel level sensor signal circuit: short circuit to ground</p> <p>Fuel level sensor signal circuit: short circuit to power</p> <p>Fuel level sensor failure</p> <p>ECM failure</p>	
P115B00	Low fuel level - forced engine shutdown	<p>Anti air suction intervention</p> <p>Low level fuel condition</p> <p>Critical fuel level switch signal circuit: high resistance</p> <p>Critical fuel level switch signal circuit: short circuit to ground</p> <p>Critical fuel level switch failure</p> <p>Fuel level sensor signal circuit: high resistance</p> <p>Fuel level sensor signal circuit: short circuit to ground</p> <p>Fuel level sensor signal circuit: short circuit to power</p> <p>Fuel level sensor failure</p> <p>ECM failure</p>	<p>Check the fuel level. If there is sufficient fuel check the critical fuel level switch and fuel level sensor circuits, Fuel Tank and Lines - 2.7L V6 - TdV6 Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P120E00	Fuel rail pressure (FRP) sensor - excessive fuel pressure variation	<p>FRP sensor circuit: high resistance</p> <p>FRP sensor circuit: short circuit to ground</p>	<p>For FRP sensor tests, Fuel Charging and Controls Refer to the warranty policy and procedure manual if an</p>

		FRP sensor circuit: short circuit to power FRP sensor failure ECM failure	ECM is suspect.
P120F00	Fuel rail pressure (FRP) regulator - fuel pressure low at start	FRP sensor circuit: high resistance FRP sensor circuit: short circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure Restricted fuel line Fuel pump module failure ECM failure	For FRP sensor tests, Fuel Charging and Controls For fuel pump module circuit and fuel line tests, Fuel Tank and Lines - 2.7L V6 - TdV6 Refer to the warranty policy and procedure manual if an ECM is suspect.
P125900	Immobilizer to PCM signal error	Incorrect ID received from instrument pack	Configure the system using the Jaguar approved diagnostic system.
P132A00	Variable geometry turbocharger (VGT) actuator H bridge fault (right hand bank)	VGT actuator circuit(s): high resistance, short circuit to ground, short circuit to power Turbocharger vanes stuck/sticking VGT actuator failure ECM failure	For right hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedure manual if an ECM is suspect.
P132B00	Variable geometry turbocharger (VGT) actuator performance (right hand bank)	VGT actuator circuit(s): high resistance, short circuit to ground, short circuit to power Turbocharger vanes stuck/sticking	For right hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedure manual if an ECM is suspect.

		VGT actuator failure ECM failure	
P132D00	Variable geometry turbocharger (VGT) actuator H bridge fault (left hand bank)	VGT actuator circuit(s): high resistance, short circuit to ground, short circuit to power Turbocharger vanes stuck/sticking VGT actuator failure ECM failure	For left hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedure manual if an ECM is suspect.
P132E00	Variable geometry turbocharger (VGT) actuator performance (left hand bank)	VGT actuator circuit(s): high resistance, short circuit to ground, short circuit to power Turbocharger vanes stuck/sticking VGT actuator failure ECM failure	For left hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedure manual if an ECM is suspect.
P132F00	Variable geometry turbocharger (VGT) actuator voltage plausibility (left hand bank)	VGT actuator circuit(s): high resistance, short circuit to ground, short circuit to power VGT actuator failure ECM failure	For left hand bank VGT actuator circuit tests, Turbocharger Refer to the warranty policy and procedure manual if an ECM is suspect.
P133400	Exhaust gas recirculation (EGR) - intake air shut off throttle minimum/maximum stop performance	EGR valve stuck/sticking EGR valve circuit(s): high resistance EGR valve circuit(s): short circuit to ground EGR valve circuit(s): short circuit to power	For EGR valve, intake air shut off throttle and circuit tests, Engine Emission Control Refer to the warranty policy and procedure manual if an ECM is suspect.

		<p>Intake air shut off throttle stuck/sticking</p> <p>Intake air shut off throttle circuit(s): high resistance</p> <p>Intake air shut off throttle circuit(s): short circuit to ground</p> <p>Intake air shut off throttle circuit(s): short circuit to power</p> <p>Intake air shut off throttle failure</p> <p>ECM failure</p>	
P133600	Crankshaft/Camshaft position (CKP/CMP) sensor range/performance	<p>CKP sensor circuit: high resistance</p> <p>CKP sensor circuit: short circuit to ground</p> <p>CKP sensor circuit: short circuit to power</p> <p>CMP sensor circuit: high resistance</p> <p>CMP sensor circuit: short circuit to ground</p> <p>CMP sensor circuit: short circuit to power</p> <p>CKP sensor failure</p> <p>CMP sensor failure</p> <p>ECM failure</p>	<p>For CKP and CMP sensor tests, GO to Pinpoint Test G549822p16.</p> <p>Refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P138E00	Variable geometry turbocharger (VGT) actuator adaption (right hand bank)	VGT actuator circuit(s): high resistance, short circuit to ground, short circuit	For right hand bank VGT actuator circuit tests, Turbocharger

		to power VGT actuator failure	
P140A00	Exhaust gas recirculation (EGR) valve circuit low (left hand bank)	EGR valve circuit(s): high resistance EGR valve circuit(s): short circuit to ground EGR valve failure	For left hand bank EGR valve and circuit tests, Engine Emission Control
P140B00	Exhaust gas recirculation (EGR) valve circuit high (left hand bank)	EGR valve circuit(s): short circuit to power EGR valve failure	For left hand bank EGR valve and circuit tests, Engine Emission Control
P140C00	Exhaust gas recirculation (EGR) - intake air shut off throttle H bridges	Intake air shut off throttle circuit(s): high resistance Intake air shut off throttle circuit(s): short circuit to ground Intake air shut off throttle circuit(s): short circuit to power Intake air shut off throttle failure ECM failure	For intake air shut off throttle and circuit tests, Engine Emission Control Refer to the warranty policy and procedure manual if an ECM is suspect.
P140D00	Exhaust gas recirculation (EGR) control circuit range/performance (left hand bank)	IAT sensor fault MAP sensor fault MAF sensor fault EGR valve stuck closed, blocked EGR valve circuit(s): high resistance EGR valve circuit(s): short circuit to	For IAT sensor circuit tests, GO to Pinpoint Test G549822p9. For MAP sensor circuit tests, GO to Pinpoint Test G549822p12. For MAF sensor circuit tests, GO to Pinpoint Test G549822p10. and GO to Pinpoint Test G549822p11. For left hand bank EGR valve and circuit tests, Engine Emission Control

		<p>ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>EGR valve failure</p>	
P140E00	Exhaust gas recirculation (EGR) valve circuit adaption (left hand bank)	<p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>EGR valve failure</p> <p>ECM failure</p>	For left hand bank EGR valve and circuit tests, Engine Emission Control Refer to the warranty policy and procedure manual if an ECM is suspect.
P141A00	Exhaust gas recirculation (EGR) valve circuit intermittent/erratic (right hand bank)	<p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>EGR valve failure</p> <p>ECM failure</p>	For right hand bank EGR valve and circuit tests, Engine Emission Control Refer to the warranty policy and procedure manual if an ECM is suspect.
P141B00	Exhaust gas recirculation (EGR) - intake air shut off throttle circuit intermittent/erratic	<p>Intake air shut off throttle circuit(s): high resistance</p> <p>Intake air shut off throttle circuit(s): short circuit to ground</p> <p>Intake air shut off throttle circuit(s): short circuit to power</p> <p>Intake air shut off</p>	For intake air shut off throttle and circuit tests, Engine Emission Control Refer to the warranty policy and procedure manual if an ECM is suspect.

		throttle failure	
		ECM failure	
P141C00	Exhaust gas recirculation (EGR) valve circuit intermittent/erratic (left hand bank)	EGR valve circuit(s): high resistance EGR valve circuit(s): short circuit to ground EGR valve circuit(s): short circuit to power EGR valve failure ECM failure	For left hand bank EGR valve and circuit tests, Engine Emission Control Refer to the warranty policy and procedure manual if an ECM is suspect.
P141D00	Exhaust gas recirculation (EGR) valve circuit adaption (right hand bank)	EGR valve circuit(s): high resistance EGR valve circuit(s): short circuit to ground EGR valve circuit(s): short circuit to power EGR valve failure ECM failure	For right hand bank EGR valve and circuit tests, Engine Emission Control Refer to the warranty policy and procedure manual if an ECM is suspect.
P150A00	Injector circuit range/performance cylinder 1	Injector disconnected Injector circuit(s): high resistance, short circuit to ground, short circuit to power Injector failure ECM failure	For injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedure manual if an ECM is suspect.
P150B00	Injector circuit range/performance cylinder 2	Injector disconnected Injector circuit(s): high resistance, short circuit to ground, short circuit to	For injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedure manual if an ECM is suspect.

		<p>power</p> <p>Injector failure</p> <p>ECM failure</p>	
P150C00	Injector circuit range/performance cylinder 3	<p>Injector disconnected</p> <p>Injector circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>Injector failure</p> <p>ECM failure</p>	For injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedure manual if an ECM is suspect.
P151B00	Idle air control system RPM lower than expected	<p>Air intake restriction</p> <p>Accessory drive overload (defective/seized component)</p>	Check the air intake system, Intake Air Distribution and Filtering Check the accessory drive belt and components, Accessory Drive - 2.7L Diesel
P151C00	Idle air control system RPM higher than expected	<p>Intake air leak between MAF sensor and throttle</p> <p>Intake air leak between throttle and engine</p> <p>Engine crankcase breather leak</p>	Check the air intake system, Intake Air Distribution and Filtering Inspect the engine breather system, Engine Emission Control
P155400	Injector circuit range/performance cylinder 4	<p>Injector disconnected</p> <p>Injector circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>Injector failure</p> <p>ECM failure</p>	For injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedure manual if an ECM is suspect.
P155500	Injector circuit range/performance cylinder 5	<p>Injector disconnected</p> <p>Injector circuit(s): high resistance, short circuit to ground, short circuit to</p>	For injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedure manual if an ECM is suspect.

		<p>power</p> <p>Injector failure</p> <p>ECM failure</p>	
P155600	Injector circuit range/performance cylinder 6	<p>Injector disconnected</p> <p>Injector circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>Injector failure</p> <p>ECM failure</p>	<p>For injector circuit tests, Fuel Charging and Controls Refer to the warranty policy and procedure manual if an ECM is suspect.</p>
P157200	Brake switch A circuit plausibility	<p>The brake pressure reading does not agree with the brake light switch value</p> <p>Brake switch circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>Brake switch failure</p> <p>ECM failure</p>	<p>Check the brake switch function, GO to Pinpoint Test G549822p18. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P169600	ECM/speed control module circuit/network - vehicle speed set point CAN invalid	<p>Speed control module off CAN</p> <p>Speed control module misaligned</p>	<p>For speed control, Speed Control - VIN Range: G45704->G99999</p>
P193300	Fuel level sensor CAN signal	<p>Fuel level sensor signal circuit: high resistance</p> <p>Fuel level sensor signal circuit: short circuit to ground</p> <p>Fuel level sensor signal circuit: short circuit to power</p> <p>Fuel level sensor signal circuit: short circuit</p>	<p>For fuel level sensor and circuit tests, Fuel Tank and Lines - 2.7L V6 - TdV6 Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

		<p>to other resistive sensors</p> <p>Fuel level sensor failure</p> <p>ECM failure</p>	
P193400	Vehicle speed sensor malfunction	Vehicle speed: invalid signal received over CAN	Check for TCM DTCs.
P193500	Brake switch/sensor signal	Error on brake switch sensor coming on CAN	<p>Check the brake switch function, GO to Pinpoint Test G549822p18.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P193700	Fuel fired heater control circuit open (where fitted)	<p>Fuel fired heater control circuit: high resistance</p> <p>Fuel fired heater control circuit: short circuit to ground</p> <p>Fuel fired heater failure</p>	No information available.
P193800	Fuel fired heater control circuit range/performance (where fitted)	<p>Fuel fired heater control circuit: high resistance</p> <p>Fuel fired heater control circuit: short circuit to ground</p> <p>Fuel fired heater control circuit: short circuit to power</p> <p>Fuel fired heater failure</p>	No information available.
P193A00	Invalid service test tool communication - request invalid	Invalid command during engine operation.	Not a fault
P200800	Port de-activation solenoid circuit open	<p>Port de-activation solenoid circuit: high resistance</p> <p>Port de-activation solenoid circuit:</p>	<p>Port de-activation solenoid circuit tests,</p> <p>Intake Air Distribution and Filtering</p>

		<p>short circuit to ground</p> <p>Port de-activation solenoid failure</p>	
P200900	Port de-activation solenoid circuit low	<p>Port de-activation solenoid circuit: high resistance</p> <p>Port de-activation solenoid circuit: short circuit to ground</p> <p>Port de-activation solenoid failure</p>	Port de-activation solenoid circuit tests, Intake Air Distribution and Filtering
P201000	Port de-activation solenoid circuit high	<p>Port de-activation solenoid circuit: short circuit to power</p> <p>Port de-activation solenoid failure</p>	Port de-activation solenoid circuit tests, Intake Air Distribution and Filtering
P202900	Fuel fired heater disabled (where fitted)	<p>Fuel fired heater control circuit: high resistance</p> <p>Fuel fired heater control circuit: short circuit to ground</p> <p>Fuel fired heater failure</p>	No information available.
P203000	Fuel fired heater performance (where fitted)	<p>Fuel fired heater control circuit: high resistance</p> <p>Fuel fired heater control circuit: short circuit to ground</p> <p>Fuel fired heater control circuit: short circuit to power</p> <p>Fuel fired heater failure</p>	No information available.
P212200	Accelerator pedal position (APP) sensor circuit 1 low	Accelerator pedal position (APP) sensor circuit 1: high	For APP sensor circuit 1 tests, GO to Pinpoint Test G549822p4.

		<p>resistance</p> <p>Accelerator pedal position (APP) sensor circuit 1: short circuit to ground</p> <p>Accelerator pedal position (APP) sensor failure</p>	
P212300	Accelerator pedal position (APP) sensor circuit 1 high	<p>Accelerator pedal position (APP) sensor circuit 1: short circuit to power</p> <p>Accelerator pedal position (APP) sensor failure</p>	For APP sensor circuit 1 tests, GO to Pinpoint Test G549822p4.
P212700	Accelerator pedal position (APP) sensor circuit 2 low	<p>Accelerator pedal position (APP) sensor circuit 2: high resistance</p> <p>Accelerator pedal position (APP) sensor circuit 2: short circuit to ground</p> <p>Accelerator pedal position (APP) sensor failure</p>	For APP sensor circuit 2 tests, GO to Pinpoint Test G549822p5.
P212800	Accelerator pedal position (APP) sensor circuit 2 high	<p>Accelerator pedal position (APP) sensor circuit 2: short circuit to power</p> <p>Accelerator pedal position (APP) sensor failure</p>	For APP sensor circuit 2 tests, GO to Pinpoint Test G549822p5.
P213800	Accelerator pedal position (APP) sensor 1 and 2 voltage correlation	<p>Accelerator pedal position (APP) sensor circuit 2: short circuit to power</p> <p>Accelerator pedal position (APP) sensor circuit 2: short circuit to ground</p> <p>Accelerator pedal</p>	For APP sensor circuit tests, GO to Pinpoint Test G549822p17.

		position (APP) sensor failure	
P214100	Exhaust gas recirculation (EGR) - intake air shut off throttle control deviation below minimum threshold	<p>EGR valve stuck/sticking</p> <p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to power</p> <p>Intake air shut off throttle stuck/sticking</p> <p>Intake air shut off throttle circuit(s): high resistance</p> <p>Intake air shut off throttle circuit(s): short circuit to ground</p> <p>Intake air shut off throttle circuit(s): short circuit to power</p> <p>Intake air shut off throttle failure</p> <p>ECM failure</p>	For EGR valve, intake air shut off throttle and circuit tests, Engine Emission Control Refer to the warranty policy and procedure manual if an ECM is suspect.
P214200	Exhaust gas recirculation (EGR) - intake air shut off throttle control deviation above maximum threshold	<p>EGR valve stuck/sticking</p> <p>EGR valve circuit(s): high resistance</p> <p>EGR valve circuit(s): short circuit to ground</p> <p>EGR valve circuit(s): short circuit to power</p>	For EGR valve, intake air shut off throttle and circuit tests, Engine Emission Control Refer to the warranty policy and procedure manual if an ECM is suspect.

		<p>Intake air shut off throttle stuck/sticking</p> <p>Intake air shut off throttle circuit(s): high resistance</p> <p>Intake air shut off throttle circuit(s): short circuit to ground</p> <p>Intake air shut off throttle circuit(s): short circuit to power</p> <p>Intake air shut off throttle failure</p> <p>ECM failure</p>	
P219900	Intake air temperature (IAT) and air charge temperature (ACT) sensor correlation after cold start	<p>IAT sensor circuit: high resistance, short circuit to ground, short circuit to power</p> <p>ACT sensor circuit: high resistance, short circuit to ground, short circuit to power</p> <p>IAT sensor failure</p> <p>ACT sensor failure</p> <p>ECM failure</p>	<p>For IAT sensor circuit tests, GO to Pinpoint Test G549822p9.</p> <p>For ACT sensor circuit tests, GO to Pinpoint Test G549822p6.</p> <p>Intake Air Distribution and Filtering Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P222800	Barometric pressure (BARO) sensor circuit low input	BARO sensor failure (internal ECM fault)	Refer to the warranty policy and procedures manual if an ECM is suspect.
P222900	Barometric pressure (BARO) sensor circuit high input	BARO sensor failure (internal ECM fault)	Refer to the warranty policy and procedures manual if an ECM is suspect.
P223000	Barometric pressure (BARO)	BARO sensor failure (internal ECM fault)	Refer to the warranty policy and procedures manual if an

	sensor circuit intermittent		ECM is suspect.
P226300	Turbocharger boost system performance, manifold absolute pressure (MAP) sensor control deviation	<p>IAT sensor circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>MAP sensor circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>MAF sensor circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>EGR circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>VGT actuator failure</p> <p>Turbocharger vanes stuck/sticking</p> <p>ECM failure</p>	<p>For IAT sensor circuit tests, GO to Pinpoint Test G549822p9.</p> <p>For MAP sensor circuit tests, GO to Pinpoint Test G549822p12.</p> <p>For EGR circuit tests, For turbo charger and circuit tests, Turbocharger Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P228800	Injector control pressure too high - fuel pressure control valve (FPCV) minimum limit reached	<p>Fuel injector control pressure: too high</p> <p>FPCV circuit fault</p> <p>FPCV failure</p> <p>Fuel pump module circuit: short circuit to power</p> <p>Fuel pump module failure</p> <p>Fuel injection pump failure</p>	<p>For fuel pressure and fuel pump module circuit tests, Fuel Tank and Lines - 2.7L V6 - TdV6 For FPCV and circuit tests, Fuel Charging and Controls For fuel injection pump, Fuel Injection Pump</p>
P229000	Injector control pressure too low - fuel pressure	Fuel injector control	For fuel lines, fuel pressure and fuel pump module circuit tests,

	control valve (FPCV) maximum limit reached	<p>pressure: too low</p> <p>Fuel line leak</p> <p>Fuel filter/system restriction</p> <p>FPCV circuit fault</p> <p>FPCV failure</p> <p>Fuel pump module circuit: short circuit to ground</p> <p>Fuel pump module failure</p> <p>Fuel injection pump failure</p>	Fuel Tank and Lines - 2.7L V6 - TdV6 For FPCV and circuit tests, Fuel Charging and Controls For fuel injection pump, Fuel Injection Pump
P229200	Injector control pressure erratic - fuel pressure control valve (FPCV) dynamic	<p>Fuel injector control pressure: erratic</p> <p>FPCV circuit fault</p> <p>FPCV failure</p> <p>Fuel pump module circuit(s): high resistance, short circuit to ground, short circuit to power</p> <p>Fuel pump module failure</p> <p>Fuel injection pump failure</p>	For fuel lines, fuel pressure and fuel pump module circuit tests, Fuel Tank and Lines - 2.7L V6 - TdV6 For FPCV and circuit tests, Fuel Charging and Controls For fuel injection pump, Fuel Injection Pump
P229900	Brake pedal position/accelerator pedal position incompatible plausibility	Brake switch failure	Check the brake switch function, GO to Pinpoint Test G549822p18.
P242B00	Diesel particulate filter (DPF) temperature sensor circuit range/performance	<p>DPF temperature sensor circuit: high resistance</p> <p>DPF temperature sensor</p>	For DPF temperature sensor circuit tests, Exhaust System

		<p>circuit: short circuit to ground</p> <p>DPF temperature sensor circuit: short circuit to power</p> <p>DPF temperature sensor failure</p>	
P242C00	Diesel particulate filter (DPF) temperature sensor circuit low	<p>DPF temperature sensor circuit: high resistance</p> <p>DPF temperature sensor circuit: short circuit to ground</p> <p>DPF temperature sensor failure</p>	For DPF temperature sensor circuit tests, Exhaust System
P242D00	Diesel particulate filter (DPF) temperature sensor circuit high	<p>DPF temperature sensor circuit: short circuit to power</p> <p>DPF temperature sensor failure</p>	For DPF temperature sensor circuit tests, Exhaust System
P242E00	Diesel particulate filter (DPF) temperature sensor circuit intermittent/erratic	<p>DPF temperature sensor circuit: high resistance</p> <p>DPF temperature sensor circuit: short circuit to ground</p> <p>DPF temperature sensor circuit: short circuit to power</p> <p>DPF temperature sensor failure</p>	For DPF temperature sensor circuit tests, Exhaust System
P244A00	Diesel particulate filter (DPF) exhaust back pressure too low	<p>Differential pressure tubes/hoses split/leaking</p> <p>DPF split/leaking</p>	For DPF, Exhaust System
P244B00	Diesel particulate filter (DPF) exhaust back pressure too high	<p>Differential pressure tubes/hoses blockage/restriction</p> <p>DPF blockage/restriction</p>	For DPF, Exhaust System

P245300	Diesel particulate filter (DPF) differential pressure sensor value too high before engine start	<p>Exhaust blockage/restriction</p> <p>DPF blockage/restriction</p> <p>Differential pressure sensor circuit: high resistance</p> <p>Differential pressure sensor circuit: short circuit to ground</p> <p>Differential pressure sensor circuit: short circuit to power</p> <p>Differential pressure sensor failure</p>	For DPF differential pressure sensor circuit tests, Exhaust System
P245400	Diesel particulate filter (DPF) differential pressure sensor circuit low	<p>Differential pressure sensor circuit: high resistance</p> <p>Differential pressure sensor circuit: short circuit to ground</p> <p>Differential pressure sensor failure</p>	For DPF differential pressure sensor circuit tests, Exhaust System
P245500	Diesel particulate filter (DPF) differential pressure sensor circuit high	<p>Differential pressure sensor circuit: short circuit to power</p> <p>Differential pressure sensor failure</p>	For DPF differential pressure sensor circuit tests, Exhaust System
P245600	Diesel particulate filter (DPF) differential pressure sensor circuit intermittent/erratic	<p>Differential pressure tubes/hoses split/leaking</p> <p>Differential pressure sensor circuit: high resistance</p> <p>Differential pressure sensor circuit: short circuit to ground</p> <p>Differential pressure sensor circuit: short</p>	For DPF differential pressure sensor circuit tests, Exhaust System

		circuit to power Differential pressure sensor failure	
P245900	Diesel particulate filter (DPF) regeneration frequency	Driving conditions not appropriate for DPF regeneration	Carry out DPF service remedy, Exhaust System
P250500	ECM relay circuit open	ECM relay circuit: high resistance ECM relay circuit: short circuit to ground ECM relay failure	For ECM relay and circuit tests, GO to Pinpoint Test G549822p26.
P250700	ECM relay circuit low	ECM relay circuit: high resistance ECM relay circuit: short circuit to ground ECM relay failure	For ECM relay and circuit tests, GO to Pinpoint Test G549822p26.
P250800	ECM relay circuit high	ECM relay circuit: short circuit to power ECM relay failure	For ECM relay and circuit tests, GO to Pinpoint Test G549822p26.
P250C00	Engine oil temperature (EOT) sensor circuit low	EOT sensor circuit: high resistance EOT sensor circuit: short circuit to ground EOT sensor failure ECM failure	For EOT sensor circuit tests, GO to Pinpoint Test G549822p3.
P250D00	Engine oil temperature (EOT) sensor circuit high	EOT sensor circuit: short circuit to power EOT sensor failure ECM failure	For EOT sensor circuit tests, GO to Pinpoint Test G549822p3.
P250E00	Engine oil temperature (EOT) sensor circuit intermittent/erratic	EOT sensor circuit: high resistance EOT sensor circuit: short circuit to ground EOT sensor circuit: short	For EOT sensor circuit tests, GO to Pinpoint Test G549822p3.

		circuit to power EOT sensor failure ECM failure	
P251D00	Engine shutdown circuit open	Inertia switch circuit: high resistance Inertia switch circuit: short circuit to ground Inertia switch circuit: short circuit to power Inertia switch failure	For inertia switch circuit tests, GO to Pinpoint Test G549822p25.
P251E00	Engine shutdown circuit low	Inertia switch circuit: high resistance Inertia switch circuit: short circuit to ground Inertia switch failure	For inertia switch circuit tests, GO to Pinpoint Test G549822p25.
P251F00	Engine shutdown circuit high	Inertia switch circuit: short circuit to power Inertia switch failure	For inertia switch circuit tests, GO to Pinpoint Test G549822p25.
P252E00	Engine oil temperature (EOT) sensor circuit intermittent/erratic	EOT sensor circuit: high resistance EOT sensor circuit: short circuit to ground EOT sensor circuit: short circuit to power EOT sensor failure ECM failure	For EOT sensor circuit tests, GO to Pinpoint Test G549822p3.
U000100	High speed CAN communication bus	CAN Mute	For network tests,
U007300	Control module communication bus off -	CAN Link circuit malfunction	For network tests,

	CAN bus off		
U010100	Lost communication with TCM - CAN timeout	CAN Link ECM/TCM CAN timeout	For network tests,
U010300	Lost communication with gear shift control module	CAN Link ECM/gear shift network malfunction	For network tests,
U010400	Lost communication with speed control module - CAN timeout	CAN Link ECM/Speed control module CAN timeout	For network tests,
U011700	Lost communication with inertia switch	CAN Link ECM/restraints control module (RCM) network malfunction	For network tests,
U012100	Lost communication with anti-lock brake system (ABS) control module	CAN Link ECM/ABS module network malfunction	For network tests,
U012200	Lost communication with stability assist module - CAN timeout	ECM/ASU compressor CAN timeout	For network tests,
U015500	Lost communication with instrument panel cluster (IPC) control module	CAN Link ECM/INSTCM network malfunction	For network tests,
U016400	Lost communication with heating ventilation and air conditioning (HVAC) control module	CAN Link ECM/HEVAC network malfunction	For network tests,
U016600	Lost communication with auxiliary heater control module (where fitted)	Fuel fired heater fitted/not configured	Configure the system using the Jaguar approved diagnostic system.
U016700	Lost communication with vehicle immobilizer control module	CAN timeout	For network tests,
U032600	Software incompatibility with vehicle immobilizer control module	Challenge does not match	For network tests,

U040500	Invalid data received from speed control module	ECM/Speed control module invalid data received	For network tests,
U041600	Invalid data received from stability assist module	ECM/ABS module invalid torque drag request	For network tests,

Pinpoint tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

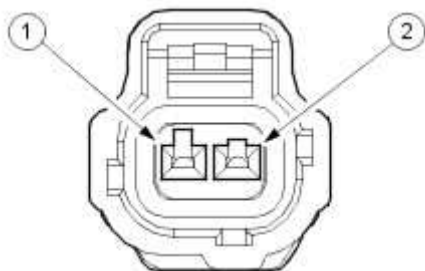
NOTE:

If DTCs are recorded and a fault is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

PINPOINT TEST G549822p1 : ENGINE COOLANT TEMPERATURE (ECT) SENSOR

G549822t1 : CHECK THE ECT PID VALUE

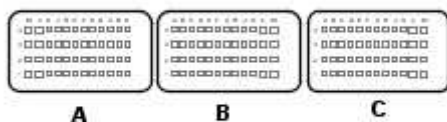
1.



E54259

Circuit	Pin
Engine coolant temperature sensor - signal	01
Engine coolant temperature sensor - return	02

2.



E54251

Circuit	Pin
Engine coolant temperature sensor - signal	C2
Engine coolant temperature sensor - return	E2

Resistance (ohms)	Temperature (degrees C)	Temperature (degrees F)	Volts
925021	-40	-40	4.8942
496051	-30	-22	4.8062
276959	-20	-04	4.6633
160313	-10	14	4.4454

123485	-5	23	4.3031
95851	0	32	4.1368
74914	5	41	3.9464
58987	10	50	3.7340
37340	20	68	3.2560
24253	30	86	2.7403
16113	40	104	2.2309
10926	50	122	1.7665
7548	60	140	1.3700
5335	70	158	1.0529
3837	80	176	0.8048
2804	90	194	0.6148
2080	100	212	0.4710
1564	110	230	0.3636
1191	120	248	0.2810
918	130	266	0.2194

3. Make sure that the engine is cold. 4. Key on, engine off. 5. Access the OBDII-engine coolant temperature PID using the Jaguar approved diagnostic system or a scan tool.

Is the ECT reading as expected for the current environmental and engine conditions?

-> Yes

GO to Pinpoint Test G549822t2.

-> No

GO to Pinpoint Test G549822t7.

G549822t2 : CHECK THE ECT PID VALUE DURING WARM UP

1. Key on, engine running. 2. Access the OBDII-engine coolant temperature PID using the Jaguar approved diagnostic system or a scan tool. 3. Increase the engine speed to 2,000 rpm and monitor the ECT reading until the engine is at full operating temperature.

Did the ECT reading rise smoothly to a value of between 80 and 95 degrees C (176 and 203 degrees F)?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> No

GO to Pinpoint Test G549822t3.

G549822t6 : CHECK FOR AN INTERMITTENT FAULT CONDITION

1.

Were there any sudden or unexpected changes in the PID readings?

-> Yes

Key off. GO to Pinpoint Test G549822t3.

-> No

GO to Pinpoint Test G549822t7.

G549822t3 : CHECK THE ECT PID VALUE

1. Key on, engine off. 2. Access the OBDII-engine coolant temperature PID using the Jaguar approved diagnostic system or a scan tool. 3. Check the ECT harness wiring and connectors for loose connections and water ingress. Monitoring the temperature readings for sudden changes while handling the harness and connectors may help in isolation of these types of fault.

Did you identify any loose connections or water ingress in the ECT harness wiring or connectors?

-> Yes

REPAIR the fault as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

-> No

GO to Pinpoint Test G549822t7.

G549822t7 : CHECK THE ECT SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECT sensor connector, C34. 3. Key on, engine off. 4. Measure the resistance between:

C34, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t8.

-> No

GO to Pinpoint Test G549822t4.

G549822t4 : CHECK THE ECT SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C34, harness side	Battery
Pin 02	Positive terminal

Is the resistance geater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t5.

-> No

GO to Pinpoint Test G549822t14.

G549822t5 : CHECK THE ECT SENSOR TO ECM RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C34, harness side	C101, harness side
Pin 02	Pin E2

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t8 : CHECK THE ECT SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C34, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t9.

-> No

GO to Pinpoint Test G549822t12.

G549822t9 : CHECK THE ECT SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C34, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t10.

-> No

GO to Pinpoint Test G549822t15.

G549822t10 : CHECK THE ECT SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C34, harness side	C101, harness side
Pin 01	Pin C2

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t11.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t11 : CHECK THE COMPONENT RESISTANCE

1. Measure the resistance between:

C34, component side	C34, component side
Pin 01	Pin 02

Is the resistance between 1 - 500 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECT connector - ECT sensor - ECM connector - ECM

-> No

INSTALL a new ECT sensor.

Engine Coolant Temperature (ECT) Sensor (18.30.10) Clear any DTCs, test the system for normal operation.

G549822t12 : CHECK THE ECT SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C34, harness side	C34, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t13.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t13 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

C34, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t14 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C34, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t15 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C34, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

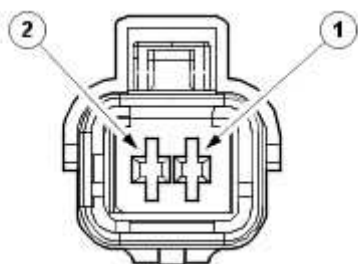
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p2 : FUEL TEMPERATURE SENSOR

G549822t16 : CHECK THE FUEL TEMPERATURE PID VALUE

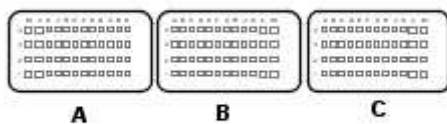
1.



E54260

Circuit	Pin
Fuel temperature sensor - signal	01
Fuel temperature sensor - return	02

2.



E54251

Circuit	Pin
Fuel temperature sensor - signal	B2
Fuel temperature sensor - return	G3

Temperature (degrees C)	Temperature (degrees F)	Volts
-40	-40	4.9701
-30	-22	4.9436
-20	-04	4.8983
0	32	4.7104

20	68	4.3092
40	104	3.6210
60	140	2.7528
80	176	1.8951
100	212	1.2389
120	248	0.7947
130	266	0.6362
150	302	0.4115

3. Make sure that the engine is cold. 4. Key on, engine off. 5. Access the ECM-fuel temperature PID using the Jaguar approved diagnostic system or a scan tool.

There are two PIDs accessible for the fuel temperature sensor, the actual reading PID, and another for limp-home. The limp-home PID is a default value, so is fixed. Make sure the actual reading PID is used.

Is the PID reading as expected for the current environmental and engine conditions?

-> Yes

GO to Pinpoint Test G549822t17.

-> No

GO to Pinpoint Test G549822t20.

G549822t17 : CHECK THE FUEL TEMPERATURE PID VALUE DURING WARM UP

1. Key on, engine running. 2. Access the ECM-fuel temperature and OBDII-engine coolant temperature PIDs using the Jaguar approved diagnostic system or a scan tool.

There are two PIDs accessible for the fuel temperature sensor, the actual reading PID, and another for limp-home. The limp-home PID is a default value, so is fixed. Make sure the actual reading PID is used. 3. Increase the engine speed to 2,000 rpm and monitor the fuel temperature reading, until the engine is at full operating temperature.

Did the fuel temperature reading rise smoothly and by more than 10 degrees C (50 degrees F)?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> **No**

GO to Pinpoint Test G549822t18.

G549822t18 : CHECK THE FUEL TEMPERATURE PID VALUE

1.

There are two PIDs accessible for the fuel temperature sensor, the actual reading PID, and another for limp-home. The limp-home PID is a default value, so is fixed. Make sure the actual reading PID is used.

Were there any sudden or unexpected changes in the fuel temperature readings?

-> **Yes**

Key off. GO to Pinpoint Test G549822t19.

-> **No**

GO to Pinpoint Test G549822t20.

G549822t19 : CHECK FOR AN INTERMITTENT FAULT CONDITION

1. Key on, engine off. 2. Access the ECM-fuel temperature PID using the Jaguar approved diagnostic system or a scan tool. 3. Check the fuel temperature harness wiring and connectors for loose connections and water ingress. Monitoring the temperature readings for sudden changes while handling the harness and connectors may help in isolation of these types of fault.

Did you identify any loose connections or water ingress in the fuel temperature harness wiring or connectors?

-> **Yes**

REPAIR the fault as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

-> **No**

GO to Pinpoint Test G549822t20.

G549822t20 : CHECK THE FUEL TEMPERATURE SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the fuel temperature sensor connector, C35. 3. Key on, engine off. 4. Measure the resistance between:

C35, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t23.

-> No

GO to Pinpoint Test G549822t21.

G549822t21 : CHECK THE FUEL TEMPERATURE SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C35, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t22.

-> No

GO to Pinpoint Test G549822t30.

G549822t22 : CHECK THE FUEL TEMPERATURE SENSOR TO ECM RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C35, harness side	C101, harness side
Pin 02	Pin G3

Is the resistance less than 10 ohms?

-> Yes

Suspect: - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t23 : CHECK THE VOLTAGE DIFFERENTIAL BETWEEN THE SIGNAL AND RETURN CIRCUITS

1. Measure the voltage between:

C35, harness side	C35, harness side
Pin 01	Pin 02

Is the voltage between 4.8 - 5.2 volts?

-> Yes

GO to Pinpoint Test G549822t27.

-> No

GO to Pinpoint Test G549822t24.

G549822t24 : CHECK THE FUEL TEMPERATURE SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C35, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t25.

-> No

GO to Pinpoint Test G549822t28.

G549822t25 : CHECK THE FUEL TEMPERATURE SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C35, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t26.

-> **No**

GO to Pinpoint Test G549822t31.

G549822t26 : CHECK THE FUEL TEMPERATURE SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C35, harness side	C101, harness side
Pin 01	Pin B2

Is the resistance less than 10 ohms?

-> **Yes**

Suspect: - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t27 : CHECK THE COMPONENT RESISTANCE

1. Measure the resistance between:

C35, component side	C35, component side
Pin 01	Pin 02

Is the resistance between 1 - 500 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel temperature connector - Fuel temperature sensor - ECM connector - ECM

-> No

INSTALL a new fuel temperature sensor.
Fuel Temperature Sensor (18.30.99)

G549822t28 : CHECK THE FUEL TEMPERATURE SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C35, harness side	C35, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t29.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t29 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

C35, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t30 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C35, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t31 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C35, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p3 : ENGINE OIL TEMPERATURE (EOT) SENSOR

G549822t32 : CHECK THE EOT PID VALUE

1. Engine oil temperature (EOT) sensor connector, C28

Circuit	Pin
Engine oil temperature sensor - signal	01
Engine oil temperature sensor - return	02

2. Engine control module (ECM) connector, C100

Circuit	Pin
Engine oil temperature sensor - signal	A1
Engine oil temperature sensor - return	K1

3. Make sure that the engine is cold. 4. Key on, engine off. 5. Access the ECM-Engine oil temperature PID using the Jaguar approved diagnostic system or a scan tool.

Is the EOT reading as expected for the current enviromental and engine conditions?

-> **Yes**

GO to Pinpoint Test G549822t33.

-> **No**

GO to Pinpoint Test G549822t36.

G549822t33 : CHECK THE EOT PID VALUE DURING WARM UP

1. Key on, engine running. 2. Access the ECM-Engine oil temperature and OBDII-Engine coolant temperature PIDs using the Jaguar approved diagnostic system or a scan tool. 3. Increase the engine speed to 2,000 rpm and monitor the EOT reading, until the engine is at full operating temperature.

Did the EOT reading rise smoothly and by more than 20 degrees C (68 degrees F)?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> No

GO to Pinpoint Test G549822t35.

G549822t34 : CHECK FOR AN INTERMITTENT FAULT CONDITION

1.

Were there any sudden or unexpected changes in the EOT readings?

-> Yes

Key off. GO to Pinpoint Test G549822t35.

-> No

GO to Pinpoint Test G549822t36.

G549822t35 : CHECK THE EOT PID VALUE

1. Key on, engine off. 2. Access the ECM-Engine oil temperature PID using the Jaguar approved diagnostic system or a scan tool. 3. Check the EOT harness wiring and connectors for loose connections and water ingress. Monitoring the temperature readings for sudden changes while handling the harness and connectors may help in isolation of these types of fault.

Did you identify any loose connections or water ingress in the EOT harness wiring or connectors?

-> Yes

REPAIR the fault as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

-> No

GO to Pinpoint Test G549822t36.

G549822t36 : CHECK THE EOT SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the EOT sensor connector, C28. 3. Key on, engine off. 4. Measure the resistance between:

C28, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t39.

-> No

GO to Pinpoint Test G549822t37.

G549822t37 : CHECK THE EOT SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C28, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t38.

-> No

GO to Pinpoint Test G549822t45.

G549822t38 : CHECK THE EOT SENSOR TO ECM RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C28, harness side	C100, harness side
Pin 02	Pin K1

Is the resistance less than 10 ohms?

-> Yes

Suspect: - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t39 : CHECK THE EOT SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C28, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t40.

-> No

GO to Pinpoint Test G549822t43.

G549822t40 : CHECK THE EOT SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C28, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t41.

-> No

GO to Pinpoint Test G549822t46.

G549822t41 : CHECK THE EOT SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Measure the resistance between:

C28, harness side	C100, harness side
Pin 01	Pin A1

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t42.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t42 : CHECK THE COMPONENT RESISTANCE

1. Measure the resistance between:

C28, component side	C28, component side
Pin 01	Pin 02

Is the resistance between 1 - 500 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - EOT connector - EOT sensor - ECM connector - ECM

-> No

INSTALL a new EOT sensor. Clear any DTCs, test the system for normal operation.

G549822t43 : CHECK THE EOT SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C28, harness side	C28, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t44.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t44 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

C28, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t45 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C28, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t46 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C100. 3. Key on, engine off. 4. Measure the resistance between:

C28, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

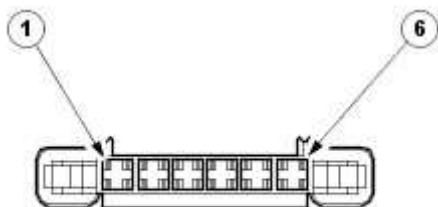
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p4 : ACCELERATOR PEDAL POSITION (APP) SENSOR 1

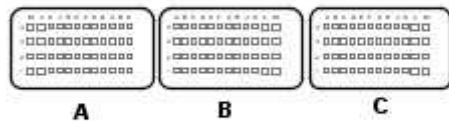
G549822t47 : CHECK THE APP1 VALUE, WITH THE ACCELERATOR PEDAL RELEASED

1.



Circuit	Pin
Accelerator pedal position sensor 1 - signal	04
Accelerator pedal position sensor 1 - power	05
Accelerator pedal position sensor 1 - return	03

2.



E54251

Circuit	Pin
Accelerator pedal position sensor 1 - signal	D1
Accelerator pedal position sensor 1 - power	E1
Accelerator pedal position sensor 1 - return	C1

3. Key on, engine off. 4. Make sure the accelerator pedal is released. 5. Access the ECM-Pedal position sensor 1 (voltage) PID using the Jaguar approved diagnostic system or a scan tool.

Is the voltage between 0 - 1 volts?

-> Yes

GO to Pinpoint Test G549822t85.

-> No

GO to Pinpoint Test G549822t86.

G549822t85 : CHECK THE APP1 VALUE, WITH THE ACCELERATOR FULLY DEPRESSED

1. Make sure the accelerator pedal is fully depressed. 2. Access the ECM-Pedal position sensor 1 (voltage) PID using the Jaguar approved diagnostic system or a scan tool.

Is the voltage between 2.2 - 2.7 volts?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> No

GO to Pinpoint Test G549822t86.

G549822t86 : CHECK THE APP1 SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the APP sensor connector, CR14. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t87.

-> No

GO to Pinpoint Test G549822t104.

G549822t87 : CHECK FOR POWER TO THE APP1 SENSOR

1. Measure the voltage between:

CR14, harness side	Battery
Pin 05	Negative terminal

Is the voltage between 4.8 - 5.2 volts?

-> Yes

GO to Pinpoint Test G549822t88.

-> **No**

GO to Pinpoint Test G549822t96.

G549822t88 : CHECK THE APP1 SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

CR14, harness side	Battery
Pin 04	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t89.

-> **No**

GO to Pinpoint Test G549822t92.

G549822t89 : CHECK THE APP1 SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR14, harness side	Battery
Pin 04	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t90.

-> **No**

GO to Pinpoint Test G549822t94.

G549822t90 : CHECK THE APP1 SIGNAL AND POWER CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 04	Pin 05

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t91.

-> No

GO to Pinpoint Test G549822t95.

G549822t91 : CHECK THE APP1 SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

CR14, harness side	EC66, harness side
Pin 04	Pin D1

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - APP connector - APP sensor - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t92 : CHECK THE APP1 SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 04	Pin 03

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t93.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t93 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

CR14, harness side	Battery
Pin 04	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t94 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 04	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t95 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 04	Pin 05
Pin 04	Pin 03

Are the resistances greater than 100 Kohms?

-> Yes

Suspect: -ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t96 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

CR14, harness side	Battery
Pin 05	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t97.

-> **No**

GO to Pinpoint Test G549822t101.

G549822t97 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR14, harness side	Battery
Pin 05	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t98.

-> **No**

GO to Pinpoint Test G549822t103.

G549822t98 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

CR14, harness side	EC66, harness side
Pin 05	Pin E1

Is the resistance less than 10 ohms?

-> **Yes**

Suspect : - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t99 : CHECK THE APP1 SUPPLY AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 05	Pin 03

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t100.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t100 : CHECK THE APP1 SENSOR TO ECM RETURN CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

CR14, harness side	EC66, harness side
Pin 03	Pin C1

Is the resistance less than 10 ohms?

-> Yes

Suspect : - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t101 : CHECK THE APP1 SUPPLY AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 05	Pin 03

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t102.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t102 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

CR14, harness side	Battery
Pin 05	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t103 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 05	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t104 : CHECK THE APP1 SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR14, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t99.

-> No

GO to Pinpoint Test G549822t105.

G549822t105 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

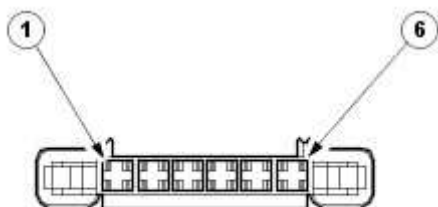
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p5 : ACCELERATOR PEDAL POSITION (APP) SENSOR 2

G549822t48 : CHECK THE APP2 VALUE, WITH THE ACCELERATOR PEDAL RELEASED

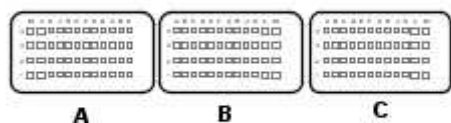
1.



E54270

Circuit	Pin
Accelerator pedal position sensor 2 - signal	01
Accelerator pedal position sensor 2 - power	02
Accelerator pedal position sensor 2 - return	06

2.



E54251

Circuit	Pin
Accelerator pedal position sensor 2 - signal	C2
Accelerator pedal position sensor 2 - power	D2

Accelerator pedal position sensor 2 - return	B2
--	----

3. Key on, engine off. 4. Make sure the accelerator pedal is released. 5. Access the ECM-Pedal position sensor 2 (voltage) PID using the Jaguar approved diagnostic system or a scan tool.

Is the voltage between 3 - 5 volts?

-> Yes

GO to Pinpoint Test G549822t106.

-> No

GO to Pinpoint Test G549822t107.

G549822t106 : CHECK THE APP2 VALUE, WITH THE ACCELERATOR FULLY DEPRESSED

1. Make sure the accelerator pedal is fully depressed. 2. Access the ECM-Pedal position sensor 2 (voltage) PID using the Jaguar approved diagnostic system or a scan tool.

Is the voltage between 2.2 - 2.7 volts?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> No

GO to Pinpoint Test G549822t107.

G549822t107 : CHECK THE APP2 SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the APP sensor connector, CR14. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 06	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t108.

-> **No**

GO to Pinpoint Test G549822t120.

G549822t108 : CHECK THE SUPPLY TO THE APP2 SENSOR

1. Measure the voltage between:

CR14, harness side	Battery
Pin 02	Negative terminal

Is the voltage between 4.8 - 5.2 volts?

-> **Yes**

GO to Pinpoint Test G549822t109.

-> **No**

GO to Pinpoint Test G549822t117.

G549822t109 : CHECK THE APP2 SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

CR14, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t110.

-> **No**

GO to Pinpoint Test G549822t113.

G549822t110 : CHECK THE APP2 SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR14, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t111.

-> No

GO to Pinpoint Test G549822t115.

G549822t111 : CHECK THE APP2 SIGNAL AND POWER CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t112.

-> No

GO to Pinpoint Test G549822t116.

G549822t112 : CHECK THE APP2 SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

CR14, harness side	EC66, harness side
---------------------------	---------------------------

Pin 01	Pin C2
--------	--------

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - APP connector - APP sensor - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t113 : CHECK THE APP2 SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 01	Pin 06

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t114.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t114 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

CR14, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t115 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t116 : CHECK WHETHER SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: -ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t117 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

CR14, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t118.

-> **No**

GO to Pinpoint Test G549822t123.

G549822t118 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR14, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t119.

-> **No**

GO to Pinpoint Test G549822t125.

G549822t119 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

CR14, harness side	EC66, harness side
Pin 02	Pin D2

Is the resistance less than 10 ohms?

-> Yes

Suspect : - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t120 : CHECK THE APP2 SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR14, harness side	Battery
Pin 06	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t121.

-> No

GO to Pinpoint Test G549822t126.

G549822t121 : CHECK THE APP2 SUPPLY AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 02	Pin 06

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t122.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t122 : CHECK THE APP2 SENSOR TO ECM RETURN CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

CR14, harness side	EC66, harness side
Pin 06	Pin B2

Is the resistance less than 10 ohms?

-> Yes

Suspect : - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t123 : CHECK THE APP2 SUPPLY AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 02	Pin 06

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t124.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t124 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

CR14, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t125 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t126 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 06	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

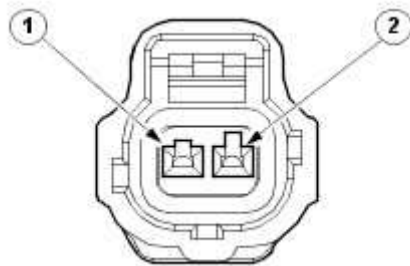
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p6 : AIR CHARGE TEMPERATURE (ACT) SENSOR

G549822t49 : CHECK THE ACT SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

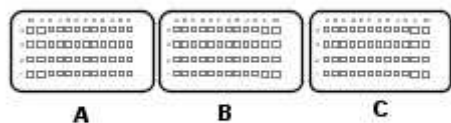
1.



E54262

Circuit	Pin
Air charge temperature sensor - signal	01
Air charge temperature sensor - return	02

2.



E54251

Circuit	Pin
Air charge temperature sensor - signal	B1
Air charge temperature sensor - return	G3

Resistance (ohms)	Temperature (degrees C)	Temperature (degrees F)	Volts
209603	-40	-40	4.9179
120372	-30	-22	4.8587
71668	-20	-04	4.7672
44087	-10	14	4.6323
27936	0	32	4.4433
18187	10	50	4.1931
12136	20	68	3.8808
8284	30	86	3.5149
5774	40	104	3.1130
4103	50	122	2.6983
2967	60	140	2.2940
2182	70	158	1.9201
1628	80	176	1.5874

1233	90	194	1.3026
949	100	212	1.0639
735	110	230	0.8678
578	120	248	0.7087
459	130	266	0.5797

3. Key off. 4. Disconnect the ACT sensor connector, C69. 5. Key on, engine off. 6. Measure the resistance between:

C69, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t52.

-> No

GO to Pinpoint Test G549822t50.

G549822t50 : CHECK THE ACT SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C69, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t51.

-> **No**

GO to Pinpoint Test G549822t59.

G549822t51 : CHECK THE ACT SENSOR TO ECM RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C69, harness side	C101, harness side
Pin 02	Pin G3

Is the resistance less than 10 ohms?

-> **Yes**

Suspect: - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t52 : CHECK FOR POWER TO THE ACT SENSOR

1. Measure the voltage between:

C69, harness side	Battery
Pin 01	Negative terminal

Is the voltage between 4.8 - 5.2 volts?

-> **Yes**

GO to Pinpoint Test G549822t56.

-> **No**

GO to Pinpoint Test G549822t53.

G549822t53 : CHECK THE ACT SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C69, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t54.

-> No

GO to Pinpoint Test G549822t57.

G549822t54 : CHECK THE ACT SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C69, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t55.

-> No

GO to Pinpoint Test G549822t60.

G549822t55 : CHECK THE ACT SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C69, harness side	C101, harness side
Pin 01	Pin B1

Is the resistance less than 10 ohms?

-> **Yes**

Suspect: - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t56 : CHECK THE COMPONENT RESISTANCE

1. Measure the resistance between:

C69, component side	C69, component side
Pin 01	Pin 02

Is the resistance between 578 ohms - 71 Kohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ACT connector. - ACT sensor. - ECM connector. - ECM

-> **No**

INSTALL a new ACT sensor.

G549822t57 : CHECK THE ACT SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C69, harness side	C69, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t58.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t58 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key on, engine off. 2. Measure the resistance between:

C69, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t59 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C69, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t60 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C69, harness side	Battery
--------------------------	----------------

Pin 01	Positive terminal
--------	-------------------

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

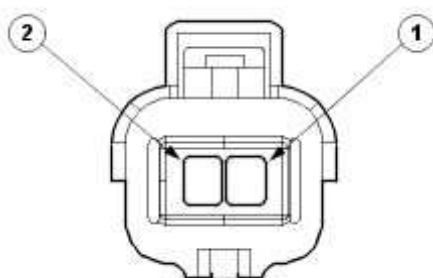
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p7 : KNOCK SENSOR (KS) (RIGHT HAND BANK)

G549822t61 : CHECK THE KS CIRCUIT(S) FOR SHORT CIRCUIT TO GROUND

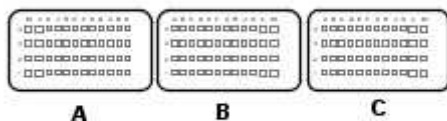
1.



E54263

Circuit	Pin
Knock sensor - positive	01
Knock sensor - negative	02

2.



E54251

Circuit	Pin
Knock sensor - positive	E4
Knock sensor - negative	D4

3. Key off. 4. Disconnect the right hand bank KS connector, C87. 5. Disconnect the ECM connector, C100. 6. Measure the resistance between:

C87, harness side	Battery
Pin 01	Negative terminal
Pin 02	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t62.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t62 : CHECK THE KS CIRCUIT(S) FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the resistance between:

C87, harness side	Battery
Pin 01	Positive terminal
Pin 02	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t63.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t63 : CHECK THE KS SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

C87, harness side	C87, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t64.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t64 : CHECK THE KS CIRCUIT(S) FOR HIGH RESISTANCE

1. Measure the resistance between:

C87, harness side	C100, harness side
Pin 01	Pin E4
Pin 02	Pin D4

Are the resistances less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - KS connector - KS sensor - ECM connector - ECM

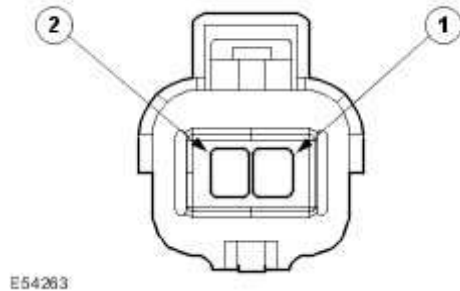
-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p8 : KNOCK SENSOR (KS) (LEFT HAND BANK)

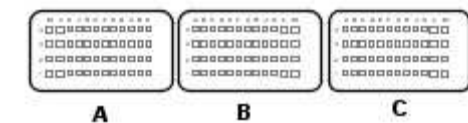
G549822t65 : CHECK THE KS CIRCUIT(S) FOR SHORT CIRCUIT TO GROUND

1.



Circuit	Pin
Knock sensor - positive	01
Knock sensor - negative	02

2.



Circuit	Pin
Knock sensor - positive	D3
Knock sensor - negative	C4

3. Key off. 4. Disconnect the left hand bank KS connector, C88. 5. Disconnect the ECM connector, C100. 6. Measure the resistance between:

C88, harness side	Battery
Pin 01	Negative terminal

Pin 02	Negative terminal
--------	-------------------

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t66.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t66 : CHECK THE KS CIRCUIT(S) FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the resistance between:

C88, harness side	Battery
Pin 01	Positive terminal
Pin 02	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t67.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t67 : CHECK THE KS SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

C88, harness side	C88, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t68.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t68 : CHECK THE KS CIRCUIT(S) FOR HIGH RESISTANCE

1. Measure the resistance between:

C88, harness side	C100, harness side
Pin 01	Pin D3
Pin 02	Pin C4

Are the resistances less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - KS connector - KS sensor - ECM connector - ECM

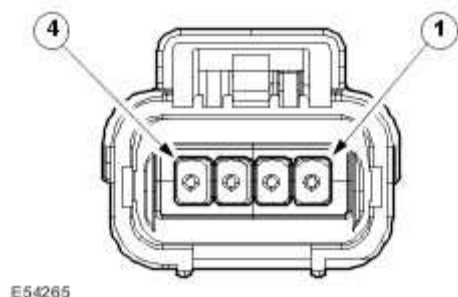
-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p9 : INTAKE AIR TEMPERATURE (IAT) SENSOR

G549822t69 : CHECK THE IAT PID VALUE

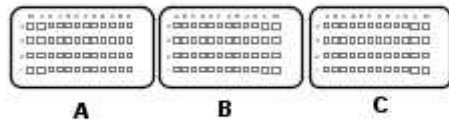
1.



E54265

Circuit	Pin
Intake air temperature sensor - signal	02
Intake air temperature sensor - return	03

2.



E54251

Circuit	Pin
Intake air temperature - return	L4
Intake air temperature - signal	F1
Mass air flow sensor - return	L4

Resistance (ohms)	Temperature (degrees C)	Temperature (degrees F)	Volts
44373	-40	-40	4.7844
25572	-30	-22	4.6373
15141	-20	-04	4.4166
9202	-10	14	4.1073
5774	0	32	3.7137
3714	10	50	3.2499
2448	20	68	2.7518
1671	30	86	2.2759

1150	40	104	1.8254
816.5	50	122	1.4497
583.1	60	140	1.1287
426.1	70	158	0.8792
315.8	80	176	0.6818
238.1	90	194	0.5319
182.8	100	212	0.4187
141.2	110	230	0.3297
110.3	120	248	0.2613
87.45	130	266	0.2095

3. Make sure that the engine is cold. 4. Key on, engine off. 5. Access the ECM-Intake air temperature PID using the Jaguar approved diagnostic system or a scan tool.

Is the IAT reading as expected for the current environmental and engine conditions?

-> Yes

GO to Pinpoint Test G549822t70.

-> No

GO to Pinpoint Test G549822t73.

G549822t70 : CHECK THE IAT PID VALUE AT INCREASED RPM

1. Key on, engine running. 2. Access the ECM-Intake air temperature PID using the Jaguar approved diagnostic system or a scan tool. 3. Slowly increase the engine speed to 4,000 rpm while monitoring the IAT reading.

Did the IAT reading rise smoothly?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> No

GO to Pinpoint Test G549822t71.

G549822t71 : CHECK FOR AN INTERMITTENT FAULT CONDITION

1.

Were there any sudden or unexpected changes in the IAT readings?

-> **Yes**

Key off. GO to Pinpoint Test G549822t72.

-> **No**

GO to Pinpoint Test G549822t73.

G549822t72 : CHECK THE IAT PID VALUE

1. Key on, engine off. 2. Access the ECM-Intake air temperature PID using the Jaguar approved diagnostic system or a scan tool. 3. Check the IAT harness wiring and connectors for loose connections and water ingress. Monitoring the temperature readings for sudden changes, while handling the harness and connectors, may help in isolation of these types of fault.

Did you identify any loose connections or water ingress in the IAT harness wiring or connectors?

-> **Yes**

REPAIR the fault as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

-> **No**

GO to Pinpoint Test G549822t73.

G549822t73 : CHECK THE IAT SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the MAF1 sensor connector, EC67. 3. Key on, engine off. 4. Measure the resistance between:

EC67, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G549822t76.

-> **No**

GO to Pinpoint Test G549822t74.

G549822t74 : CHECK THE IAT SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

EC67, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t75.

-> **No**

GO to Pinpoint Test G549822t83.

G549822t75 : CHECK THE IAT SENSOR TO ECM RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

EC67, harness side	EC66, harness side
Pin 03	Pin L4

Is the resistance less than 10 ohms?

-> **Yes**

Suspect: - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t76 : CHECK FOR POWER TO THE IAT SENSOR

1. Key on, engine off. 2. Measure the voltage between:

EC67, harness side	Battery
Pin 02	Negative terminal

Is the voltage between 4.8 volts - 5.2 volts?

-> **Yes**

GO to Pinpoint Test G549822t80.

-> **No**

GO to Pinpoint Test G549822t77.

G549822t77 : CHECK THE IAT SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

EC67, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t78.

-> **No**

GO to Pinpoint Test G549822t81.

G549822t78 : CHECK THE IAT SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the resistance between:

EC67, harness side	Battery
---------------------------	----------------

Pin 02	Positive terminal
--------	-------------------

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t79.

-> No

GO to Pinpoint Test G549822t84.

G549822t79 : CHECK THE IAT SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

EC67, harness side	EC66, harness side
Pin 02	Pin F1

Is the resistance less than 10 ohms?

-> Yes

Suspect: - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t80 : CHECK THE COMPONENT RESISTANCE

1. Measure the resistance between:

EC67, component side	EC67, component side
Pin 02	Pin 03

Is the resistance between 150 ohms - 15 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - MAF1 connector - MAF1 sensor - ECM connector - ECM

-> **No**

INSTALL a new MAF1 sensor.

Mass Air Flow (MAF) Sensor (18.30.15)

G549822t81 : CHECK THE IAT SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

EC67, harness side	EC67, harness side
Pin 02	Pin 03

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t82.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t82 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

EC67, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t83 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

EC67, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t84 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

EC67, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

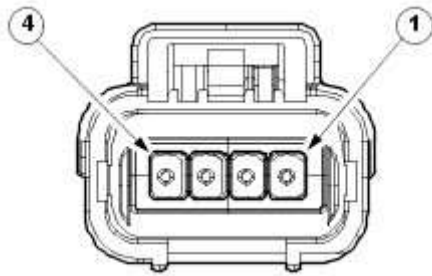
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p10 : MASS AIR FLOW (MAF) SENSOR (RIGHT HAND BANK)

G549822t127 : CHECK THE MAF PID VALUE

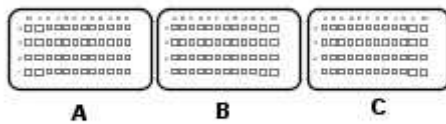
1.



E54265

Circuit	Pin
Mass air flow sensor - signal	01
Mass air flow sensor - return	03
ECM relay controlled 12 volt supply	04

2.



E54251

Circuit	Pin
Mass air flow sensor - signal	F4
Mass air flow sensor - return	L4

3. Key on, engine running. 4. Access the ECM-Right hand bank mass air flow sensor signal frequency PID using the Jaguar approved diagnostic system or a scan tool.

Is the Hot\$MAF between 4 g/sec - 18 g/sec?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> No

GO to Pinpoint Test G549822t128.

G549822t128 : CHECK THE MAF PID VALUE

1. Access the ECM-Right hand bank mass air flow sensor signal frequency PID using the Jaguar approved diagnostic system or a scan tool.

Is the Hot\$MAF less than 4 g/sec?

-> **Yes**

GO to Pinpoint Test G549822t130.

-> **No**

GO to Pinpoint Test G549822t129.

G549822t129 : CHECK FOR AIR LEAKAGE BETWEEN THE TURBOCHARGER AND THE RIGHT HAND BANK MAF SENSOR

1. Key off. 2. Check for air leakage between the turbocharger and the right hand bank MAF sensor.
Intake Air Distribution and Filtering

Are there any air leaks?

-> **Yes**

REPAIR the fault as necessary. Clear any DTCs, test the system for normal operation.

-> **No**

GO to Pinpoint Test G549822t131.

G549822t130 : CHECK FOR OIL INGESTION

1. Key off. 2. Check for oil ingestion via the engine manifold.

Is there any oil ingestion?

-> **Yes**

REPAIR/INSTALL a new right hand bank MAF sensor.

Mass Air Flow (MAF) Sensor (18.30.15) Check/rectify any external oil leaks.

-> **No**

GO to Pinpoint Test G549822t131.

G549822t131 : CHECK THE COMPONENT RESISTANCE

1. Disconnect the right hand bank MAF sensor connector, EC67. 2. Measure the resistance between:

EC67, component side	EC67, component side
Pin 04	Pin 03

Is the resistance between 120 - 130 Kohms?

-> Yes

GO to Pinpoint Test G549822t132.

-> No

INSTALL a new right hand bank MAF sensor.

Mass Air Flow (MAF) Sensor (18.30.15)

G549822t132 : CHECK THE SUPPLY TO THE MAF SENSOR

1. Key on, engine off. 2. Measure the voltage between:

EC67, harness side	Battery
Pin 04	Negative terminal

Is the voltage between 9 - 15 volts?

-> Yes

GO to Pinpoint Test G549822t133.

-> No

REPAIR the ECM to right hand bank MAF sensor supply circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t133 : CHECK THE MAF SENSOR CIRCUIT(S) FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

EC67, harness side	Battery
Pin 03	Negative terminal
Pin 01	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t134.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t134 : CHECK THE MAF SENSOR CIRCUIT(S) FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

EC67, harness side	Battery
Pin 03	Positive terminal
Pin 01	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t135.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t135 : CHECK THE MAF SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

EC67, harness side	EC67, harness side
Pin 01	Pin 03

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t136.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t136 : CHECK THE MAF SENSOR CIRCUIT(S) FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

EC67, harness side	EC66, harness side
Pin 03	Pin L4
Pin 01	Pin F4

Are the resistances less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - MAF connector - MAF sensor - ECM connector - ECM

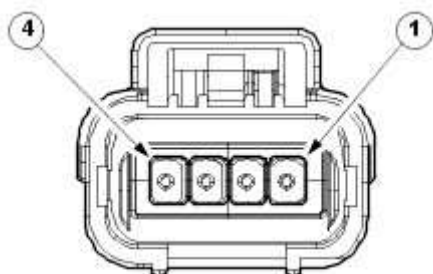
-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p11 : MASS AIR FLOW (MAF) SENSOR (LEFT HAND BANK)

G549822t137 : CHECK THE MAF PID VALUE

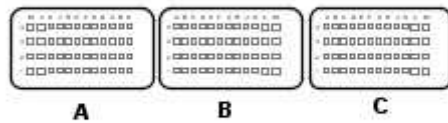
1.



E54265

Circuit	Pin
Mass air flow sensor - signal	02
Mass air flow sensor - return	03
ECM relay controlled 12 volt supply	04

2.



E54251

Circuit	Pin
Mass air flow sensor - signal	G4
Mass air flow sensor - return	L4

3. Key on, engine running. 4. Access the ECM-Left hand bank mass air flow sensor signal frequency PID using the Jaguar approved diagnostic system or a scan tool.

Is the Hot\$MAF between 4 g/sec - 18 g/sec?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> No

GO to Pinpoint Test G549822t138.

G549822t138 : CHECK THE MAF PID VALUE

1. Access the ECM-Left hand bank mass air flow sensor signal frequency PID using the Jaguar approved diagnostic system or a scan tool.

Is the Hot\$MAF less than 4 g/sec?

-> **Yes**

GO to Pinpoint Test G549822t140.

-> **No**

GO to Pinpoint Test G549822t139.

G549822t139 : CHECK FOR AIR LEAKAGE BETWEEN THE TURBOCHARGER AND THE LEFT HAND BANK MAF SENSOR

1. Key off. 2. Check for air leakage between the turbocharger and the left hand bank MAF sensor.

Intake Air Distribution and Filtering

Are there any air leaks?

-> **Yes**

REPAIR the fault as necessary. Clear any DTCs, test the system for normal operation.

-> **No**

GO to Pinpoint Test G549822t141.

G549822t140 : CHECK FOR OIL INGESTION

1. Key off. 2. Check for oil ingestion via the engine manifold.

Is there any oil ingestion?

-> **Yes**

REPAIR/INSTALL a new left hand bank MAF sensor.

Mass Air Flow (MAF) Sensor (18.30.15) Check/rectify any external oil leaks.

-> **No**

GO to Pinpoint Test G549822t141.

G549822t141 : CHECK THE COMPONENT RESISTANCE

1. Disconnect the left hand bank MAF sensor connector, EC68. 2. Measure the resistance between:

EC68, component side	EC68, component side
Pin 04	Pin 03

Is the resistance between 120 - 130 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t142.

-> **No**

INSTALL a new left hand bank MAF sensor.

Mass Air Flow (MAF) Sensor (18.30.15)

G549822t142 : CHECK THE SUPPLY TO THE MAF SENSOR

1. Key on, engine off. 2. Measure the voltage between:

EC68, harness side	Battery
Pin 04	Negative terminal

Is the voltage between 9 - 15 volts?

-> **Yes**

GO to Pinpoint Test G549822t143.

-> **No**

REPAIR the ECM to left hand bank MAF sensor supply circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t143 : CHECK THE MAF SENSOR CIRCUIT(S) FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

EC68, harness side	Battery
Pin 03	Negative terminal
Pin 01	Negative terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t144.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t144 : CHECK THE MAF SENSOR CIRCUIT(S) FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

EC68, harness side	Battery
Pin 03	Positive terminal
Pin 01	Positive terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t145.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t145 : CHECK THE MAF SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

EC68, harness side	EC68, harness side
Pin 01	Pin 03

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t146.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t146 : CHECK THE MAF SENSOR CIRCUIT(S) FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

EC68, harness side	EC66, harness side
Pin 03	Pin L4
Pin 01	Pin G4

Are the resistances less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - MAF connector - MAF sensor - ECM connector - ECM

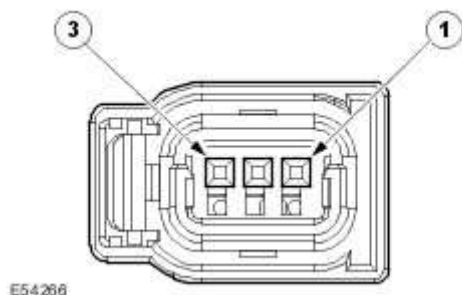
-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p12 : MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

G549822t244 : CHECK THE MAP SENSOR CONNECTOR FOR PHYSICAL DAMAGE OR CORROSION

1.

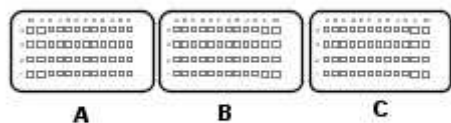


E54266

Circuit	Pin
Manifold absolute pressure sensor - signal	02
Manifold absolute pressure sensor - power	01

Manifold absolute pressure sensor - return	03
--	----

2.



E54251

Circuit	Pin
Manifold absolute pressure sensor - signal	C1
Manifold absolute pressure sensor - power	D1
Manifold absolute pressure sensor - return	E2

3. Inspect the sensor for damage, correct fitment, connection, etc.

Is the sensor correctly installed and in good condition?

-> **Yes**

GO to Pinpoint Test G549822t243.

-> **No**

CHECK and rectify as necessary.

Manifold Absolute Pressure (MAP) Sensor (18.30.86)

G549822t243 : CHECK THE MAP PID VALUE

1. Key on, engine running. 2. Access the OBDII-Intake manifold absolute pressure PID using the Jaguar approved diagnostic system or a scan tool. 3. Slowly increase the engine speed to 1,500 rpm while monitoring the MAP reading.

Did the pressure increase smoothly as the engine speed was increased?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> **No**

GO to Pinpoint Test G549822t147.

G549822t147 : CHECK THE MAP SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the MAP sensor connector, C31. 3. Measure the resistance between:

C31, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G549822t148.

-> **No**

GO to Pinpoint Test G549822t159.

G549822t148 : CHECK THE SUPPLY TO THE MAP SENSOR

1. Key on, engine off. 2. Measure the voltage between:

C31, harness side	Battery
Pin 01	Negative terminal

Is the voltage between 4.8 - 5.2 volts?

-> **Yes**

GO to Pinpoint Test G549822t149.

-> **No**

GO to Pinpoint Test G549822t156.

G549822t149 : CHECK THE MAP SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C31, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t150.

-> No

GO to Pinpoint Test G549822t153.

G549822t150 : CHECK THE MAP SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the resistance between:

C31, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t151.

-> No

GO to Pinpoint Test G549822t154.

G549822t151 : CHECK THE MAP SIGNAL CIRCUIT FOR SHORT CIRCUIT TO RETURN AND SUPPLY CIRCUITS

1. Measure the resistance between:

C31, harness side	C31, harness side
Pin 02	Pin 01
Pin 02	Pin 03

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t152.

-> No

GO to Pinpoint Test G549822t155.

G549822t152 : CHECK THE MAP SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C31, harness side	C101, harness side
Pin 02	Pin C1

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - MAP connector - MAP sensor - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t153 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C31, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t154 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C31, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t155 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C31, harness side	C31, harness side
Pin 02	Pin 01
Pin 02	Pin 03

Are the resistances greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t156 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C31, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t157.

-> No

GO to Pinpoint Test G549822t162.

G549822t157 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C31, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t158.

-> No

GO to Pinpoint Test G549822t163.

G549822t158 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C31, harness side	C101, harness side
--------------------------	---------------------------

Pin 01	Pin D1
--------	--------

Is the resistance less than 10 ohms?

-> Yes

Suspect : - ECM connector. - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t159 : CHECK THE MAP SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C31, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t160.

-> No

GO to Pinpoint Test G549822t164.

G549822t160 : CHECK THE MAP SUPPLY AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

C31, harness side	C31, harness side
Pin 01	Pin 03

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t161.

-> **No**

GO to Pinpoint Test G549822t165.

G549822t161 : CHECK THE MAP SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C31, harness side	C101, harness side
Pin 03	Pin E2

Is the resistance less than 10 ohms?

-> **Yes**

Suspect : - MAP connector - MAP sensor - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t162 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C31, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t163 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C31, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t164 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C31, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t165 : CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C31, harness side	C31, harness side
Pin 01	Pin 03

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

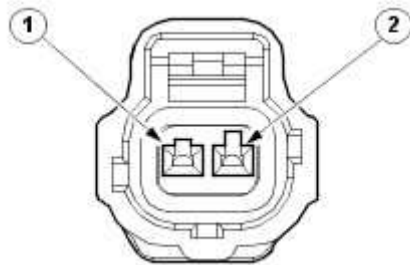
-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p13 : INTAKE AIR TEMPERATURE (IAT) AND CHARGE AIR TEMPERATURE (ACT) SENSORS

G549822t166 : CHECK THE IAT PID VALUE

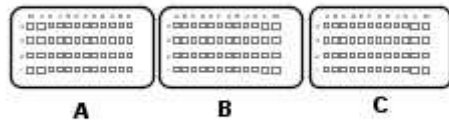
1.



E54262

Circuit	Pin
Air charge temperature sensor - signal	01
Air charge temperature sensor - return	02

2.



E54251

Circuit	Pin
Intake air temperature - return	L4
Intake air temperature - signal	F1
Mass air flow sensor - return	L4

Circuit	Pin
Air charge temperature sensor - signal	B1
Air charge temperature sensor - return	G3

3. Make sure that the engine is cold. 4. Key on, engine off. 5. Access the ECM-Boost air temperature PID using the Jaguar approved diagnostic system or a scan tool.

Is the IAT reading as expected for the current environmental and engine conditions?

-> Yes

GO to Pinpoint Test G549822t167.

-> No

GO to Pinpoint Test G549822t170.

G549822t167 : CHECK THE IAT PID VALUE

1. Key on, engine running. 2. Access the ECM-Boost air temperature PID using the Jaguar approved diagnostic system or a scan tool. 3. Slowly increase the engine speed to 4,000 rpm while monitoring the IAT reading.

Did the IAT reading rise smoothly?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> **No**

GO to Pinpoint Test G549822t168.

G549822t168 : CHECK FOR AN INTERMITTENT FAULT CONDITION

1.

Were there any sudden or unexpected changes in the IAT readings?

-> **Yes**

Key off. GO to Pinpoint Test G549822t169.

-> **No**

GO to Pinpoint Test G549822t170.

G549822t169 : CHECK THE IAT PID VALUE

1. Key on, engine off. 2. Access the ECM-Boost air temperature PID using the Jaguar approved diagnostic system or a scan tool. 3. Check the IAT harness wiring and connectors for loose connections and water ingress. Monitoring the temperature readings for sudden changes, while handling the harness and connectors, may help in isolation of these types of fault.

Did you identify any loose connections or water ingress in the IAT harness wiring or connectors?

-> **Yes**

REPAIR the fault as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

-> **No**

GO to Pinpoint Test G549822t170.

G549822t170 : CHECK THE ACT SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ACT sensor connector, C69. 3. Key on, engine off. 4. Measure the resistance between:

C69, harness side	Battery
--------------------------	----------------

Pin 02	Negative terminal
--------	-------------------

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t173.

-> No

GO to Pinpoint Test G549822t171.

G549822t171 : CHECK THE ACT SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C69, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t172.

-> No

GO to Pinpoint Test G549822t180.

G549822t172 : CHECK THE ACT SENSOR TO ECM RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C69, harness side	C101, harness side
Pin 02	Pin G3

Is the resistance less than 10 ohms?

-> **Yes**

Suspect: - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t173 : CHECK FOR POWER TO THE ACT SENSOR

1. Measure the voltage between:

C69, harness side	Battery
Pin 01	Negative terminal

Is the voltage between 4.8 - 5.2 volts?

-> **Yes**

GO to Pinpoint Test G549822t177.

-> **No**

GO to Pinpoint Test G549822t174.

G549822t174 : CHECK THE ACT SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C69, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t175.

-> **No**

GO to Pinpoint Test G549822t178.

G549822t175 : CHECK THE ACT SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Key on, engine off. 2. Measure the resistance between:

C69, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t176.

-> No

GO to Pinpoint Test G549822t181.

G549822t176 : CHECK THE ACT SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Measure the resistance between:

C69, harness side	C101, harness side
Pin 01	Pin B1

Is the resistance less than 10 ohms?

-> Yes

Suspect: - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t177 : CHECK THE COMPONENT RESISTANCE

1. Measure the resistance between:

C69, component side	C69, component side
Pin 01	Pin 02

Is the resistance between 1 - 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ACT connector. - ACT sensor. - ECM connector. - ECM

-> No

INSTALL a new ACT sensor.

G549822t178 : CHECK THE ACT SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C69, harness side	C69, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t179.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t179 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Key on, engine off. 2. Measure the resistance between:

C69, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t180 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C69, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t181 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, C101. 3. Key on, engine off. 4. Measure the resistance between:

C69, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

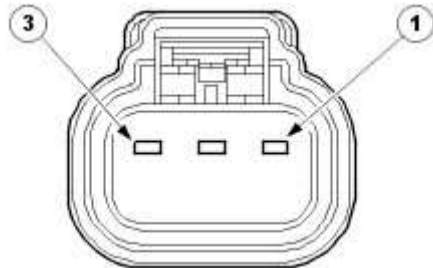
-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p14 : CRANKSHAFT POSITION (CKP) SENSOR

G549822t182 : CHECK THE CKP CIRCUITS FOR SHORT CIRCUIT TO GROUND

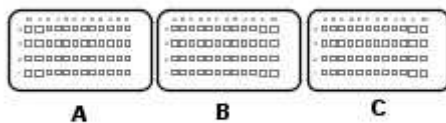
1.



E54268

Circuit	Pin
Crankshaft position sensor - signal	02
Crankshaft position sensor - positive	01
Crankshaft position sensor - negative	03

2.



E54251

Circuit	Pin
Crankshaft position sensor - signal	F1
Crankshaft position sensor - positive	G1
Crankshaft position sensor - negative	G2

3. Key off. 4. Disconnect the ECM connector, C101. 5. Key on, engine off. 6. Measure the resistance between:

C101, harness side	Battery
Pin G2	Negative terminal
Pin G1	Negative terminal
Pin F1	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t183.

-> No

REPAIR the short circuit to ground in the CKP harness or component. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t183 : CHECK THE CKP CIRCUITS FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C101, harness side	Battery
Pin G2	Positive terminal
Pin G1	Positive terminal
Pin F1	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t184.

-> No

REPAIR the short circuit to ground in the CKP harness or component. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t184 : CHECK THE CKP CIRCUIT RESISTANCE

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin G2	Pin F1

Is the resistance between 100 - 120 Kohms?

-> Yes

GO to Pinpoint Test G549822t185.

-> No

REPAIR the out of limits resistance in the CKP harness or component. This may be due to a short or open circuit, depending on the result of the last measurement. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t185 : CHECK THE CKP CIRCUIT RESISTANCE

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin G1	Pin F1
Pin G1	Pin G2

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Open circuit in sensor power line - CKP connector - CKP sensor - Crankshaft sensor target wheel - ECM connector - ECM

-> No

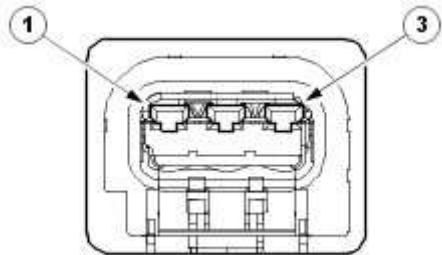
REPAIR the out of limits resistance in the CKP harness or component. This may be due to a short or open circuit, depending on the result of the last measurement. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p15 :

CAMSHAFT POSITION (CMP) SENSOR

G549822t186 : CHECK THE CMP CIRCUITS FOR SHORT CIRCUIT TO GROUND

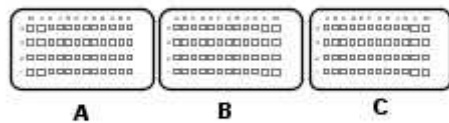
1.



E54269

Circuit	Pin
Camshaft position sensor - signal	01
Camshaft position sensor - return	02
Camshaft position sensor - power	03

2.



E54251

Circuit	Pin
Camshaft position sensor - signal	G4
Camshaft position sensor - return	H3
Camshaft position sensor - power	H4

3. Key off. 4. Disconnect the ECM connector, C101. 5. Key on, engine off. 6. Measure the resistance between:

C101, harness side	Battery
Pin G4	Negative terminal
Pin H3	Negative terminal
Pin H4	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t187.

-> No

REPAIR the short circuit to ground in the CMP harness or component. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t187 : CHECK THE CMP CIRCUITS FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C101, harness side	Battery
Pin G4	Positive terminal
Pin H3	Positive terminal
Pin H4	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t188.

-> No

REPAIR the short circuit to power in the CMP harness or component. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t188 : CHECK THE CMP CIRCUIT RESISTANCE

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin G4	Pin H3

Is the resistance between 100 Kohms - 120 Kohms?

-> Yes

GO to Pinpoint Test G549822t189.

-> No

REPAIR the out of limits resistance in the CMP harness or component. This may be due to a short or open circuit, depending on the result of the last measurement. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t189 : CHECK THE CMP CIRCUIT RESISTANCE

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin H4	Pin G4
Pin H4	Pin H3

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Open circuit in sensor power line - CMP connector - CMP sensor - Camshaft sensor target wheel - ECM connector - ECM

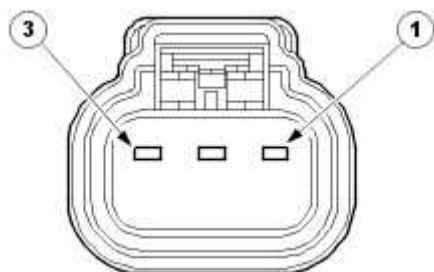
-> No

REPAIR the out of limits resistance in the CMP harness or component. This may be due to a short or open circuit, depending on the result of the last measurement. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p16 : CRANKSHAFT (CKP) AND CAMSHAFT (CMP) POSITION SENSORS

G549822t190 : CHECK THE CKP CIRCUITS FOR SHORT CIRUIT TO GROUND

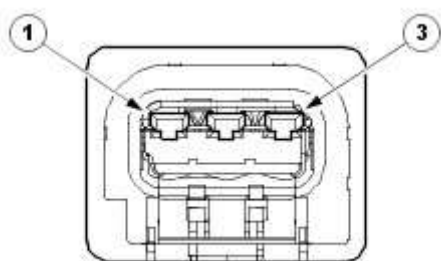
1.



E54268

Circuit	Pin
Crankshaft position sensor - signal	02
Crankshaft position sensor - positive	01
Crankshaft position sensor - negative	03

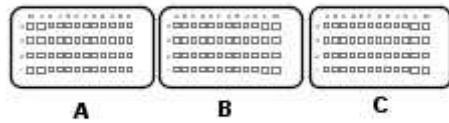
2.



E54269

Circuit	Pin
Camshaft position sensor - signal	01
Camshaft position sensor - return	02
Camshaft position sensor - power	03

3.



E54251

Circuit	Pin
Crankshaft position sensor - signal	F1
Crankshaft position sensor - positive	G1
Crankshaft position sensor - negative	G2
Camshaft position sensor - signal	G4
Camshaft position sensor - return	H3
Camshaft position sensor - power	H4

4. Key off. 5. Disconnect the ECM connector, C101. 6. Key on, engine off. 7. Measure the resistance between:

C101, harness side	Battery
Pin G2	Negative terminal
Pin G1	Negative terminal
Pin F1	Negative terminal

Are the resistances greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t191.

-> **No**

REPAIR the short circuit to ground in the CKP harness or component. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t191 : CHECK THE CKP CIRCUITS FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C101, harness side	Battery
Pin G2	Positive terminal
Pin G1	Positive terminal
Pin F1	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t192.

-> No

REPAIR the short circuit to ground in the CKP harness or component. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t192 : CHECK THE CKP CIRCUIT RESISTANCE

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin G2	Pin F1

Is the resistance between 100 Kohms - 120 Kohms?

-> Yes

GO to Pinpoint Test G549822t193.

-> No

REPAIR the out of limits resistance in the CKP harness or component. This may be due to a short or open circuit, depending on the result of the last measurement. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t193 : CHECK THE CKP CIRCUIT RESISTANCE

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin G1	Pin F1
Pin G1	Pin G2

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t194.

-> No

REPAIR the out of limits resistance in the CKP harness or component. This may be due to a short or open circuit, depending on the result of the last measurement. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t194 : CHECK THE CMP CIRCUITS FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

C101, harness side	Battery
Pin G4	Negative terminal
Pin H3	Negative terminal
Pin H4	Negative terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t195.

-> No

REPAIR the short circuit to ground in the CMP harness or component. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t195 : CHECK THE CKP CIRCUITS FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

C101, harness side	Battery
Pin G4	Positive terminal
Pin H3	Positive terminal
Pin H4	Positive terminal

Are the resistances greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t196.

-> No

REPAIR the short circuit to power in the CMP harness or component. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t196 : CHECK THE CMP CIRCUIT RESISTANCE

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin G4	Pin H3

Is the resistance between 100 - 120 Kohms?

-> Yes

GO to Pinpoint Test G549822t197.

-> No

REPAIR the out of limits resistance in the CMP harness or component. This may be due to a short or open circuit, depending on the result of the last measurement. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t197 : CHECK THE CMP CIRCUIT RESISTANCE

1. Measure the resistance between:

C101, harness side	C101, harness side
Pin H4	Pin G4
Pin H4	Pin H3

Are the resistances greater than 100 Kohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Open circuit in sensor power line - CMP connector - CKP connector - CMP sensor - CKP sensor - Crankshaft sensor target wheel - Camshaft sensor target wheel - ECM connector - ECM

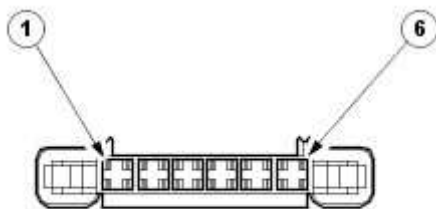
-> No

REPAIR the out of limits resistance in the CMP harness or component. This may be due to a short or open circuit, depending on the result of the last measurement. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p17 : ACCELERATOR PEDAL POSITION (APP) SENSORS 1 AND 2

G549822t198 : CHECK THE APP1 VALUE, WITH THE ACCELERATOR PEDAL RELEASED

1.

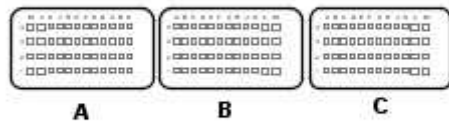


E54270

Circuit	Pin
Accelerator pedal position sensor 2 - signal	01
Accelerator pedal position sensor 2 - power	02

Accelerator pedal position sensor 2 - return	06
Accelerator pedal position sensor 1 - signal	04
Accelerator pedal position sensor 1 - power	05
Accelerator pedal position sensor 1 - return	03

2.



E54251

Circuit	Pin
Accelerator pedal position sensor 2 - signal	C2
Accelerator pedal position sensor 2 - power	D2
Accelerator pedal position sensor 2 - return	B2
Accelerator pedal position sensor 1 - signal	D1
Accelerator pedal position sensor 1 - power	E1
Accelerator pedal position sensor 1 - return	C1

3. Key on, engine off. 4. Make sure the accelerator pedal is released. 5. Access the ECM-Pedal position sensor 1 (voltage) PID using the Jaguar approved diagnostic system or a scan tool.

Is the voltage between 0 - 1 volts?

-> Yes

GO to Pinpoint Test G549822t199.

-> No

GO to Pinpoint Test G549822t202.

G549822t199 : CHECK THE APP2 VALUE, WITH THE ACCELERATOR PEDAL RELEASED

1. Make sure the accelerator pedal is released. 2. Access the ECM-Pedal position sensor 2 (voltage) PID using the Jaguar approved diagnostic system or a scan tool.

Is the voltage between 3 - 5 volts?

-> Yes

GO to Pinpoint Test G549822t200.

-> No

GO to Pinpoint Test G549822t222.

G549822t200 : CHECK THE APP1 VALUE, WITH THE ACCELERATOR FULLY DEPRESSED

1. Make sure the accelerator pedal is fully depressed. 2. Access the ECM-Pedal position sensor 1 (voltage) PID using the Jaguar approved diagnostic system or a scan tool.

Is the voltage between 2.2 - 2.7 volts?

-> Yes

GO to Pinpoint Test G549822t201.

-> No

GO to Pinpoint Test G549822t202.

G549822t201 : CHECK THE APP2 VALUE, WITH THE ACCELERATOR FULLY DEPRESSED

1. Make sure the accelerator pedal is fully depressed. 2. Access the ECM-Pedal position sensor 2 (voltage) PID using the Jaguar approved diagnostic system or a scan tool.

Is the voltage between 2.2 - 2.7 volts?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness.

-> No

GO to Pinpoint Test G549822t222.

G549822t202 : CHECK THE APP1 SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the APP sensor connector, CR14. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t203.

-> No

GO to Pinpoint Test G549822t220.

G549822t203 : CHECK FOR POWER TO THE APP1 SENSOR

1. Measure the voltage between:

CR14, harness side	Battery
Pin 05	Negative terminal

Is the voltage between 4.8 - 5.2 volts?

-> Yes

GO to Pinpoint Test G549822t204.

-> No

GO to Pinpoint Test G549822t212.

G549822t204 : CHECK THE APP1 SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

CR14, harness side	Battery

Pin 04	Negative terminal
--------	-------------------

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t205.

-> No

GO to Pinpoint Test G549822t208.

G549822t205 : CHECK THE APP1 SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR14, harness side	Battery
Pin 04	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t206.

-> No

GO to Pinpoint Test G549822t210.

G549822t206 : CHECK THE APP1 SIGNAL AND POWER CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 04	Pin 05

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t207.

-> **No**

GO to Pinpoint Test G549822t211.

G549822t207 : CHECK THE APP1 SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

CR14, harness side	EC66, harness side
Pin 04	Pin D1

Is the resistance less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - APP connector - APP sensor - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t208 : CHECK THE APP1 SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 04	Pin 03

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t209.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t209 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

CR14, harness side	Battery
Pin 04	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t210 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 04	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t211 : CHECK WHETHER SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 04	Pin 05
Pin 04	Pin 03

Are the resistances greater than 100 Kohms?

-> Yes

Suspect: -ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t212 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

CR14, harness side	Battery
Pin 05	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t213.

-> No

GO to Pinpoint Test G549822t217.

G549822t213 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR14, harness side	Battery
Pin 05	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t214.

-> No

GO to Pinpoint Test G549822t219.

G549822t214 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

CR14, harness side	EC66, harness side
Pin 05	Pin E1

Is the resistance less than 10 ohms?

-> Yes

Suspect : - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t215 : CHECK THE APP1 SUPPLY AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 05	Pin 03

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t216.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t216 : CHECK THE APP1 SENSOR TO ECM RETURN CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

CR14, harness side	EC66, harness side
Pin 03	Pin C1

Is the resistance less than 10 ohms?

-> **Yes**

Suspect : - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t217 : CHECK THE APP1 SUPPLY AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 05	Pin 03

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t218.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t218 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

CR14, harness side	Battery
Pin 05	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t219 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 05	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t220 : CHECK THE APP1 SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR14, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t215.

-> **No**

GO to Pinpoint Test G549822t221.

G549822t221 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t222 : CHECK THE APP2 SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the APP sensor connector, CR14. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 06	Negative terminal

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G549822t223.

-> **No**

GO to Pinpoint Test G549822t235.

G549822t223 : CHECK THE SUPPLY TO THE APP2 SENSOR

1. Measure the voltage between:

CR14, harness side	Battery
Pin 02	Negative terminal

Is the voltage between 4.8 - 5.2 volts?

-> **Yes**

GO to Pinpoint Test G549822t224.

-> **No**

GO to Pinpoint Test G549822t232.

G549822t224 : CHECK THE APP2 SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

CR14, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t225.

-> **No**

GO to Pinpoint Test G549822t228.

G549822t225 : CHECK THE APP2 SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR14, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t226.

-> No

GO to Pinpoint Test G549822t230.

G549822t226 : CHECK THE APP2 SIGNAL AND POWER CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t227.

-> No

GO to Pinpoint Test G549822t231.

G549822t227 : CHECK THE APP2 SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

CR14, harness side	EC66, harness side
Pin 01	Pin C2

Is the resistance less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - APP connector - APP sensor - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t228 : CHECK THE APP2 SIGNAL AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 01	Pin 06

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t229.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t229 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

CR14, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t230 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: - ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t231 : CHECK WHETHER SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 01	Pin 02

Is the resistance greater than 100 Kohms?

-> **Yes**

Suspect: -ECM

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t232 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

CR14, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t233.

-> No

GO to Pinpoint Test G549822t238.

G549822t233 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR14, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t234.

-> No

GO to Pinpoint Test G549822t240.

G549822t234 : CHECK THE 5 VOLT SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

CR14, harness side	EC66, harness side
Pin 02	Pin D2

Is the resistance less than 10 ohms?

-> **Yes**

Suspect : - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t235 : CHECK THE APP2 SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR14, harness side	Battery
Pin 06	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t236.

-> **No**

GO to Pinpoint Test G549822t241.

G549822t236 : CHECK THE APP2 SUPPLY AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 02	Pin 06

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t237.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t237 : CHECK THE APP2 SENSOR TO ECM RETURN CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

CR14, harness side	EC66, harness side
Pin 06	Pin B2

Is the resistance less than 10 ohms?

-> **Yes**

Suspect : - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t238 : CHECK THE APP2 SUPPLY AND RETURN CIRCUITS FOR SHORT CIRCUIT TO EACH OTHER

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

CR14, harness side	CR14, harness side
Pin 02	Pin 06

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t239.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t239 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE HARNESS OR THE MODULE

1. Measure the resistance between:

CR14, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t240 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t241 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE MODULE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

CR14, harness side	Battery
Pin 06	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

Suspect: - ECM

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p18 : BRAKE PEDAL SWITCH

G549822t242 : CHECK THE OPERATION OF THE BRAKE PEDAL SWITCH WITH THE BRAKE PEDAL RELEASED

1. Brake pedal switch connector, CR78

Circuit	Pin
Brake pedal switch - power	01
Brake pedal switch - signal	02

2. Engine control module (ECM) connector, EC66

Circuit	Pin
Brake pedal switch - signal	G2

3. Key off. 4. Disconnect the brake pedal switch connector, CR78. 5. Make sure the brake pedal is released. 6. Measure the resistance between:

CR78, component side	CR78, component side
Pin 01	Pin 02

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t245.

-> **No**

INSTALL a new brake pedal switch. Clear any DTCs, test the system for normal operation.

G549822t245 : CHECK THE OPERATION OF THE BRAKE PEDAL SWITCH WITH THE BRAKE PEDAL DEPRESSED

1. Make sure the brake pedal is depressed. 2. Measure the resistance between:

CR78, component side	CR78, component side
Pin 01	Pin 02

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G549822t246.

-> **No**

INSTALL a new brake pedal switch. CLEAR the DTC, test the system for normal operation.

G549822t246 : CHECK FOR POWER TO THE BRAKE PEDAL SWITCH

1. Key on, engine off. 2. Measure the voltage between:

CR78, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G549822t247.

-> **No**

REPAIR the power supply circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t247 : CHECK THE BRAKE SWITCH SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

CR78, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t248.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t248 : CHECK THE BRAKE SWITCH SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR78, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t249.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t249 : CHECK THE BRAKE SWITCH SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM connector, EC66. 2. Measure the resistance between:

CR78, harness side	EC66, harness side
Pin 02	Pin G2

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Brake pedal switch connector - Brake pedal switch - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p19 : AIR CONDITIONING (A/C) PRESSURE SENSOR

G549822t253 : CHECK THE A/C PRESSURE SENSOR RETURN CIRCUIT FOR HIGH RESISTANCE

1. Air conditioning (A/C) pressure sensor connector, EC101

Circuit	Pin
Air conditioning pressure sensor - return	01
Air conditioning pressure sensor - signal	02
Air conditioning pressure sensor - power	03

2. Engine control module (ECM) connector, EC66

Circuit	Pin
Air conditioning pressure sensor - return	B3
Air conditioning pressure sensor - signal	F2
Air conditioning pressure sensor - power	D3

3. Key off. 4. Disconnect the A/C pressure sensor connector, EC101. 5. Key on, engine off. 6. Measure the resistance between:

EC101, harness side	Battery
----------------------------	----------------

Pin 01	Negative terminal
--------	-------------------

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t256.

-> No

GO to Pinpoint Test G549822t254.

G549822t254 : CHECK THE A/C PRESSURE SENSOR RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

EC101, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t255.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t255 : CHECK THE A/C PRESSURE SENSOR TO ECM RETURN CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

EC101, harness side	EC66, harness side
Pin 01	Pin B3

Is the resistance less than 10 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - A/C pressure sensor connector - A/C pressure sensor - ECM connector - ECM

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t256 : CHECK FOR POWER TO THE A/C PRESSURE SENSOR

1. Key on, engine off. 2. Measure the voltage between:

EC101, harness side	Battery
Pin 03	Negative terminal

Is the voltage between 4.8 - 5.2 volts?

-> **Yes**

GO to Pinpoint Test G549822t252.

-> **No**

REPAIR the power supply circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t252 : CHECK THE A/C PRESSURE SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

EC101, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t251.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t251 : CHECK THE A/C PRESSURE SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

EC101, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t250.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t250 : CHECK THE A/C PRESSURE SENSOR SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

A/C pressure sensor connector EC101, harness side	ECM connector EC66, harness side
Pin 02	Pin F2

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - A/C pressure sensor connector - A/C pressure sensor - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p21 :

RADIATOR COOLING FAN

G549822t263 : CHECK THE RADIATOR COOLING FAN MODULE GROUND CIRCUIT FOR HIGH RESISTANCE

1. Radiator cooling fan connector, EC72

Circuit	Pin
Radiator cooling fan - power	01
Radiator cooling fan - ground	02

2. Radiator cooling fan connector, GC01

Circuit	Pin
Radiator cooling fan - control	01
Radiator cooling fan - ignition	02

3. Engine control module (ECM) connector, EC66

Circuit	Pin
Radiator cooling fan - control	K2

4. Key off. 5. Disconnect the fan module electrical connector, EC72. 6. Measure the resistance between:

EC72, harness side	Battery
Pin 02	Negative terminal

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G549822t264.

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t264 : CHECK FOR POWER TO THE RADIATOR COOLING FAN MODULE

1. Measure the voltage between:

EC72, harness side	Battery
Pin 01	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G549822t265.

-> **No**

REPAIR the power supply circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t265 : CHECK THE IGNITION SUPPLY TO THE RADIATOR COOLING FAN MODULE

1. Key off. 2. Disconnect the fan module electrical connector, GC01. 3. Key on, engine off. 4. Measure the voltage between:

GC01, harness side	Battery
Pin 02	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G549822t266.

-> **No**

REPAIR the EMS relay to radiator cooling fan supply circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t266 : CHECK THE RADIATOR COOLING FAN MODULE CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

GC01, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t267.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t267 : CHECK THE RADIATOR COOLING FAN MODULE CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

GC01, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t268.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t268 : CHECK THE RADIATOR COOLING FAN MODULE CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Key on, engine off. 4. Measure the resistance between:

GC01, harness side	EC66, harness side
Pin 01	Pin K2

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Radiator cooling fan module connector(s) - Radiator cooling fan module - ECM connector - ECM

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p22 : STARTER RELAY AND CIRCUITS

G549822t261 : CHECK THE STARTER RELAY AND CIRCUITS

1.

Starting System

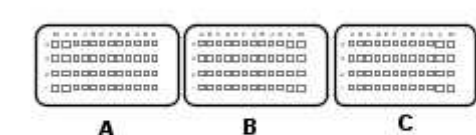
-> Yes

-> No

PINPOINT TEST G549822p23 : ECM POWER SUPPLY CIRCUIT

G549822t269 : CHECK FOR POWER TO THE ECM

1.



E54251

Circuit	Pin
ECM - power	K4

2. Key off. 3. Disconnect the ECM electrical connector, EC66. 4. Measure the voltage between:

EC66, harness side	Battery
Pin K4	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

Recheck the DTCs. If no DTCs are set an intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

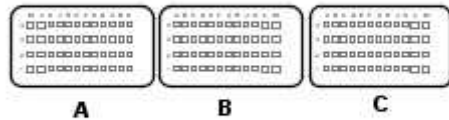
-> No

REPAIR the power supply circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p20 : ECM IGNITION SUPPLY CIRCUIT(S)

G549822t257 : CHECK THE IGNITION TO ECM SUPPLY CIRCUITS

1.



E54251

Circuit	Pin
ECM - ignition supply A	L2
ECM - ignition supply B	L3
ECM - ignition supply C	L1

2. Key off. 3. Disconnect the ECM electrical connector, EC66. 4. Measure the voltage between:

EC66, harness side	Battery
Pin L2	Negative terminal
Pin L3	Negative terminal
Pin L1	Negative terminal

Are the voltages greater than 10 volts?

-> Yes

Recheck the DTCs. If no DTCs are set an intermittent fault may be present in the wiring harness. Visually check for chafed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - ECM connector - ECM

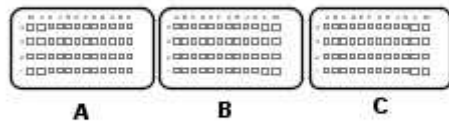
-> No

REPAIR the ignition power supply circuit(s) as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p26 : EMS CONTROL RELAY

G549822t258 : CHECK THE EMS RELAY CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1.



E54251

Circuit	Pin
EMS relay - control	J3

2. Remove the EMS relay. 3. Measure the resistance between:

EMS relay base	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t259.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t259 : CHECK THE EMS RELAY CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

EMS relay base	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t277.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t277 : CHECK THE EMS RELAY CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the ECM connector, EC66. 3. Measure the resistance between:

EMS relay base	EC66
Pin 02	Pin J3

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G549822t278.

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t278 : CHECK FOR POWER TO THE EMS RELAY BASE

1. Measure the voltage between:

EMS relay base	Battery
Pin 01	Negative terminal
Pin 03	Negative terminal

Are the voltages greater than 10 volts?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - EMS relay - ECM connector - ECM

-> **No**

REPAIR the circuit between the battery and the EMS relay base as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G549822p25 : INERTIA SWITCH

G549822t270 : CHECK THE INERTIA SWITCH SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Make sure the inertia switch is not tripped. 2. Key off. 3. Disconnect the inertia switch connector, CR02. 4. Measure the resistance between:

CR02, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t271.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t271 : CHECK THE INERTIA SWITCH SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR02, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t272.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t272 : CHECK THE INERTIA SWITCH SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ignition switch connector, IP34. 2. Measure the resistance between:

CR02, harness side	IP34
Pin 02	Pin 07

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G549822t279.

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t279 : CHECK THE INERTIA SWITCH TO ECM CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

CR02, harness side	Battery
Pin 03	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G549822t273.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t273 : CHECK THE INERTIA SWITCH TO ECM CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

CR02, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G549822t280.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G549822t280 : CHECK THE INERTIA SWITCH TO ECM CIRCUIT FOR HIGH RESISTANCE

1. Disconnect electrical connector, PI41. 2. Measure the resistance between:

CR02, harness side	PI41
Pin 03	Pin 15

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): -Inertia switch connector -Inertia switch - ECM connector - ECM

-> No

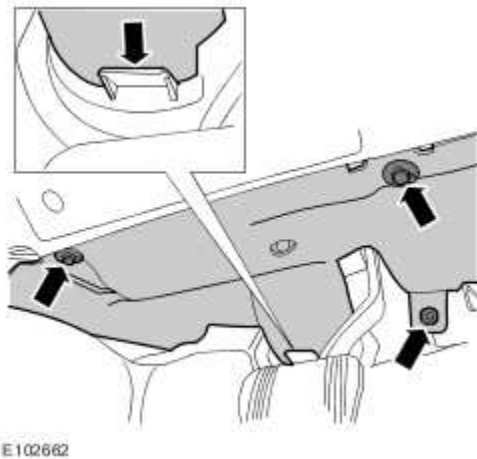
REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

Brake Pedal Position (BPP) Switch

Removal

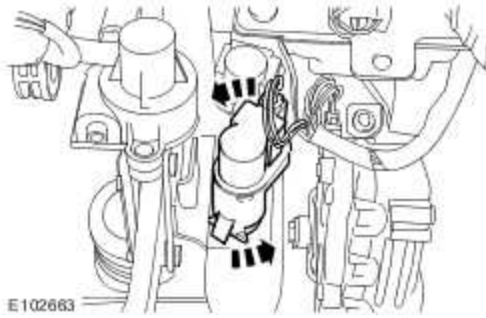
- 1 . Switch the ignition on.
- 2 . Position the front seat fully rearwards.
- 3 . Switch the ignition off.
- 4 . Remove the driver's side footwell trim panel.

▶ Release the 3 clips.



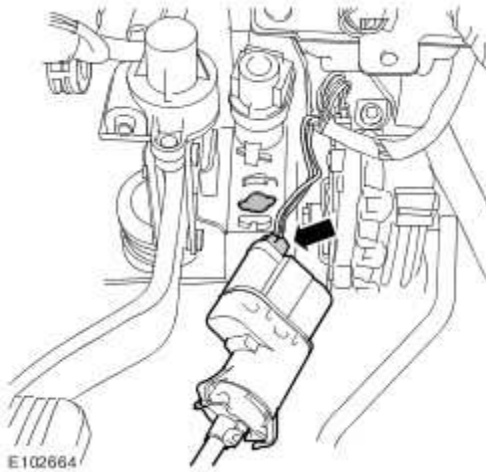
- 5 . Release the brake pedal position (BPP) switch.

▶ Rotate the BPP switch 45 degrees counter-clockwise.





6 . Remove the BPP switch.

▶ Disconnect the electrical connector.



Installation

- 1  **CAUTION:** Make sure that the brake pedal remains in the rest position during this procedure.

 **CAUTION:** The bracket is keyed to avoid incorrect orientation. Failure to correctly align the switch may result in damage to the vehicle.



CAUTION: Make sure that the pedal box, booster-to-brake pedal assembly and switch bracket are all installed correctly before installing the switch.

Install the BPP switch.

- ▶ Locate the BPP switch in the bracket.
- ▶ Rotate the BPP switch 45 degrees clockwise.

2 . Connect the electrical connector.

3 . Install the driver's side footwell trim panel.

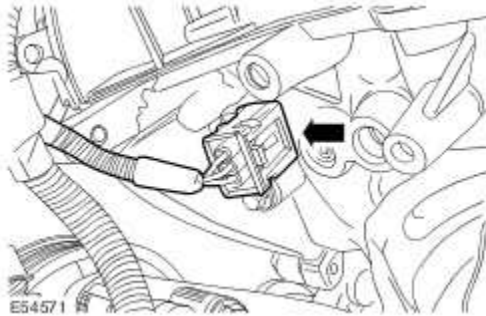
- ▶ Align the trim panel with the guide.
- ▶ Install the 3 clips.

Camshaft Position (CMP) Sensor (18.30.63)

Removal

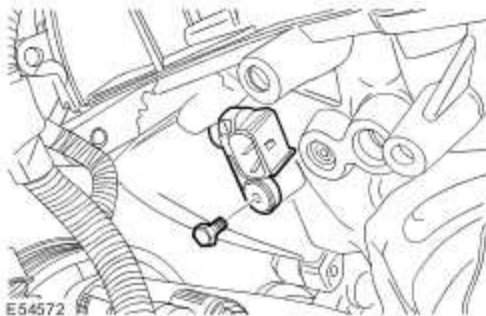
- 1 . Remove the left-hand exhaust gas recirculation (EGR) valve.
For additional information, refer to Exhaust Gas Recirculation (EGR) Valve LH

- 2 . Disconnect the camshaft position (CMP) sensor electrical connector.



- 3 . Remove and discard the CMP sensor.

▶ Remove the CMP sensor retaining bolt.

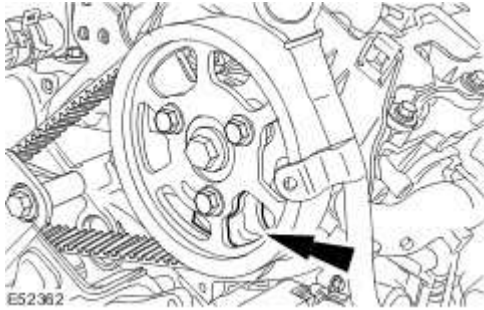


Installation

1 NOTE:

Only turn the engine in the normal direction of rotation.

Turn the engine until one of the three webs on the back of the camshaft pulley is visible through the CMP sensor housing (timing belt upper cover shown removed for clarity).

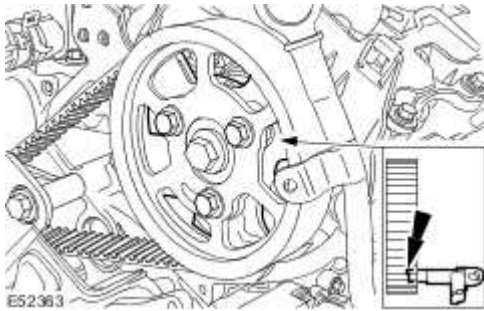


2



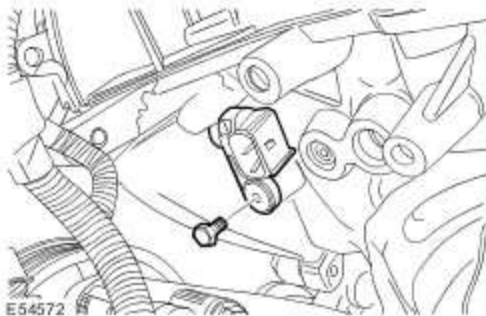
CAUTION: The CMP sensor tip must rest on one of the three webs on the back of the camshaft pulley. Incorrect installation may result in the CMP sensor being damaged.

Install the CMP sensor until the tip of the sensor touches the back of the camshaft pulley (timing belt upper cover shown removed for clarity).

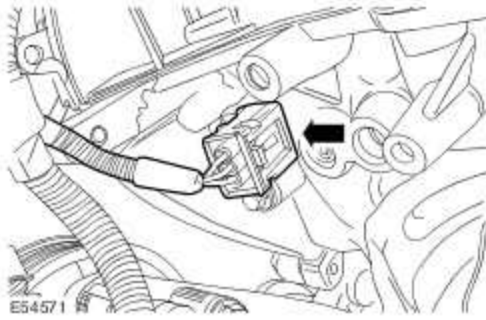


3 . Install the CMP sensor retaining bolt.

► Tighten to 10 Nm.



4 . Connect the CMP sensor electrical connector.



- 5 . Install the left-hand EGR valve.

For additional information, refer to Exhaust Gas Recirculation (EGR) Valve LH



Crankshaft Position (CKP) Sensor (18.30.12)

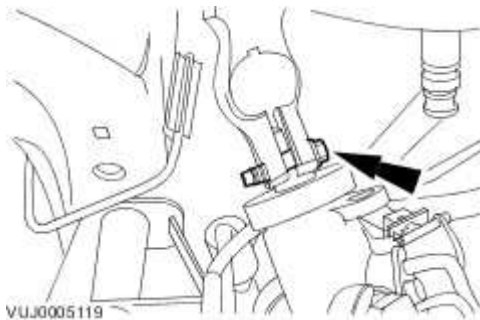
Removal

All vehicles

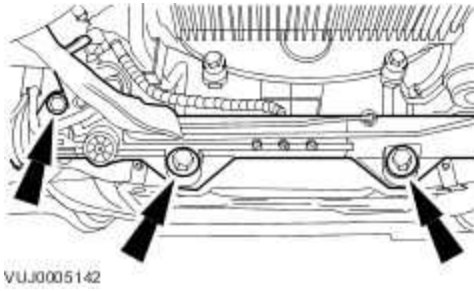
- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)

Left-hand drive vehicles

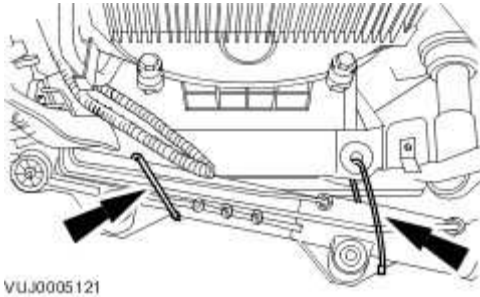
- 3 . Lower the vehicle.
- 4 . Center the steering wheel.
 Lock in position, and remove the ignition key.
- 5 . Raise the vehicle.
- 6 . Detach the lower steering column.
 Remove the steering gear shaft pinch bolt.



7 . Detach the steering gear.

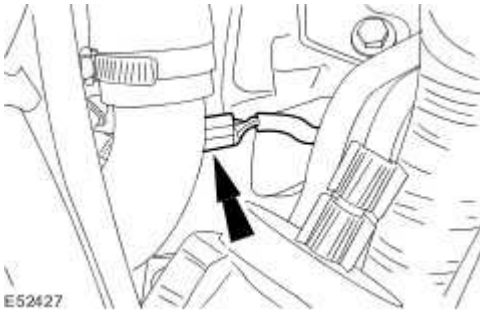


8 . Using suitable tie straps, secure the steering gear.

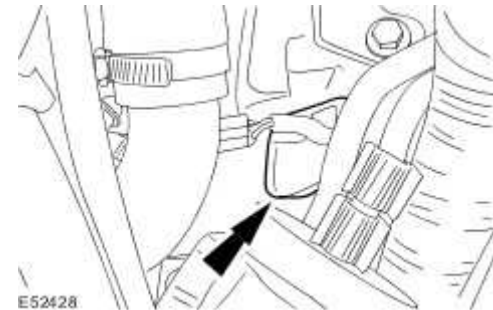


All vehicles

9 . Disconnect the crankshaft position (CKP) sensor electrical connector.



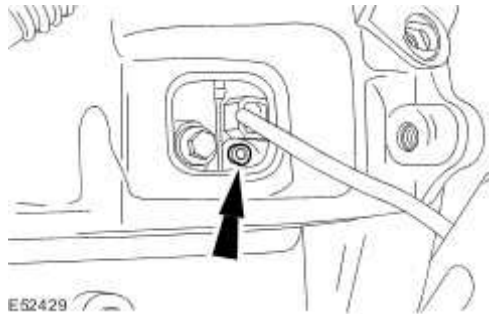
10 . Remove the CKP sensor blanking cover.



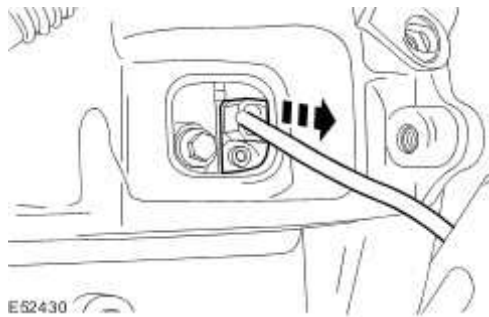
11 . NOTE:

The CKP sensor retaining bolt should not be removed from the CKP sensor.


Fully loosen the CKP sensor retaining bolt.



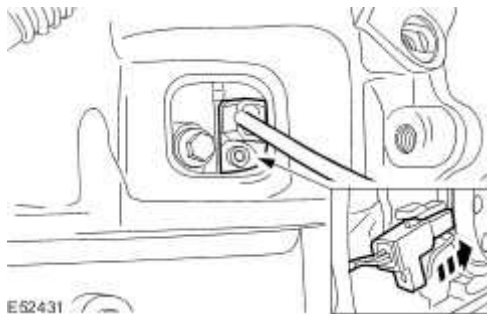
12 . Remove the CKP sensor.



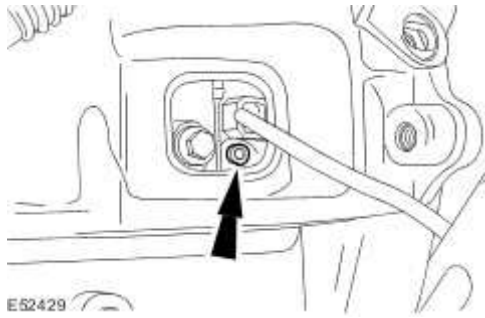
Installation

- 1  **CAUTION:** Install the CKP sensor correctly into the housing. Failure to follow this instruction may result in damage to the CKP sensor.

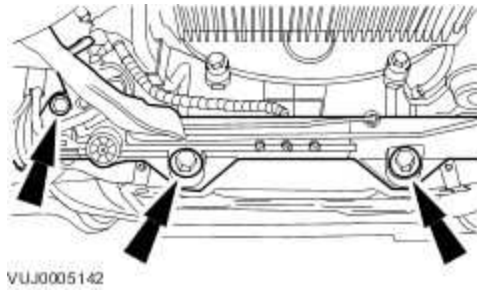
To install, reverse the removal procedure.



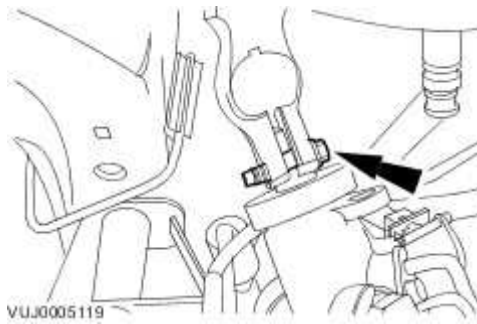
2 . Tighten to 5 Nm.



3 . Tighten to 100 Nm.



4 . Tighten to 35 Nm.



Crankshaft Position (CKP) Sensor Ring

Special Service Tools



E52723

Installer - Timing Trigger Wheel

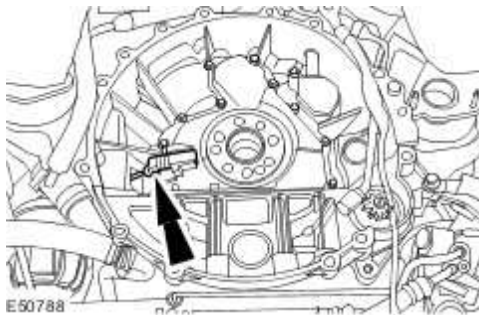
303-1130

Removal

- 1 . Remove the flexplate.

For additional information, refer to Flexplate (12.53.13)

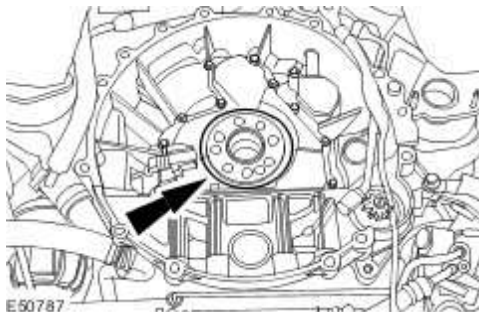
- 2 . Remove the crankshaft position (CKP) sensor.



E50788

- 3 . Remove the CKP sensor ring.

▶ Discard the CKP ring.

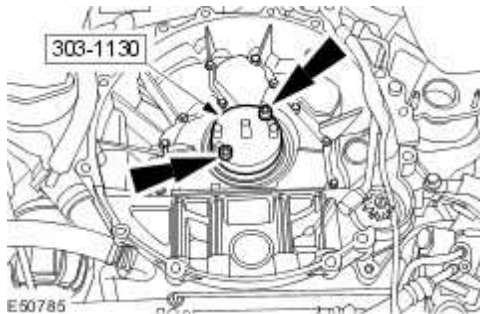


E50787

Installation

1 . Install the alignment special tool to the crankshaft.

▶ Align the special tool alignment peg to the timing hole on the crankshaft.



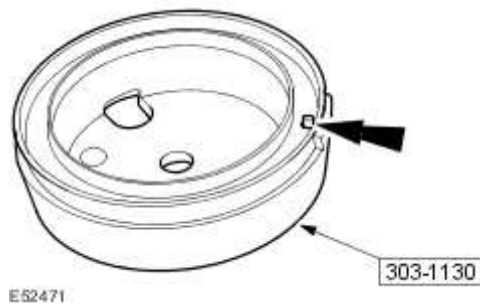
2 **NOTE:**

Install a new CKP ring.

NOTE:

Make sure that the CKP sensor ring is aligned correctly with the special tool pip and that both mating surfaces are fully seated.

Install the CKP sensor ring to the installation special tool.

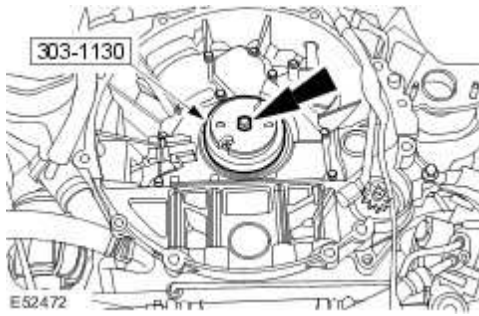


3 . **NOTE:**

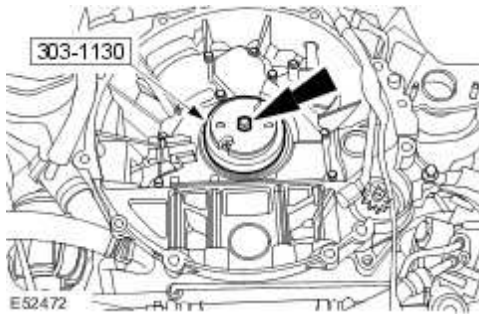
Assemble the installation special tool to the alignment special tool.

Using the special tool, install the CKP sensor ring.

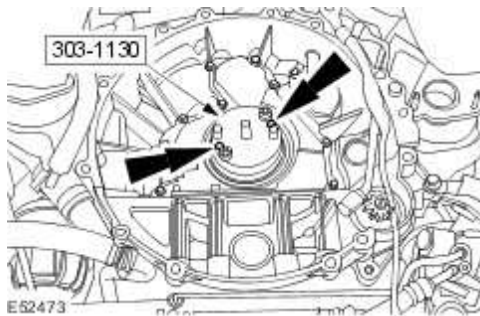
- ▶ Tighten the special tool nut.




- 4 . Remove the installation special tool.



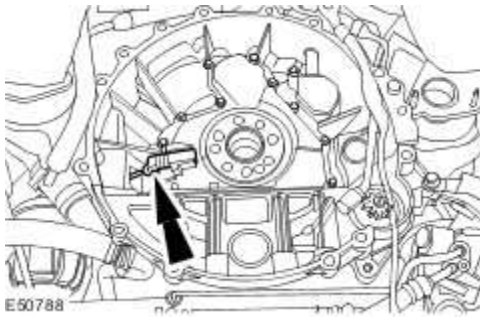
- 5 Remove the special tool retaining bolts and reposition into the threaded holes on the special tool and tighten to remove the alignment special tool from the crankshaft.



- 6  **CAUTION:** Install the CKP sensor correctly into the housing. Failure to follow this instruction may result in damage to the CKP sensor.

Install the crankshaft position (CKP) sensor.

► Tighten to 5 Nm.



7 . Install the flexplate.

For additional information, refer to Flexplate (12.53.13)

Engine Control Module (ECM) (18.30.01)

Removal

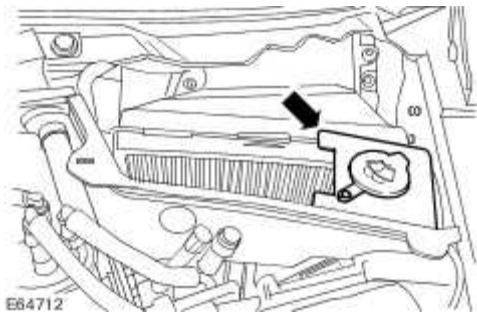
- 1 . Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

- 2 . Remove the cowl vent screen.

For additional information, refer to Cowl Vent Screen (76.10.01)

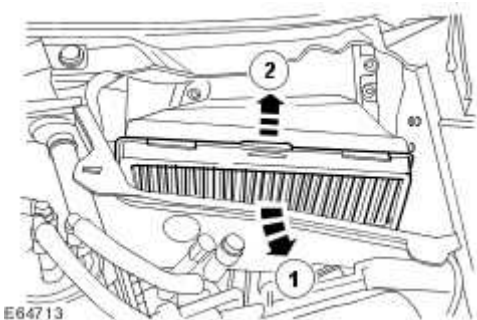
- 3 . Remove the washer reservoir filler neck.



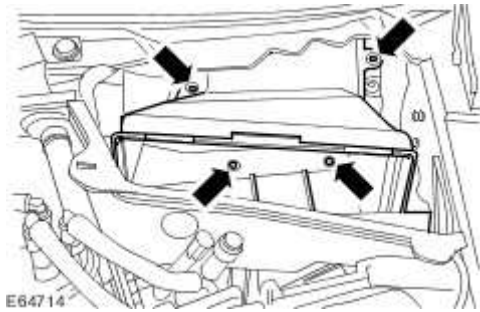
- 4 . Remove the cabin air filter.

1) Detach the cabin air filter.

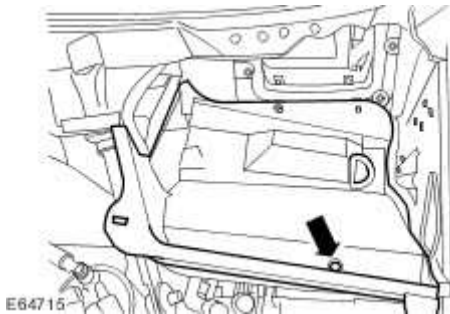
2) Remove the cabin air filter.



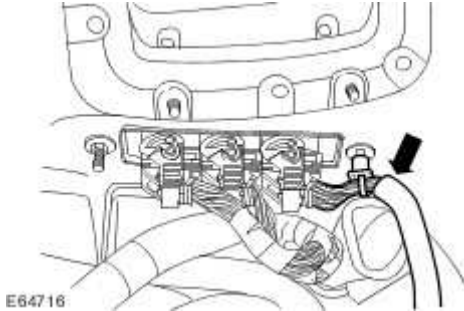
- 5 . Remove the cabin air filter housing.



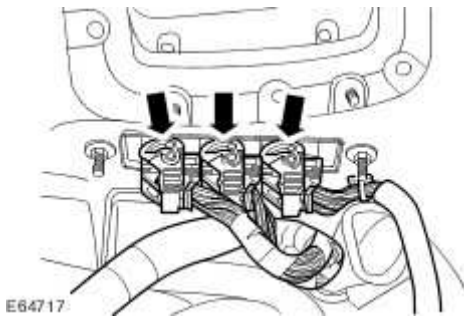
6 . Remove the engine compartment left-hand panel.



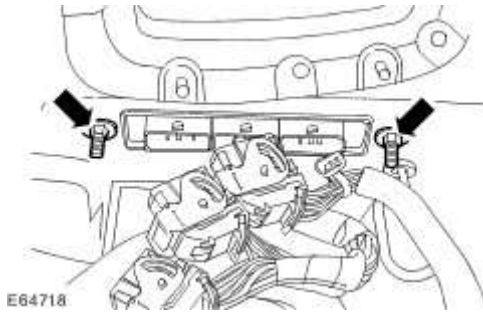
7 . Detach the engine control module (ECM) module wiring harness from the bulkhead.



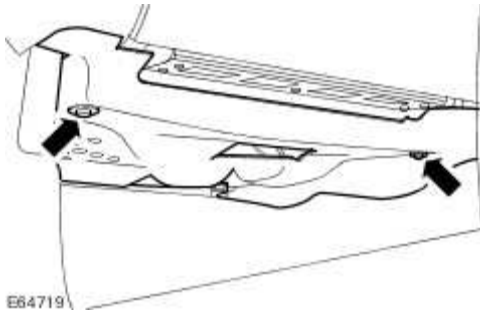
8 . Disconnect the ECM electrical connectors.



9 . Remove the ECM bracket retaining nuts.

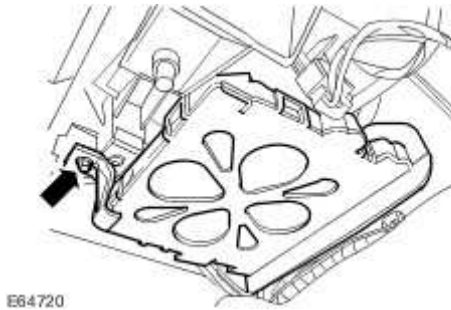


10 . Remove the instrument panel left-hand lower trim panel.



11 . Remove the ECM.

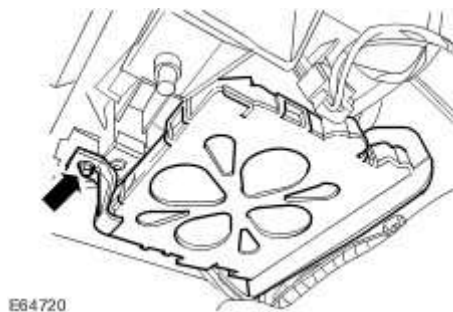
▶ Remove the ECM bracket bolt.



Installation

1 . To install, reverse the removal procedure.

▶ Tighten to 6 Nm.



2 . Tighten to 3 Nm.



Engine Coolant Temperature (ECT) Sensor (18.30.10)

Removal

1



WARNING: Never remove the coolant expansion tank pressure cap under any circumstances while the engine is operating. Failure to follow this instruction may result in personal injury.



WARNING: To avoid hot coolant or steam blowing out of the cooling system, use extreme care when removing the coolant expansion tank pressure cap. Wait until the engine has cooled down, then insulate the coolant pressure cap with a suitable cloth and slowly loosen the coolant expansion tank pressure cap until the cooling system pressure is released. Do not remove the coolant expansion tank pressure cap. Step back while the pressure is released from the system. When all of the pressure has been released slowly remove the coolant expansion tank pressure cap (still with the suitable cloth in position) from the coolant expansion tank. Failure to follow this instruction may result in personal injury.

Release the cooling system pressure.

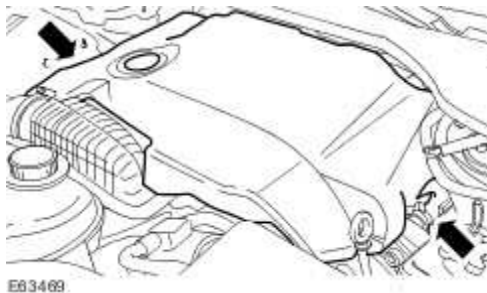


Remove the coolant expansion tank pressure cap.

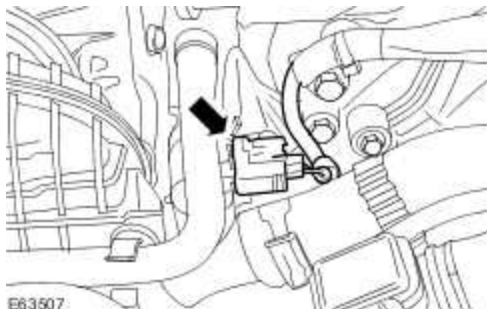
2 . Remove the oil filler cap.



3 . Remove the engine cover.



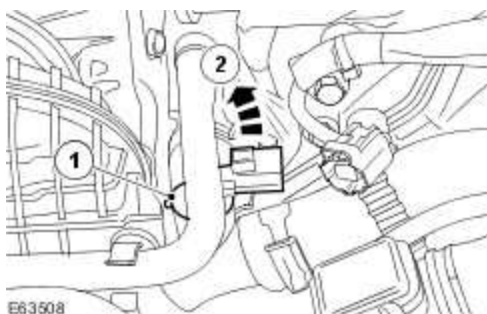
4 . Disconnect the engine coolant temperature (ECT) sensor electrical connector.



5 . Remove the ECT sensor.

1) Lift the locking tang.

2) Rotate the ECT sensor counterclockwise to remove.



Installation

1 . To install, reverse the removal procedure.

► Fill the cooling system up to the MAX mark on the coolant expansion tank.

Exhaust Gas Temperature Sensor

Special Service Tools

303-1184



E67739

Exhaust gas temperature sensor wrench

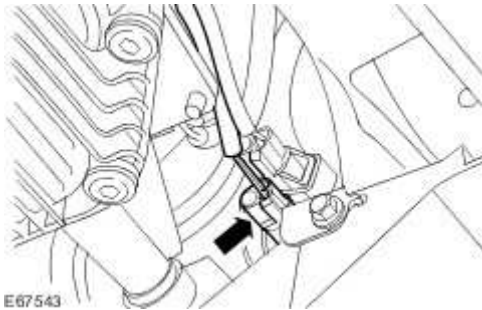
303-1184

Removal

- 1 . Remove the air deflector.

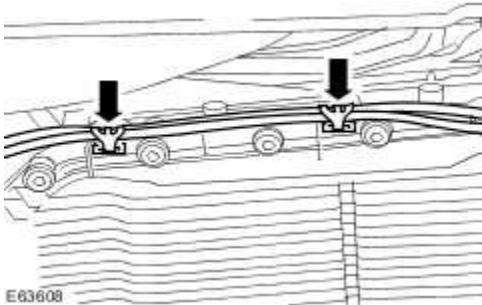
For additional information, refer to Air Deflector (76.11.41)

- 2 . Disconnect the exhaust gas temperature sensor electrical connector.



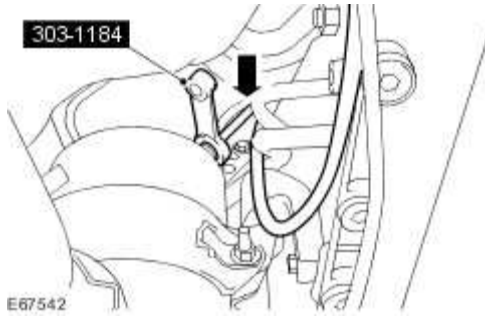
E67543

- 3 . Detach the exhaust gas temperature sensor wiring harness from the transmission.




E63608

- 4 . Remove the exhaust gas temperature sensor.

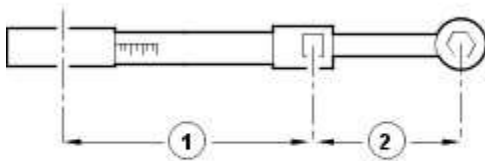


Installation


- 1  **CAUTION: Make sure the torque wrench setting procedure is followed correctly. Failure to follow this instruction may result in damage to the vehicle.**

Calculate the setting for the torque wrench.

- ▶ Stage 1: Multiply the required torque by the effective length of the torque wrench (1).
- ▶ Stage 2: Add the effective length of the special tool (2) to the effective length of the torque wrench.
- ▶ Stage 3: Divide the total of stage 1 by the total of stage 2.
- ▶ Stage 4: Set the torque wrench to the figure arrived at in stage 3.

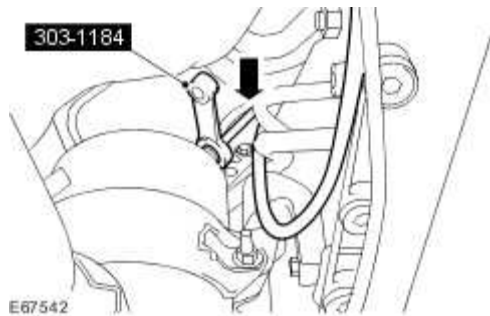


E37107

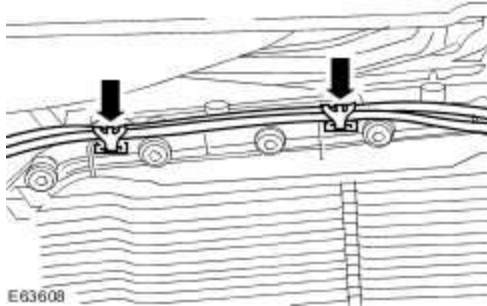
- 2  **CAUTION: Make sure the torque wrench setting procedure is followed correctly. Failure to follow this instruction may result in damage to the vehicle.**

Install the exhaust gas temperature sensor.

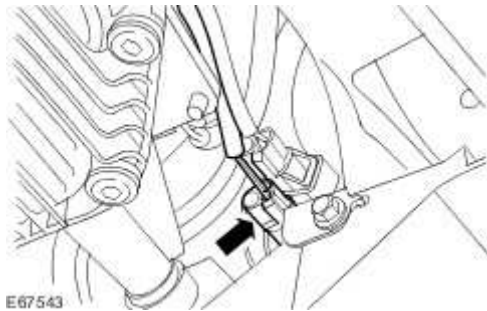
► Tighten to 35 Nm.



3 . Attach the exhaust gas temperature sensor wiring harness to the transmission.



4 . Connect the exhaust gas temperature sensor electrical connector.



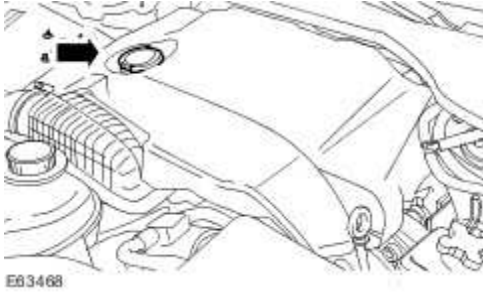
5 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

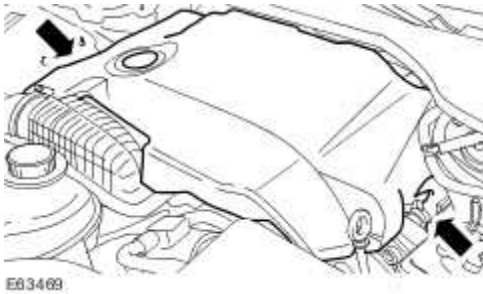
Engine Oil Pressure (EOP) Sensor

Removal

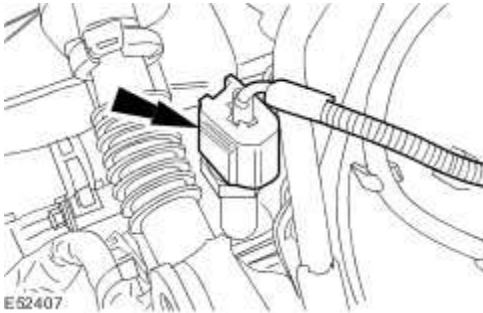
- 1 . Remove the oil filler cap.



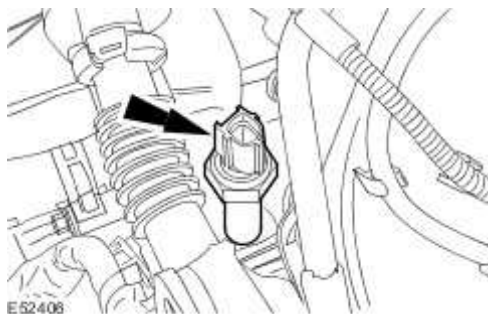
- 2 . Remove the engine cover.



- 3 . Disconnect the engine oil pressure (EOP) sensor electrical connector.



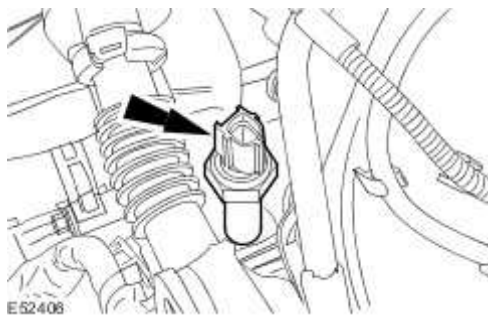
- 4 . Remove the EOP sensor.



Installation

- 1 . To install, reverse the removal procedure.

▶ Tighten to 15 Nm.



Fuel Rail Pressure (FRP) Sensor (18.30.98)

- 1 The fuel rail pressure sensor is removed as part of the fuel diverter rail and can not be serviced separately.

For additional information, refer to Fuel Diverter Rail

Fuel Temperature Sensor (18.30.99)

Removal

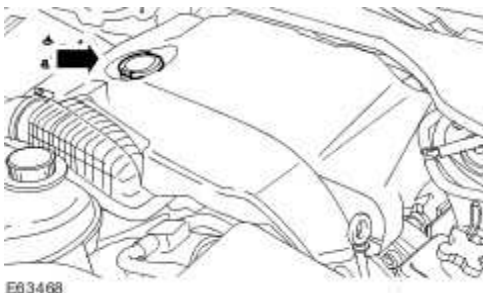


WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury. This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury. Do not carry out any repairs to the fuel injection system with the engine running. The fuel pressure within the system can be as high as 1600 bar. Failure to follow this instruction may result in personal injury. Do not carry out any repairs to the fuel injection system without checking that the fuel pressure has dropped to zero. Failure to follow this instruction may result in personal injury. Wait at least one minute after the engine stops before commencing any repair to the fuel injection system. Failure to follow this instruction may result in personal injury. **CAUTIONS:**

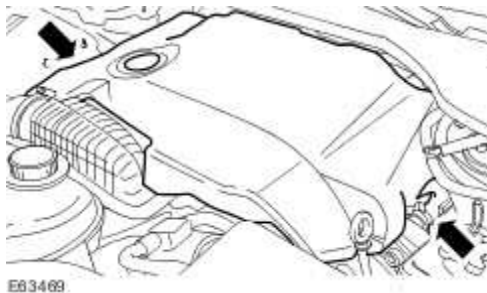


CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction. Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system. Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking caps to any open orifices or lines.

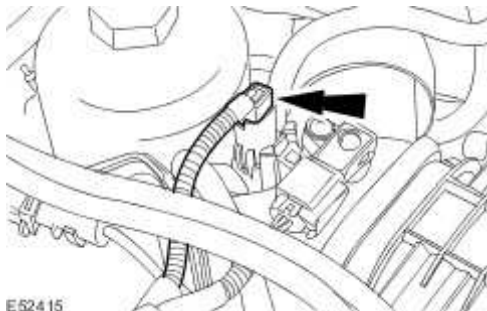
- 1 . Remove the oil filler cap.




- 2 . Remove the engine cover.




3 . Disconnect the fuel temperature sensor electrical connector.



4  **CAUTION:** Do not use excessive force when detaching the fuel return line from the retaining bracket. Failure to follow this instruction may result in damage to the fuel return line.

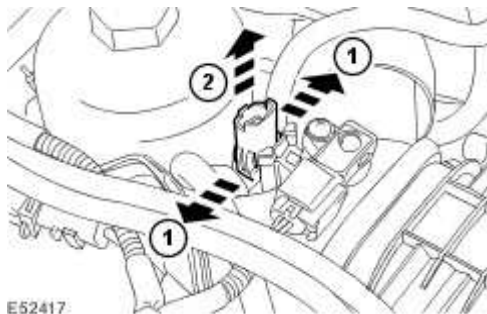
To gain access to the locking tangs, detach the fuel return line from the retaining bracket and position to it one side.



5  **CAUTION:** Do not use excessive force when releasing the fuel temperature sensor locking tangs. Failure to follow this instruction may result in damage to the fuel temperature sensor.

Remove the fuel temperature sensor.

- 1) Release the locking tangs.
 - 2) Remove the fuel temperature sensor from the fuel return line.
- ▶ Install a clean blanking caps to the fuel return line.
 - ▶ Discard the O-ring seal.



Installation



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and may ignite. Failure to follow these instructions may result in personal injury. This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury. Do not carry out any repairs to the fuel injection system with the engine running. The fuel pressure within the system can be as high as 1600 bar. Failure to follow this instruction may result in personal injury. Do not carry out any repairs to the fuel injection system without checking that the fuel pressure has dropped to zero. Failure to follow this instruction may result in personal injury. Wait at least one minute after the engine stops before commencing any repair to the fuel injection system. Failure to follow this instruction may result in personal injury. **CAUTIONS:**



CAUTION: Make sure the workshop area in which the vehicle is being worked on is as clean and as dust free as possible. Foreign matter from work on clutches, brakes or from machining or welding operations can contaminate the fuel system and may result in later malfunction. Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in foreign matter ingress to the fuel

injection system. Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking caps to any open orifices or lines.

NOTE:

Install a new O-ring seal and fuel temperature sensor.

1 . NOTE:

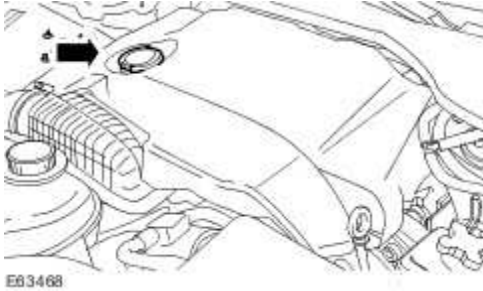
Remove and discard the blanking caps from the fuel return line.

To install, reverse the removal procedure.

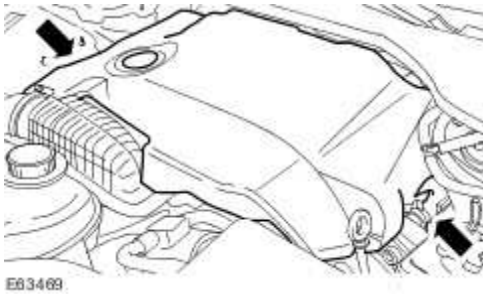
Intake Air Temperature (IAT) Sensor (18.30.52)

Removal

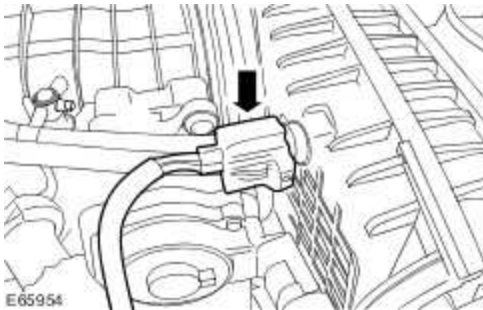
- 1 . Remove the oil filler cap.



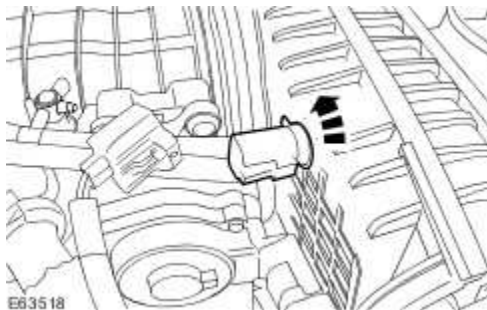
- 2 . Remove the engine cover.



- 3 . Disconnect the intake air temperature (IAT) sensor electrical connector.



- 4 . Remove the IAT sensor.



Installation

- 1 . To install, reverse the removal procedure.

Knock Sensor (KS) LH (18.30.92)

Removal

- 1 . Remove the crankcase vent oil separator.

For additional information, refer to Crankcase Vent Oil Separator

2 NOTE:

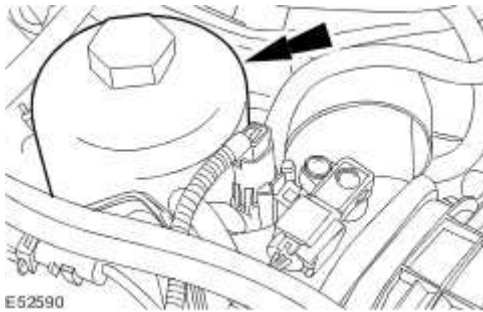
Remove and discard the O-ring seal.

Remove the oil filter element housing.

▶ Rotate the oil filter element housing five complete turns counter-clockwise.

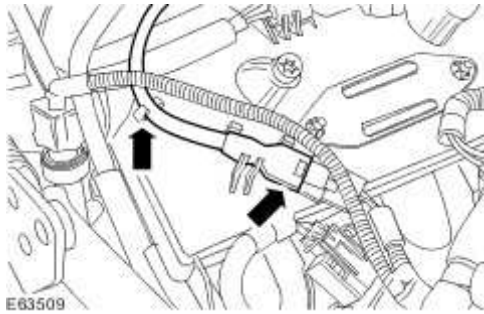
▶ Allow the engine oil to drain from the oil filter element housing for two minutes.

▶ Remove the oil filter element housing.

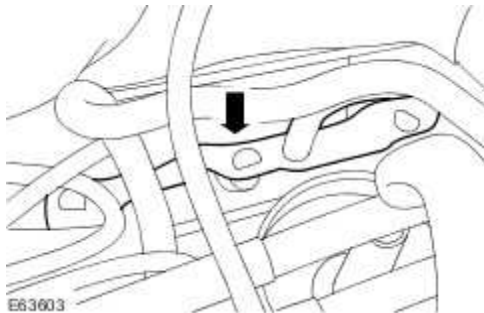


- 3 . Disconnect the knock sensor (KS) electrical connector.

▶ Detach the KS wiring harness.



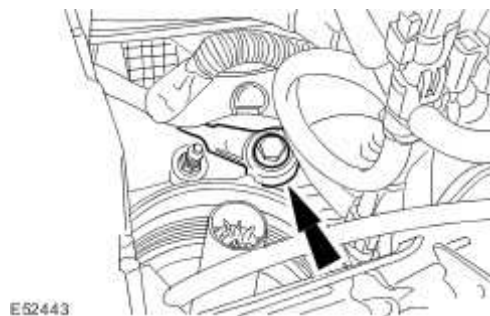
4 . Detach the left-hand glow plug rail.



5 **NOTE:**

Make a note of the orientation of the KS and make sure it is positioned in the same position when installed.

Remove the KS.



Installation

1 . **NOTE:**

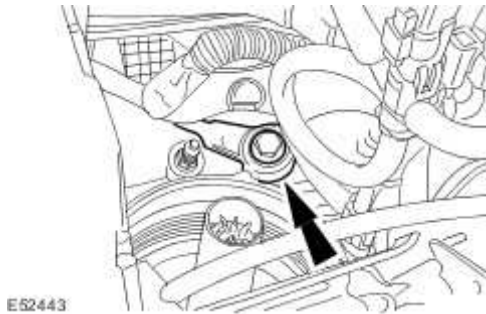
Prior to installing the KS, clean the cylinder head and KS mating surfaces.

NOTE:

Make sure the KS is installed in the same position as removed.

To install, reverse the removal procedure.

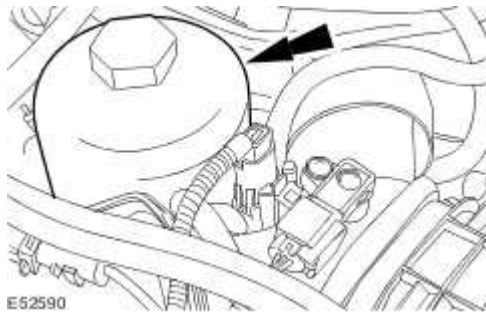
▶ Tighten to 20 Nm.



2 . NOTE:

Install a new O-ring seal.

Tighten to 25 Nm.



Knock Sensor (KS) RH (18.30.93)

Removal

- 1 . Remove the crankcase vent oil separator.

For additional information, refer to Crankcase Vent Oil Separator

2 NOTE:

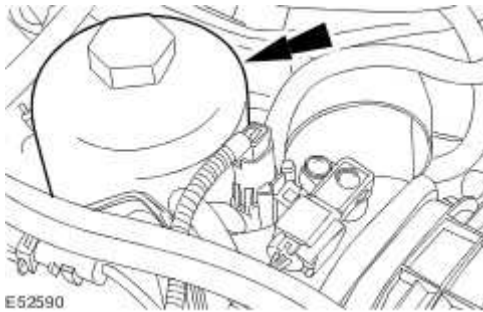
Remove and discard the O-ring seal.

Remove the oil filter element housing.

▶ Rotate the oil filter element housing five complete turns counter-clockwise.

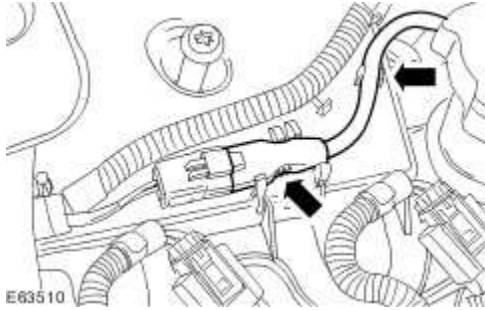
▶ Allow the engine oil to drain from the oil filter element housing for two minutes.

▶ Remove the oil filter element housing.



- 3 . Disconnect the knock sensor (KS) electrical connector.

▶ Detach the KS wiring harness.

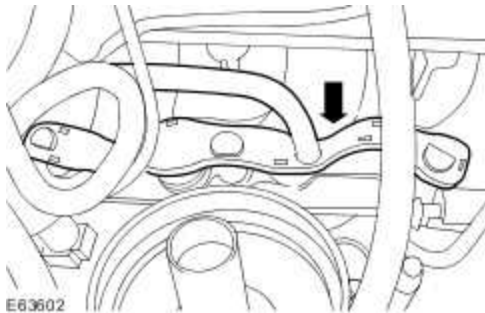


4 NOTE:

Make a note of the routing of the KS wiring harness and make sure it is routed in the same position when installed.

Reposition the KS wiring harness under the intake air shutoff throttle.

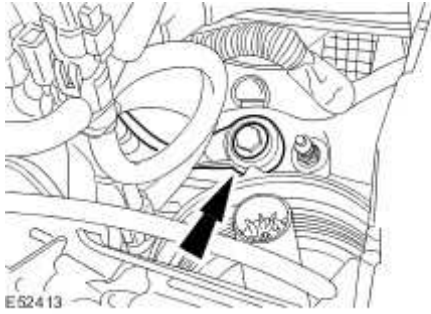
5 . Detach the right-hand glow plug rail.



6 NOTE:

Make a note of the orientation of the KS and make sure it is positioned in the same position when installed.

Remove the KS.



Installation

1 . NOTE:

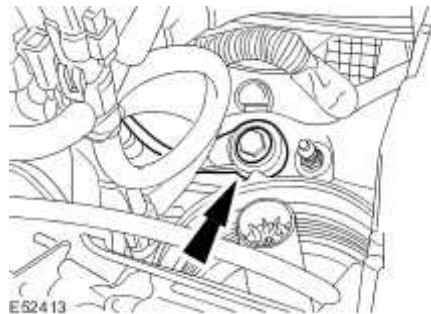
Prior to installing the KS, clean the cylinder head and KS mating surfaces.

NOTE:

Make sure the KS is installed in the same position as removed.

To install, reverse the removal procedure.

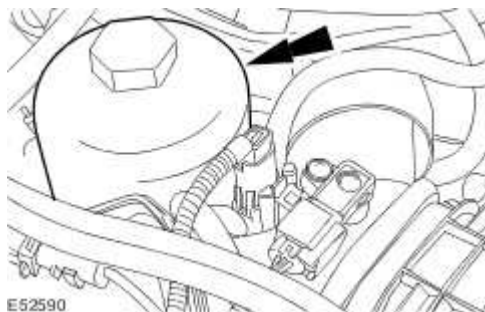
► Tighten to 20 Nm.



2 . NOTE:

Install a new O-ring seal.

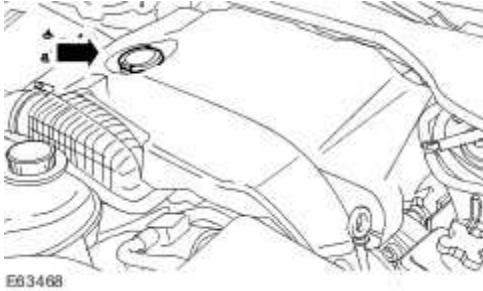
Tighten to 25 Nm.



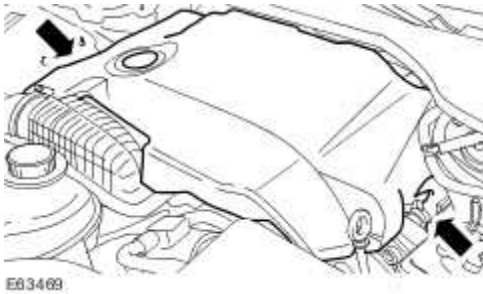
Manifold Absolute Pressure (MAP) Sensor (18.30.86)

Removal

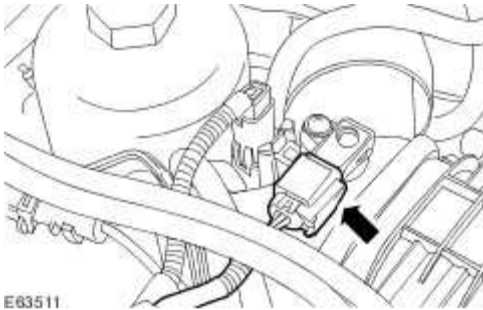
- 1 . Remove the oil filler cap.



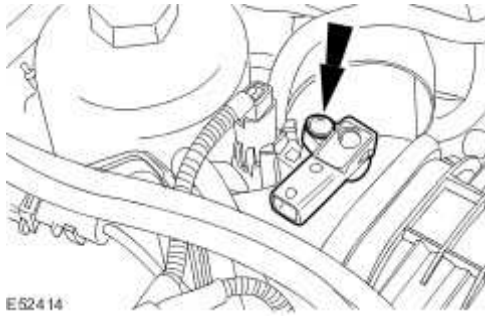
- 2 . Remove the engine cover.



- 3 . Disconnect the manifold absolute pressure (MAP) sensor electrical connector.



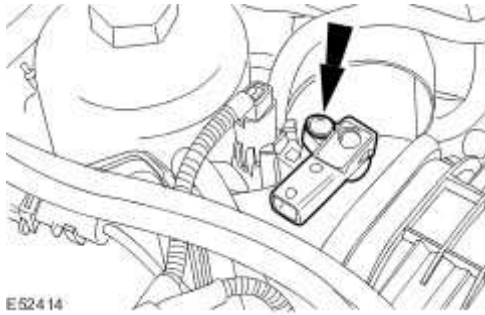
- 4 . Remove the MAP sensor.



Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 3 Nm.



Mass Air Flow (MAF) Sensor (18.30.15)

Removal

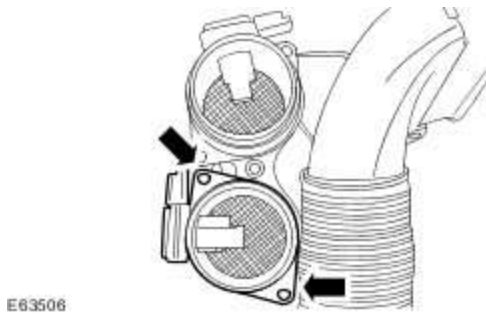
NOTE:

This procedure is showing the lower mass air flow (MAF) sensor removal and installation. The upper MAF sensor removal and installation is similar.

- 1 . Remove the air cleaner.

For additional information, refer to

- 2 . Remove the mass air flow (MAF) sensor.



Installation

- 1 . To install, reverse the removal procedure.

► Tighten MAF sensor retaining screws to 2 Nm.

Oil Temperature Sensor (18.31.01)

Removal

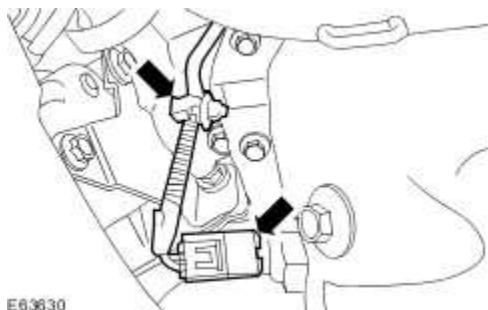
- 1 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

- 2 . Drain the engine oil.

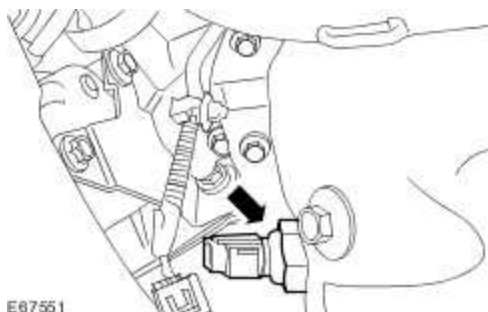
- ▶ Place suitable container under the vehicle.
- ▶ Remove the drain plug and drain the engine oil.
- ▶ Install the drain plug.
- ▶ Tighten to 25 Nm.

- 3 . Disconnect the oil temperature sensor electrical connector.



- 4 . Remove the oil temperature sensor.

- ▶ Remove and discard the O-ring seal.

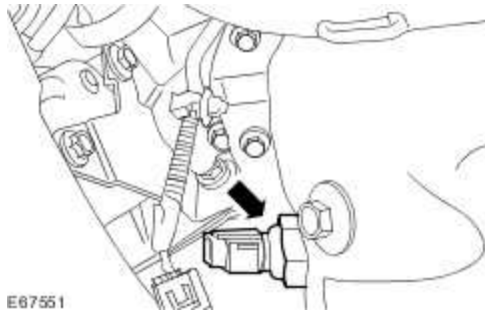


Installation

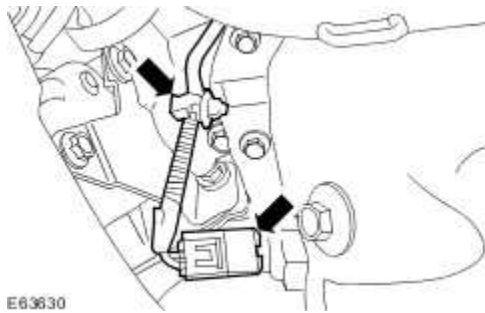
1 . Install the oil temperature sensor.

▶ Install a new O-ring seal.

▶ Tighten to 24 Nm.



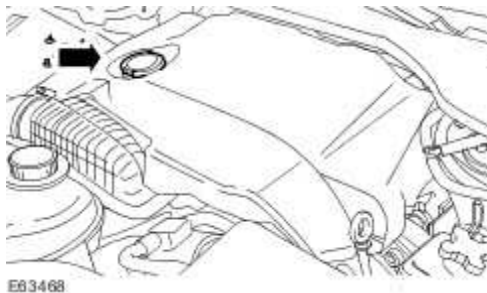
2 . Connect the electrical connector.



3 . Install the air deflector.

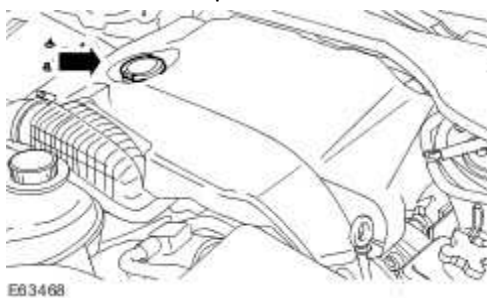
For additional information, refer to Air Deflector (76.11.41)

4 . Remove the filler cap.



5 . Check and top-up the engine oil.

6 . Install the filler cap.



307 : Automatic Transmission/Transaxle

307-01 : Automatic Transmission/Transaxle

Specifications

Specifications

Fluid Maintenance



CAUTION: Use only Shell M1375.4 Automatic transmission fluid. Use of any other fluids may result in a transmission malfunction or failure.

Description	Intervals
Normal Maintenance	Not necessary. Filled for life.
Severe Duty Maintenance	Change the fluid at 48,000 km (30,000 mile) intervals.

Lubricants, Fluids, Sealers and Adhesives

Description	Specification
Transmission Fluid	Shell M1375.4
Sealant	WSS-M4G323-A6
Metal Surface Cleaner	WSW-M5B392-A
High Temperature Grease	Molecote FB180

General Specifications

Engine	Approximate Liters	Refill Capacity Approximate dry capacity, includes cooler and tubes. Check the level at normal operating temperature. DO NOT OVERFILL. If it is necessary to add or change fluid, use only fluid which has been certified by the supplier as meeting the Jaguar Cars Ltd specification shown. U.S. Quarts
3.0L	10.0	10.57
3.5L or 4.2L	10.0	10.57
2.7L	10.0	10.57

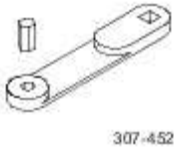
Diesel		
--------	--	--

Torque Specifications

Description	Nm	lb-ft	lb-in
Converter housing to engine retaining bolts	48	35	-
Transmission mount retaining bolts	50	37	-
Transmission fluid fill plug	A	-	-
Transmission control module (TCM) and Main control valve body retaining screws	8	-	71
Output shaft flange retaining nut	60	44	-
Torque converter retaining bolts	55	41	-
Transmission fluid cooler pipes retaining bolt	23	17	-
Transmission selector cable retaining bolts	11	8	-
Transmission fluid cooler tube to oil pan retaining bolt	10	-	89
Transmission fluid drain plug	8	-	71
Transmission fluid pan, gasket and filter retaining screws	8	-	71
Exhaust manifold retaining nuts (3.0L only)	20	15	-
Dipstick tube retaining bolt (3.0L only)	10	-	89
A = refer to the procedure for correct torque sequence			

Transmission Fluid Drain and Refill (44.24.02)

Special Service Tools



Adaptor
307-452

Drain

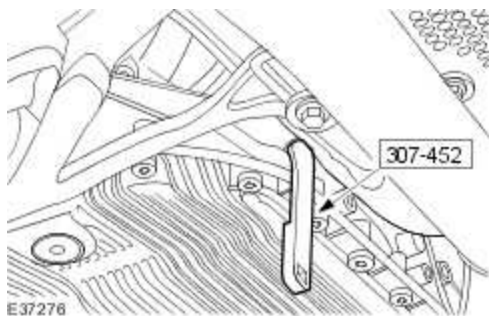
1. Raise and support the vehicle.
Lifting

2. Remove the air deflector (vehicles fitted with diesel engines only).
Air Deflector (76.11.41)

3. Place a suitable container under the transmission.

4. Using the special tool, remove the transmission fluid filler plug.

- Remove and discard the sealing washer.



5.

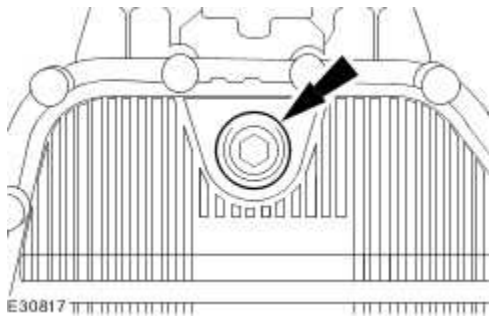


CAUTION: If the automatic transmission fluid is very dirty or it contains metallic particles, then along with a new transmission, install a new automatic transmission fluid cooler and lines.

NOTE:

Discard the sealing washer.

Remove the transmission fluid drain plug.

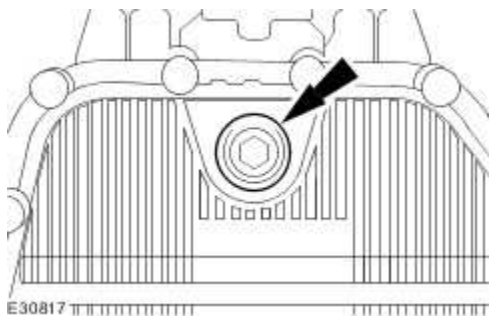


6. NOTE:

Install the new sealing washer.

Install the transmission fluid drain plug.

- Tighten to 8 Nm.

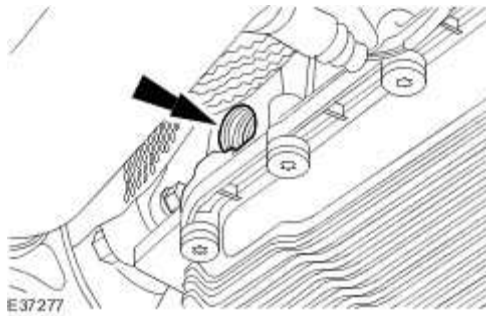


Refill

1. NOTE:

Use transmission fluid meeting Jaguar specification.

Fill the transmission with 8 liters of transmission fluid through the transmission fluid filler plug hole.



2. Carry out a transmission fluid level check.

Transmission Fluid Level Check

3. Install the air deflector (vehicles fitted with diesel engines only).

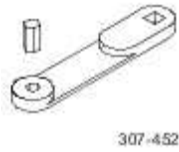
Air Deflector (76.11.41)

4. Lower the vehicle.

Lifting

Transmission Fluid Level Check

Special Service Tools



Adaptor

307-452

1. The following steps must be observed before starting the transmission fluid level check.

- The vehicle must be on a horizontal ramp.
- The parking brake must be applied.
- The engine must be running for 2 minutes with the transmission selector lever in the ' P' position.

2. Connect the Jaguar approved diagnostic system.

3. Make sure the transmission selector lever is in the ' P' position.

4. **NOTE:**

Make sure the transmission fluid temperature is below 30°C (86°F) on the Jaguar approved diagnostic system.

With the engine running and the foot brake applied, circulate the transmission fluid by:

- Moving the transmission selector lever to the ' R' position.
- Waiting for three seconds.
- Moving the transmission selector lever to the ' D' position.
- Waiting for three seconds.

- Moving the transmission selector lever to the 'P' position.

5. Raise and support the vehicle.

Lifting

6. Remove the air deflector (vehicles fitted with diesel engines only).

Air Deflector (76.11.41)

7. Place a suitable container under the transmission fluid filler plug.

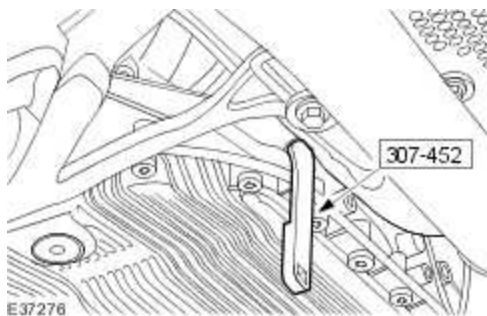
8.



WARNING: Make sure that care is exercised near rotating parts. Failure to follow this instruction may result in personal injury.

With the engine running, remove the transmission fluid filler plug using the special tool.

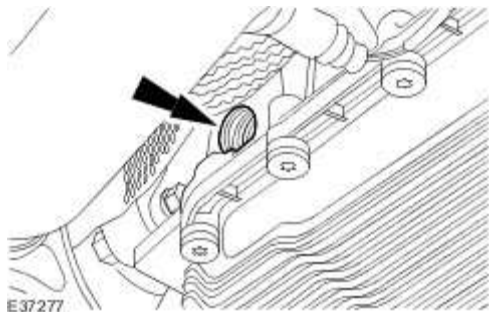
- Remove and discard the sealing washer.



9. **NOTE:**

Use transmission fluid meeting Jaguar specification.

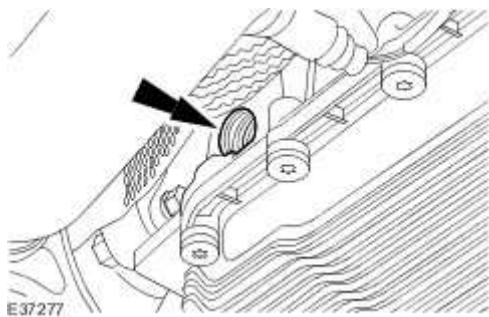
If the transmission fluid does not come out of the transmission fluid filler plug hole the transmission fluid level is insufficient. If this is the case add the transmission fluid in 0.5 liter units into the transmission fluid filler plug hole until fluid comes out.



10. **NOTE:**

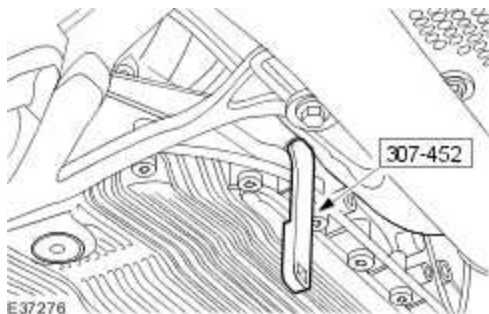
Make sure the transmission fluid temperature does not exceed 50°C (122°F). If the transmission fluid temperature does exceed 50°C (122°F) stop the transmission fluid level check and allow the transmission fluid to cool until the temperature is below 30°C (86°F).

Allow the transmission fluid to drain from the transmission fluid filler plug hole until the flow almost stops.



11. Using the special tool, install the transmission fluid filler plug.

- Install a new sealing washer.



12.

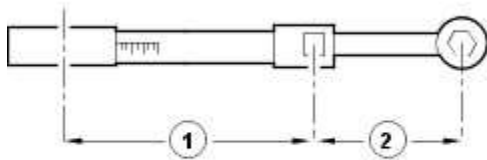


CAUTION: Make sure the transmission fluid filler plug is tightened to the correct

specification. Failure to follow this instruction may result in damage to the vehicle.

Using the special tool and a torque wrench, tighten the transmission fluid filler plug.

- Tighten the transmission fluid filler plug to the torque given by the calculation.
- To make sure the transmission filler plug is torqued to the correct specification. Using the special tool and a torque wrench the following calculation steps must be followed.
Step 1. Multiply 35 Nm by the effective length of the torque wrench (1).
Step 2. Add the effective length of the special tool (2) to the effective length of the torque wrench (1).
Step 3. Divide the total of step 1 by the total of step 2.
Step 4. Set the torque wrench to the figure arrived at in step 3.
- Tighten the transmission fluid filler plug to the torque given by the calculation.



E37107

13. Remove the container.

14. Install the air deflector (vehicles fitted with diesel engines only).

Air Deflector (76.11.41)

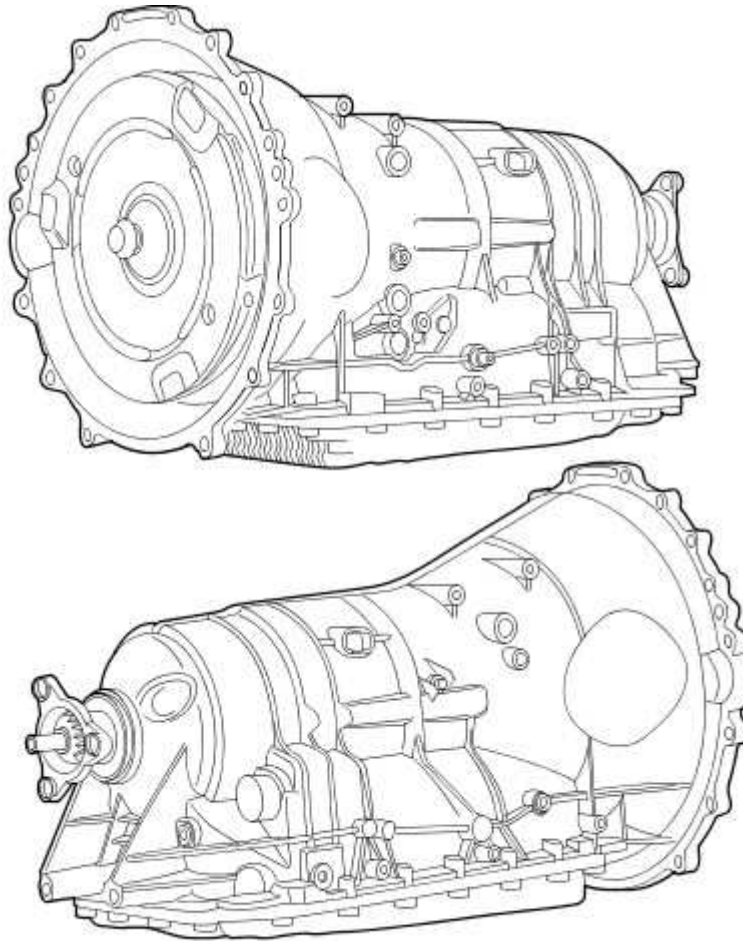
15. Lower the vehicle.

Lifting

16. Disconnect the Jaguar approved diagnostic system.

Transmission Description

The ZF 6HP26 automatic transmission has been developed for vehicles with an engine torque of up to 600 Newton-metres (Nm). This transmission uses planetary gears with hydraulic-electronic control. The transmission control module (TCM) and the main control valve body units form a composite element that is installed as a single unit inside the automatic transmission.



E30230

The 6HP26 has the following features:

- six forward speeds.
- a torque converter with an integral converter lock up clutch.
- electronic shift and pressure controls.
- a single planetary gear set.

a double planetary gear set.

two fixed multi-disc brakes.

three multi-plate clutches.

All hydraulic functions are directed by electronic solenoids to control:

engagement feel.

shift feel.

shift scheduling.

modulated torque converter clutch (TCC) applications.

engine braking utilizing the coast clutch.

Engine power reaches the transmission by a torque converter with integral converter lock up clutch. The 6 forward gears and 1 reverse gear are obtained from a single planetary set followed by a double planetary set also known as lepelletier-type gear sets, these gear sets make it possible to obtain 6 forward gears.

The 6HP26 Automatic Transmission is a six speed electronically controlled transmission comprising the basic elements of a TCM and main control valve body unit, a torque converter, one solenoid valve and six pressure regulators. Gear selection is achieved by the control of Automatic Transmission Fluid (ATF) flow to operate various internal clutches. The TCM operates the electrical components and provides for the control of gear selection shift pressure which increases refinement and torque converter slip control.

In the event of a system fault the TCM also provides for Failure Mode Effect Management (FMEM) to maintain maximum functional operation of the transmission with a minimum reduction in driver, passenger or vehicle safety. In the event of a total loss of control or electrical power the basic transmission functions Park, Reverse, Neutral and Drive are retained. Also 3rd or 5th gear is retained by the hydraulic system, the gear retained is dependant upon the gear selected at time of the failure.

The transmission also contains turbine and output shaft speed sensors, an internal P, R, N, D selector shaft position sensor, and a transmission fluid temperature sensor. The TCM also requires information from the J-Gate to determine when the driver has initiated manual gear selection. The TCM communicates with other electronic control modules by the controller area network (CAN).

The TCM also provides for legislated transmission diagnostics, which meet the requirements of CARB OBDII legislation, monitoring all components, which may effect vehicle emissions. Additional diagnostic functions are also supported to ensure fast repairs of all failures in the service environment.

Upshifts

Transmission upshifting is controlled by the TCM. The TCM receives inputs from various engine or vehicle sensors and driver demands to control shift scheduling, shift feel and torque converter clutch (TCC) operation.

The TCM has an adaptive learn strategy to electronically control the transmission which will automatically adjust the shift feel.

Downshifts

Under certain conditions the transmission will downshift automatically to a lower gear range (without moving the gearshift lever). There are three categories of automatic downshifts, coastdown, torque demand and forced or kickdown shifts.

Coastdown

The coastdown downshift occurs when the vehicle is coasting down to a stop.

Torque Demand

The torque demand downshift occurs (automatically) during part throttle acceleration when the demand for torque is greater than the engine can provide at that gear ratio. If applied, the transmission will disengage the TCC to provide added acceleration.

Kickdown

For maximum acceleration, the driver can force a downshift by pressing the accelerator pedal to the floor. A forced downshift into a lower gear is possible below calibrated speeds. Specifications for downshift speeds are subject to variations due to tire size and engine and transmission calibration requirements.

Range Selection

Depending on the vehicle options selected the transmission range selector may have different range positions.

The standard range selector has eight positions: P, R, N, D, 5, 4, 3 and 2.

J-Gate Range Selection



"P"

In the PARK position:

there is no power flow through the transmission.

the parking pawl locks the output shaft to the case.

the engine may be started.

the ignition key may be removed.

"R"

In the REVERSE position:

the vehicle may be operated in a rearward direction, at a reduced gear ratio.

backup lamps are illuminated.

"N"

In the NEUTRAL position:

there is no power flow through the transmission.

the output shaft is not held and is free to turn.

the engine may be started.

"D"

DRIVE is the normal position for most forward driving.

The D position provides:

automatic shift 1-6 and 6-1.

apply and release of the torque converter clutch.

maximum fuel economy during normal operation.

engine braking in 6th gear.

"5"

The 5 position provides:

automatic shift 1-5 and 5-1.

apply and release of the torque converter clutch.

engine braking in 5th gear.

"4"

The 4 position provides:

automatic shift 1-4 and 4-1.

apply and release of the torque converter clutch.

engine braking in 4th gear.

"3"

The 3 position provides:

automatic shift 1-3 and 3-1.

engine braking in 3rd gear.

"2"

The 2 position provides:

automatic shift 1-2 and 2-1.

engine braking in 2nd gear.

"S"

The sport mode switch:

allows the driver to select or de-select the automatic transmission sport mode.

allows the automatic transmission to operate normally when the sport mode is selected, but under acceleration the gear shift points are extended to make full use of the engine's power reserves.

allows the driver to drive the vehicle in the "D" position with the full automatic transmission shift or manually shift gears in the "second, third, fourth and fifth" positions.

is illuminated when Sport mode is selected.

communicates with the TCM through the CAN network to show the sport mode switch status.

Torque converter

The torque converter is a three element unit containing a single plate lock up clutch. The lock up clutch can be controlled and engaged in any gear 1 to 6. The clutch is applied by removing transmission fluid pressure from one side of the plate. The torque converter transmits and multiplies torque. The torque converter is a three-element device:

impeller assembly

turbine assembly

reactor assembly

The standard torque converter components operate as follows:

The impeller, which is driven by the engine, imparts a circular flow to the transmission fluid in the converter.

This transmission fluid strikes the turbine wheel, which causes the flow to change its direction.

The transmission fluid flows out of the turbine wheel close to the hub and strikes the stator, where its direction is changed again to a direction suitable for re-entering the impeller.

The change in direction at the stator generates a torque reaction that increases the torque reaching the turbine.

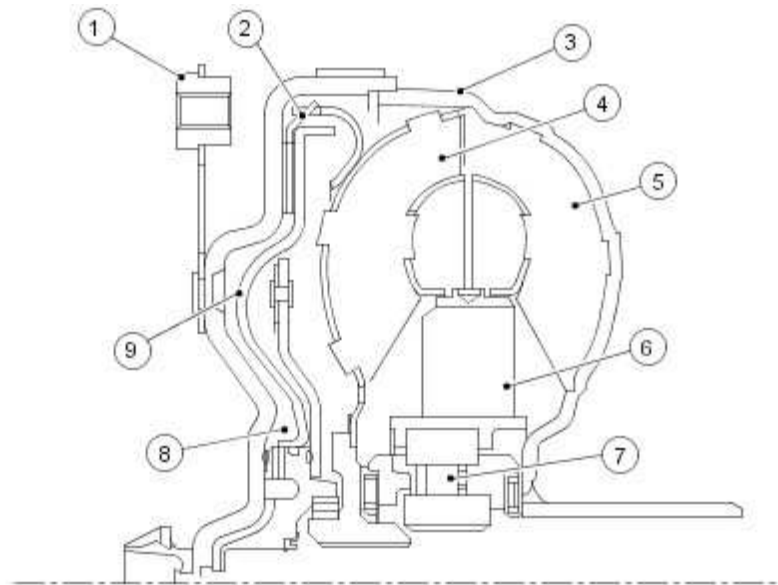
The ratio between turbine and impeller torque is referred to as torque multiplication or conversion.

The greater the difference in speeds of rotation at the impeller and turbine, the greater the increase in torque; The maximum increase is obtained when the turbine wheel is stationary. As turbine wheel speed increases, the amount of torque multiplication gradually drops.

When the turbine wheel is rotating at about 85 % of the impeller speed, torque conversion reverts to 1, that is to say torque at the turbine wheel is no higher than the torque at the impeller.

The stator, which is prevented from rotating backwards by a freewheel and the shaft in the transmission housing, runs freely in the transmission fluid flow and overruns the freewheel. From this point on, the converter acts only as a fluid coupling. During the torque conversion process, the stator ceases to rotate and bears against the housing by the freewheel.

Torque converter



E31501

Item	Part Number	Description

1		Torque converter retaining plate
2		Lock-up clutch lined plate
3		Torque converter cover
4		Turbine
5		Impeller
6		Stator
7		Stator freewheel
8		Space behind lock-up clutch
9		Lock-up clutch piston

Torque Converter Lock-up Clutch

The torque converter lock-up clutch is a device that eliminates slip in the torque converter and therefore helps to keep fuel consumption to a minimum.

The torque converter lock-up clutch is engaged and released by the control system. During the actuating phase, a slight difference is selected between the impeller and turbine wheels.

Pressure at the torque converter lock-up clutch piston is determined by an electronic pressure control valve.

The torque converter lock-up clutch can be controlled and engaged in any gear from 1 to 6. When decoupling takes place the actuating clutch A in the transmission is dependent on load and output speed.

When the torque converter lock-up clutch is released, transmission fluid pressures behind the lock-up clutch piston turbine area are equalized. The direction of flow is through the turbine shaft and the area behind the piston into the turbine area.

To engage the torque converter lock-up clutch the direction of transmission fluid flow is changed and reversed by a valve in the hydraulic control unit. At the same time the space behind the torque converter lock-up clutch piston is vented.

Oil pressure extends from the turbine area to the torque converter lock-up clutch piston and presses it against the cover outer shell of the torque converter. This locks the turbine wheel by way of the lined disc between the piston and the cover and enables the drive to pass with limited slip to the planetary gear train in normal operating conditions.

Geartrain

Power is transmitted from the torque converter to the planetary gearsets through the input shaft. Clutches are used to hold and drive certain combinations of gearsets. This results in six forward ratios and one reverse ratio, which are transmitted to the output shaft and differential.

Gear Ratio

Gear	ratios
1st	4.17:1
2nd	2.34:1
3rd	1.52:1
4th	1.14:1
5th	0.87:1
6th	0.69:1
Rev	3.40:1

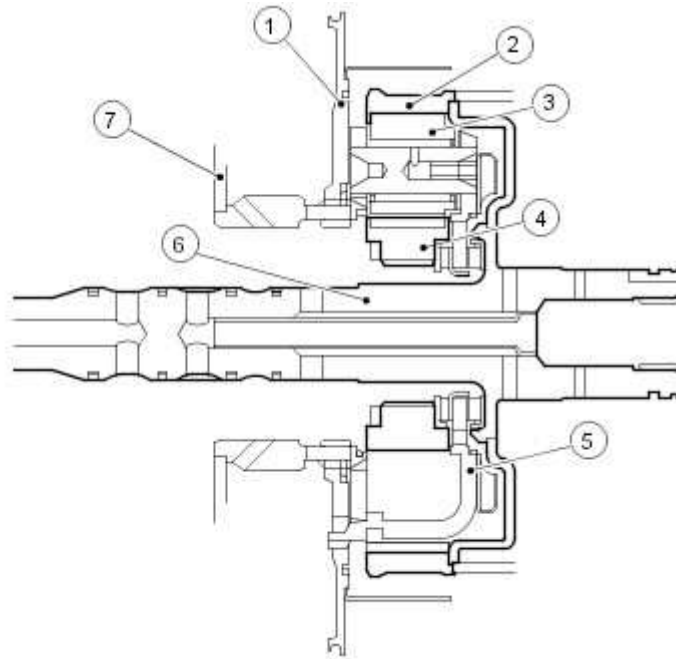
Single Planetary Gearset

The single planetary gear overdrive carrier is driven by the input shaft.

The single planetary gear set consists of:

- 1 sunwheel
- 4 planetary gears meshing with the sunwheel
- 1 planetary gear carrier
- 1 ring gear

Single Planetary Gearset



E31213

Item	Part Number	Description
1		Baffle plate A
2		Ring gear
3		Planetary gear 1
4		Sunwheel
5		Planetary gear spider
6		Turbine shaft
7		Cylinder A

Double Planetary Gearset

The double planetary gearset is splined to the output shaft.

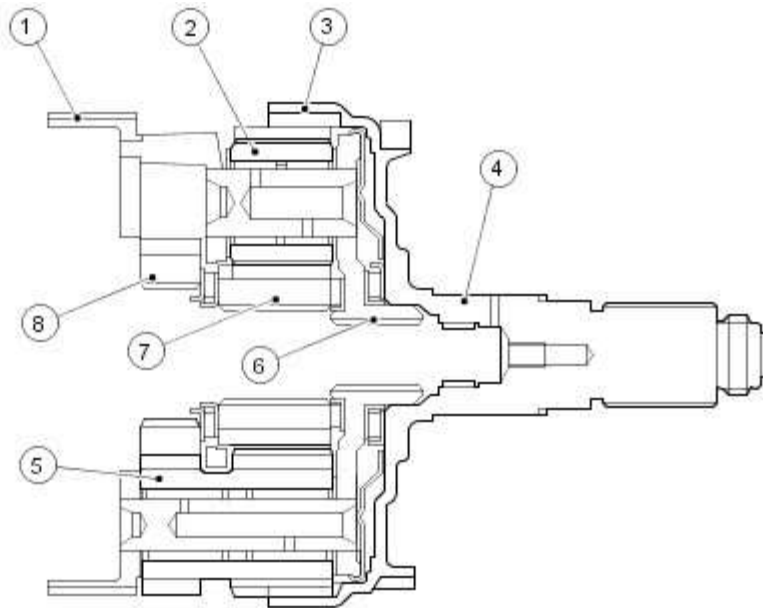
The double planetary gear set consists of:

- 2 sunwheels of different sizes
- 3 short planetary gears meshing with the sunwheels
- 3 long planetary gears meshing with the sunwheels

1 planetary gear carrier

1 ring gear

Double Planetary Gearset



E31212

Item	Part Number	Description
1		Planetary gear spider brake D
2		Planetary gears (short)
3		Ring gear 2
4		Output
5		Double planetary gears (long)
6		Planetary gear spider clutch E
7		Sunwheel 3 clutch B
8		Sunwheel 2 clutch A

Apply Components

Shift Elements

The other shift elements in addition to the torque converter lock-up clutch are:

three rotating multi-plate clutches A, B and E.

two fixed multi-disc brakes C and D.

All gear shifts from 1st to 6th or from 6th to 1st are power-on overlapping shifts, that is to say during the shift one of the clutches must continue to transmit the drive at lower main pressure until the other clutch is able to accept the input torque.

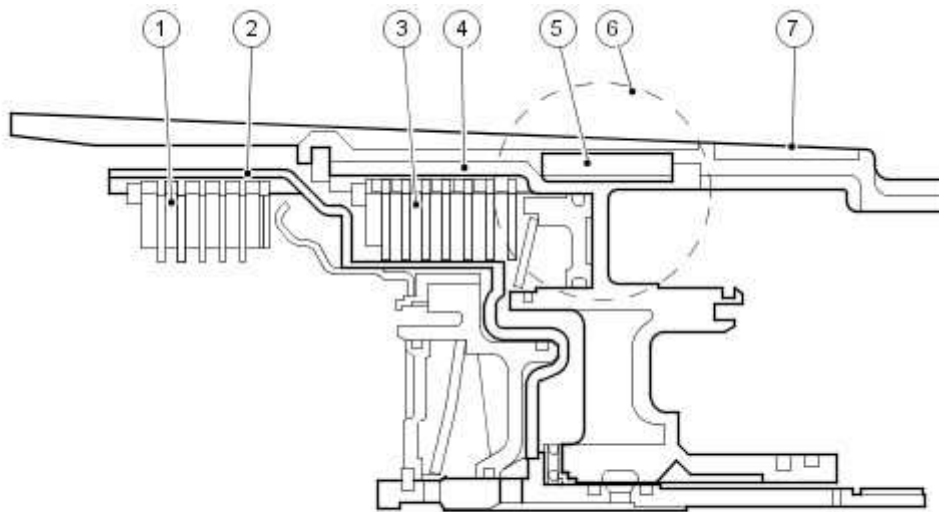
The shift elements, clutches or brakes are engaged hydraulically. The transmission fluid pressure is built up between the cylinder and the piston, this presses the clutch plates together.

When the transmission fluid pressure drops, the cup spring pressing against the piston moves it back to its original position.

The purpose of these shift elements is to perform in-load shifts with no interruption to traction.

Multi-plate clutches A, B and E supply power from the engine to the planetary gear train; multi-disc brakes C and D bear against the transmission housing in order to achieve a torque reaction effect.

Shift Elements



E31211

Item	Part Number	Description
1		Multi-plate clutch B
2		Clutch cylinder B, outer plate carrier
3		Multi-disc brake C
4		Brake cylinder C, outer plate carrier

5		Shaft key
6		Brake cylinder C, outer plate carrier
7		Transmission housing

Multi Plate Clutch

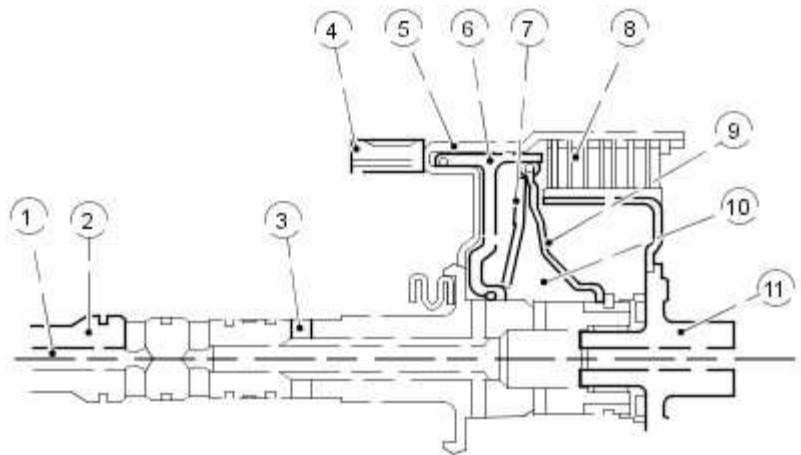
Clutch E is equalized in terms of dynamic pressure, that is to say its piston is exposed to the transmission fluid flow on both sides, in order to prevent pressure build up in the clutch as the speed increases. This equalization process is achieved by a baffle plate and pressure-free transmission fluid supply by a lubricating passage, through which the space between piston and baffle plate is filled with transmission fluid.

The advantages of this dynamic pressure equalization are:

reliable clutch engagement and release in all speed ranges.

improved shift refinement.

Multi Plate Clutch



E31215

Item	Part Number	Description
1		Lubricating transmission fluid passage
2		Turbine shaft
3		Main pressure supply to clutch E

4		Ring gear
5		Cylinder E
6		Piston E
7		Cup spring
8		Clutch plate cluster
9		Baffle plate
10		Space for dynamic pressure equalization
11		Inner plate carrier E

Shift overlap control

When overlap gearshift takes place, freewheels (one-way clutches) are not used but are replaced by suitable actuation of the relevant clutches. This both enables weight and space to be saved.

The electronic-hydraulic shift action is obtained by means of various valves in the transmission control module (TCM) and main control valve body, actuated by pressure regulators. They engage or disengage the relevant clutches or brakes at the correct moments.

Output is always by the ring gear of the second, downstream planetary gear set.

Hydraulic System

Fluid Pump

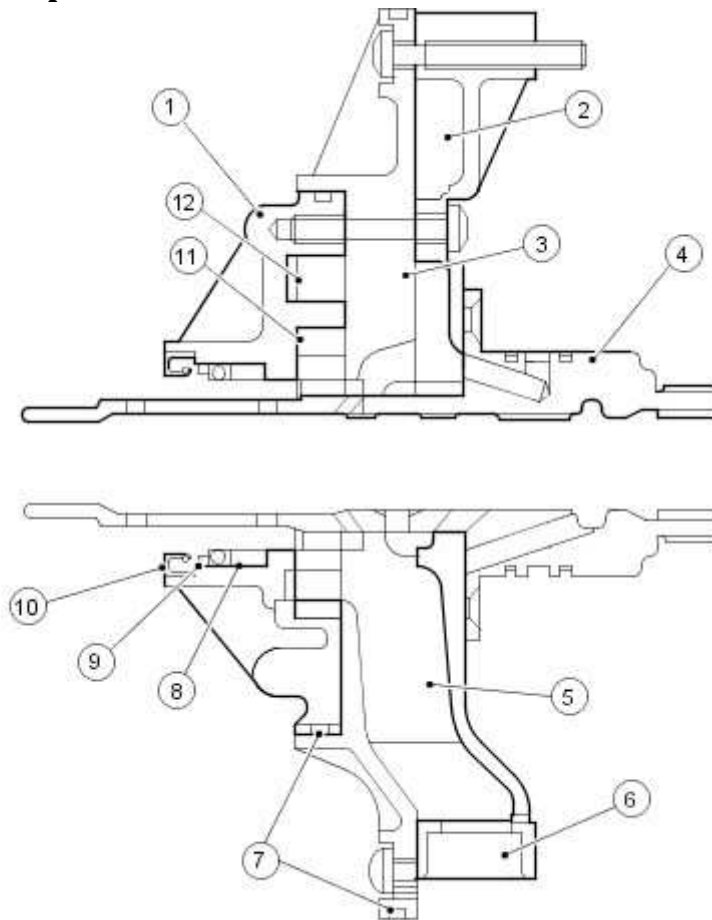
The fluid pump is of a "half-moon" pattern and delivers approximately 16 square cm of transmission fluid per revolution.

It is located between the torque converter and the transmission housing.

The torque converter is supported in the fluid pump by a needle roller bearing. The fluid pump is driven directly from the engine by the torque converter shell and supplies transmission fluid to the transmission and the hydraulic control unit.

The fluid pump draws in transmission fluid through a filter and delivers it at high pressure to the main pressure valve in TCM and main control valve body unit. This valve adjusts the pressure and returns excess transmission fluid to the fluid pan.

Fluid Pump



E31216

Item	Part Number	Description
1		Fluid pump housing
2		Intermediate plate
3		Centring plate
4		Stator shaft
5		Intake port
6		To mesh filter
7		Seal
8		Bearing
9		Retaining clip

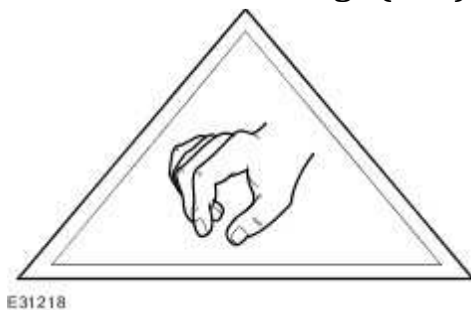
10		Shaft seal
11		Impeller
12		Ring gear

Fluid Pan, Gasket and Filter

The transmission fluid pan, gasket and filter is a one piece assembly, all transmission fluid is drawn from the transmission fluid pan by the fluid pump and passes through the fluid filter.

Transmission Control Module (TCM) and Main Control Valve Body

Electrostatic Discharge (ESD)



CAUTION: When working with the transmission control module (TCM) and main control valve body, all suitable safety precautions must be taken to protect the component against electrostatic discharge (ESD). Failure to follow these instructions may result in component damage.

Make sure all possible safety precautions are taken to protect the TCM and main control valve body unit against ESD.

Personal Wrist-Band Earthing

Earthing (grounding) by means of a wrist band or strap is the most reliable method of diverting electrostatic charges away from working personnel, and should therefore be used wherever possible, particularly if the person concerned is working while seated. The wrist band earthing (grounding) device consists of a bracelet closely attached to the wrist and a spiral earthing (grounding) cable connecting it to the earthing (grounding) contact point. This system must include a quick-release device so that the wrist can be released in the event of danger.

Shoes and Foot Earthing Straps

Electrically conductive shoes should be worn by persons who mainly work standing up or either standing or sitting in ESD protection zones, particularly if wrist band earthing (grounding) is impracticable. The standard calls for ESD shoes to record values between 0 and 35 Megga-ohms (MOhm) resistance. However, for antistatic working shoes resistance values between 0.1 and 1000

MOhm are called for, and a through-conducting resistance for protective shoes of 0.1 to 100 MOhm. A lower limit value of not less than 0.1 MOhm must be maintained on account of the contact voltage risk. For this reason the minimum value has been set contrary to the standard at the higher figure of 0.75 MOhm.

Transmission Control Module (TCM) and Main Control Valve Body

The transmission control module (TCM) and main control valve body is a combination of hydraulic and electronic control units. Both these modules are installed in the transmission, in the fluid pan.

This technical principle has the following advantages:

- Minimum tolerances (TCM is mated to solenoids)

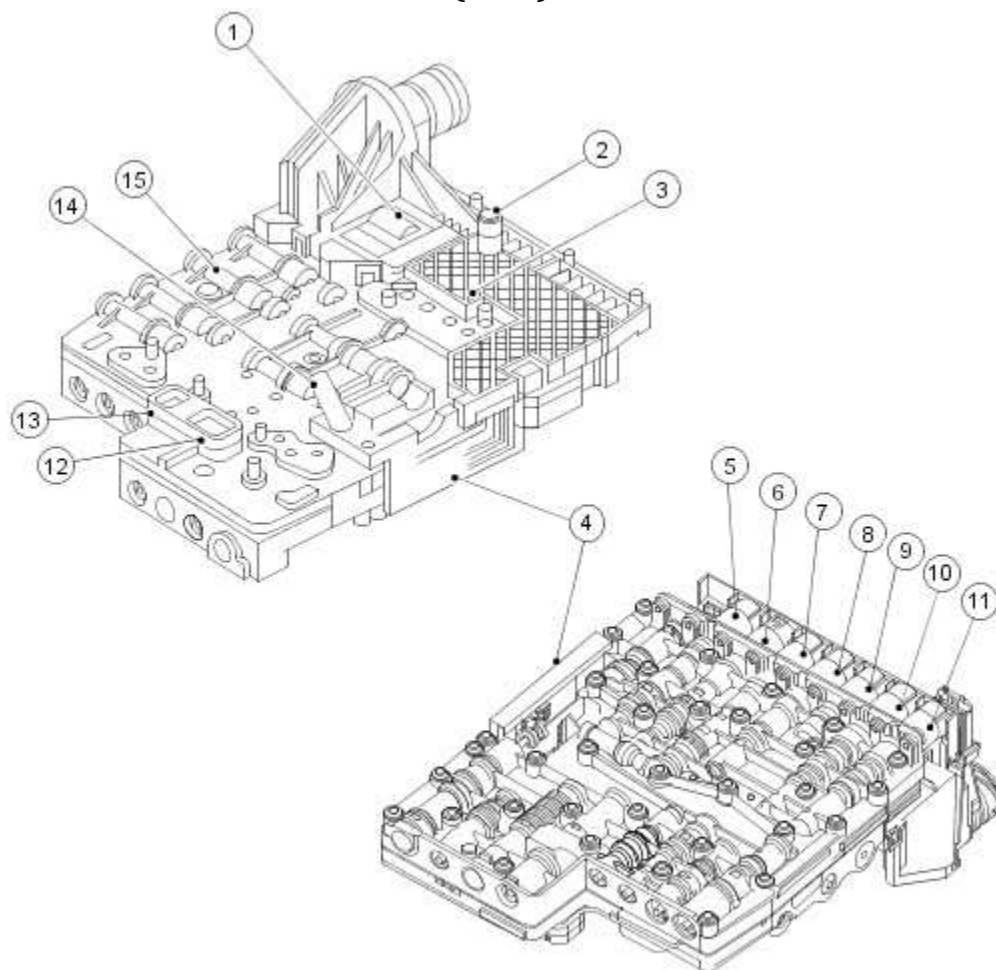
- Better coordination of gear shifts

- Increased refinement

- Optimized shift quality

- Good reliability, since the number of plug connections and interfaces is reduced.

Transmission Control Module (TCM) and Main Control Valve Body



E31217

Item	Part Number	Description
1		TCM
2		Output speed sensor
3		Transmission fluid temperature sensor
4		Position switch
5		Pressure regulator 6
6		Solenoid valve
7		Pressure regulator 5
8		Pressure regulator 4

9		Pressure regulator 3
10		Pressure regulator 2
11		Pressure regulator 1
12		Discharge port
13		Suction port
14		Turbine speed sensor
15		Main control valve body

Transmission Electronic System

The transmission control module (TCM) and its input/output network control the following transmission operations:

shift timing.

line pressure (shift feel).

torque converter clutch.

In addition, the TCM receives input signals from certain transmission-related sensors and switches. The TCM also uses these signals when determining transmission operating strategy.

Using all of these input signals, the TCM can determine when the time and conditions are right for a shift, or when to apply or release the torque converter clutch. It will also determine the pressure needed to optimize shift feel. To accomplish this the TCM uses six pressure control solenoids and one shift solenoid to control transmission operation.

The following provides a brief description of each of the sensors and actuators used to control transmission operation.

TCM

The TCM for the transmission is mounted on top of the main control valve body. The control module for the transmission has been designed to operate correctly in the environment in which the TCM is located.

The transmission control module is activated and deactivated by the ignition supply and is connected to the transmission link harness by a 16-way connector.

The TCM controls the operation of the transmission. The TCM processes information received in both analogue and digital form such as:

Transmission input speed

Output speed

Throttle pedal position

Gear selector position

Engine torque

Engine speed

Transmission fluid temperature

Brake pedal status

Engine oil temperature

Coolant temperature

ABS wheel speed

This information is then used by the TCM to decide which shift pattern to select and for shift energy management. Electro-hydraulic solenoid valves and pressure regulators control the transmission gear changes.

Five pressure regulators and one solenoid valve are used to control direct transmission fluid flow to select internal clutches and control the fluid pressure at the clutch. A separate pressure regulator is used exclusively for torque converter clutch control.

The TCM monitors all TCM inputs and outputs to confirm correct system operation. If a fault occurs the TCM is able to perform default action and inform the driver of the problem, this is by the instrument cluster message centre.

Solenoids

The hydraulic module contains one solenoid valve. The solenoid valve is actuated by the TCM and has two positions of open or closed, it is used to switch the position valve.

There are six electronic pressure control valves, these convert an electric current into a proportional hydraulic pressure. They are energized by the TCM and actuate the valves belonging to the relevant switching elements.

Controller Area Network (CAN) Interface

For the TCM to be able to perform shift point and shift quality management a number of external signals are required. For shift point management alone the TCM requires output speed sensor,

throttle pedal position, brake pedal status and gear selector position. The controller area network (CAN) bus is used to share information between control modules. The TCM obtains most of its required data over the CAN bus from the electronic engine controls, J-Gate and ABS, Instruments pack and diagnostic tools.

Brake Pedal Position (BPP) Switch

The brake pedal position (BPP) switch tells the TCM when the brakes are applied, and disengages torque converter clutch. The BPP switch closes when the brakes are applied and opens when they are released. The BPP is also used to disengage the brake shift interlock and stops gradient calculations.

Engine Coolant Temperature (ECT) Sensor

The engine coolant temperature (ECT) sensor detects engine coolant temperature and supplies the information to the TCM. The ECT sensor is used to control the torque converter clutch (TCC) operation.

Accelerator Pedal Position (APP) Sensor

The accelerator pedal position (APP) sensor is a potentiometer mounted on the accelerator pedal. The APP sensor detects the position of the accelerator pedal and sends this information to the electronic control module (ECM). The APP sensor is used for shift scheduling and TCC lock-up.

Input Shaft Speed (ISS) Sensor

The input shaft speed (ISS) sensor is a Hall effect type sensor.

The ISS sensor is mounted internally on the transmission and is located on the TCM and main control valve body unit.

Output Shaft Speed (OSS) Sensor

The output shaft speed (OSS) sensor is a Hall effect type sensor.

The OSS sensor is mounted internally on the transmission and is located on the TCM and main control valve body unit and is used for shift scheduling.

Transmission Fluid Temperature (TFT) Sensor

The TCM utilizes one transmission fluid temperature sensor located on the main control valve body. The TCM uses the sensor input to activate various shift strategies. The sensor is in the form of a temperature dependent resistor.

The temperature sensor performs plausibility checks on each sensor reading. Obviously, the transmission oil temperature should not jump in value excessively between sensor readings. If the inputs from the temperature sensor are outside the working range it possible that the sensor is short or open circuit.

Position sensor

The TCM uses the position of this switch housed on the TCM and main control valve body, to determine the selected gear range on the Automatic side of the selector lever.

The selector lever is connected to the transmission by a cable, which operates the transmission selector shaft between positions Park, Reverse, Neutral and Drive. The TCM detects the driver's choice of manual range selection (5,4,3,2) by means of a 3-bit code generated by the J-gate. This 3-bit code is then transformed in to a CAN message by the J-Gate module and transmitted on to the CAN bus where it is detected by the TCM.

3-Bit Code

Position	3-Bit Code		
2nd Gear	0	1	0
3rd Gear	0	1	1
4th Gear	1	0	0
5th Gear	1	0	1
P, R, N, D	1	1	1

The TCM uses this information to generate the CAN message "Gear Position Selected", which must not be confused with the similar message "Gear Position Actual" indicating the current mechanical gear ratio activated by the TCM.

Movement of the lever between Park, Reverse, Neutral and Drive manually controls the flow of transmission fluid, the TCM having control of the forward gear selected in Drive. Additional movement of the lever to 5,4,3 and 2 positions does not manually modify the fluid flow, the TCM detects these positions, and controls the gear selected electronically.

Sport mode switch

The sport mode switch:

Allows the driver to select or de-select the automatic transmission sport mode.

Allows the automatic transmission to operate normally when the sport mode is selected, but under acceleration the gear shift points are extended to make full use of the engine's power reserves.

Allows the driver to drive the vehicle in the "D" position with the full automatic transmission shift or manually shift gears in the "second, third, fourth and fifth" positions.

Is illuminated when Sport mode is selected.

Communicates with the TCM through the CAN network to show the sport mode switch status.

TCM Monitoring Functions

As explained above the TCM monitors all input and outputs to identify possible failures. If a fault is detected the TCM takes the appropriate action to ensure the transmission enters a safe mode of operation, without sacrificing transmission durability or driver safety.

Supply Monitoring

If the battery voltage is either too great or too low, the TCM will detect a fault condition. For the TCM to be able to identify this fault, the engine must be running and the transmission fluid temperature sensor must be functioning correctly.

Solenoid Supply Monitoring

While the solenoid operating transistors are being activated, checks are run for open circuits, shorts circuits to ground and short circuits to supply. The monitoring function evaluates the voltage characteristics during the switch on process checking for the above faults.

All solenoid outputs are fully protected. The processor and the appropriate fail-safe action taken can quickly identify open and short circuit faults.

Sensor Supply Monitoring

The sensor supply voltage is a stabilized supply. This supply is monitored by the micro-processor by an Analogue to Digital Converter (ADC). If the voltage is out of the valid tolerance a raise a diagnostic trouble code (DTC) is set and the appropriate fail-safe action is performed.

Electronically Erasable Program Read Only Memory (EEPROM) Monitoring

To diagnose errors with the electronically erasable program read only memory (EEPROM) the TCM calculates 4 checksums continuously: If the processor identifies discrepancies in any of the four checksums the TCM will engage mechanical limp-home mode.

The TCM can diagnose errors within the EEPROM. Diagnosis is only performed during TCM initialization. There is no fail-safe mechanism associated with this function as the EEPROM is mainly used for the storage of fault codes and transmission calibration adaptations. If a fault occurs the TCM is able to perform default action and inform the driver of the problem, this is by the instrument cluster message centre.

Watchdog Monitoring

The watchdog monitoring function has two functions. Firstly it checks that it is possible to inhibit output control by the activation of the solenoid supply transistor. Secondly the watchdog checks that the safety circuit is functioning correctly.

During initialization the watchdog checks that it is possible to inhibit control of the pressure regulator and solenoid valves by switching the solenoid supply transistor. There is a fault if activation of the solenoids cannot be inhibited by the watchdog (NB. The supply to the solenoids can still be inhibited by the high side switch responsible for control of each solenoid i.e. One safety path is lost).

Monitoring the Substrate Temperature Sensor

The TCM is situated within the transmission on the valve body. As the TCM controls a number of high power solenoids and is surrounded by ATF, the TCM can obviously get very hot. If the temperature of the hardware rises above a pre-determined level the TCM will be shut down. Prior to the TCM shutting down the TCM will log a fault code, during shutdown the transmission will enter mechanical limp-home mode. Monitoring of the substrate temperature is performed by a temperature dependent resistor mounted on the processor.

Plausibility Checking

The TCM detects a fault if an excessive voltage jump is identified between any two consecutive measurements. Also, with the engine started from cold the transmission fluid temperature will start to rise. Therefore the substrate or fluid temperature will also start to rise because the TCM is surrounded by transmission fluid. If the engine and output shaft speed is higher than a set threshold for a predetermined length of time without the substrate temperature rising above a set threshold a fault will be detected.

Pressure Regulator/Solenoid Monitoring

Each pressure regulator and solenoid is monitored for open circuits and short circuits. The TCM also checks that the current being delivered to each solenoid valve or pressure regulator is within valid limits. When each solenoid is being driven with minimum current the TCM checks that the current is not above a threshold value. If a solenoid is being driven with maximum current, it checks that the current is not below a valid threshold. If either of these two errors occurs a plausibility error is logged and the appropriate fail-safe action is performed.

Output Speed Monitor

It is possible for the TCM to diagnose electrical errors associated with the output speed sensor while the vehicle is stationary as well as moving. Plausibility monitoring is performed on the sensor output when the vehicle is moving.

Input Speed Monitor

It is possible for the TCM to diagnose electrical errors associated with the input shaft speed sensor while the vehicle is stationary as well as moving. Plausibility monitoring is performed on the sensor output when the vehicle is moving.

Transmission Fluid Temperature Sensor Monitoring

The TCM monitors for faults associated with the transmission fluid temperature sensor in the following ways:

- 1 . Open and short circuit fault detection.
- 2 . The temperature cannot alter by more than a predefined differential between any two consecutive measurements.
- 3 . The transmission fluid temperature must rise after the engine has been started provided that the

fluid temperature was low enough to begin with (The vehicle must be driven and the diagnostic test condition met).

Position Sensor Monitoring

The TCM can identify errors with the position switch located within the transmission. If an unrecognized position code is read by the TCM a plausibility fault will be logged. (A code is checked between positions).

The position switch outputs a 4-bit code to the TCM, the bits being labelled L1-L4. For the transmission, the following codes are used to identify the selector position.

Only for the automatic side of the J-GATE P,R,N,D

Selector position switch code

Position	Code			
	L1	L2	L3	L4
Park	0	0	1	0
Reverse	0	0	0	1
Neutral	0	1	0	0
Drive	1	1	1	0

Gear Ratio Monitoring

The gear ratio diagnostic checks that each gear ratio is correctly engaged. Also, following a gear shift the diagnostic checks that the transmission has engaged the target gear within the allowed time.

Torque Converter Monitoring

The TCM checks that the torque converter can be locked correctly. If torque converter lock-up does not occur correctly the TCM performs the appropriate fail-safe action of opening the Torque converter clutch.

Torque Converter Lock-up Control

The TCM controls how the torque converter clutch is engaged as a function of the accelerator pedal position , output speed, transmission fluid temperature, gear selected and shift program. Lock-up is possible in all forward gears, but usually it is restricted to fourth, fifth and sixth gears. To make use of the comfort enhancing effect of the torque converter, the converter clutch can be disengaged prior to a downshift or up-shift. The torque converter lock up clutch is always modulated to allow for controlled slip, to further improve the shift quality.

Shift Energy Management

This function involves reducing or increasing the engine output torque during shifting. The aim when up-shifting is to reduce the energy that is dissipated in the friction elements of the transmission. This is done by reducing the engine torque during synchronization without interrupting the tractive drive. This function may be used for:

Increasing the transmission service life by shortening the slipping time.

Improving the shift comfort by reducing the step change in torque caused by the gearshift.

Transferring a higher engine power, this is allowed by the mechanical in-gear strength of the transmission.

Real-time control of engine torque is required to maintain maximum shift quality and transmission durability. The TCM has the ability to control the engine output torque during the gearshift to synchronize with the operation of the transmission clutches.

Pressure Modulation

To provide a high level of shift comfort and durability, the hydraulic pressure in the shift related friction elements of the transmission must be matched very accurately to the transmission input torque. This hydraulic pressure is composed of a hydraulically pre-set basic pressure and a controlling pressure that is set by one of the electro-hydraulic pressure regulators.

The transmission input torque can be directly calculated from the following operating parameters: engine torque signals, engine speed or any signals transmitted from the ECM by CAN, and converter slip. Separate pressure characteristics for each gear change make it possible to adapt precisely to the particular shift operation. A further improvement in shift comfort is achieved by individual treatment of special cases, such as manual shifts.

Shift Quality Adapts

The shift quality adapts are used to obtain a high quality and consistent shift feel. This is achieved through monitoring shift quality and then adapting the shift pressures and shift energy management to overcome hardware variability and "in service wear".

It will typically take a new transmission approximately 161 kilometers (100 miles) of use to fully adapt.

Shift Point Selection

The gearshift points are selected by the TCM, as a function of the output speed, accelerator pedal position, selector position and shift program selected. The driver has control over the shift points by the selector lever, accelerator pedal movement and mode switch.

Transmission Shift selection

Shift Map Selection

The transmission control system utilizes a number of driver selectable operating modes and also a number of adaptive/automatically selectable modes. Sport, Normal and Cruise Control mode are all driver selectable. Hot mode, traction control mode and trailer towing mode are all adaptive modes i.e. the transmission will automatically select this mode dependent upon the current driving conditions.

Normal Mode

Normal mode can be selected by activation of the transmission mode switch located on the J-Gate. Once activated this mode will remain engaged until the driver deselects the mode or engages the cruise control system. If the driver engages cruise control when Normal mode is active upon deactivation of the cruise system the transmission will automatically re-engage Normal mode. This mode can be over-ridden by a number of adaptive modes.

The mode switch is of the momentary type.

Cruise Mode

When the driver engages the cruise control system the TCM receives a CAN message transmitted by the Adaptive Cruise Control (ACC) or engine electronic controls which informs the TCM that cruise control is currently active. Upon receipt of this message the TCM selects a new transmission shift map. This map has been developed to reduce busy gearshift during cruise mode. It has also been developed to increase fuel economy.

Hot Mode

This is one of the adaptive modes the transmission can enter when conditions are correct. When the transmission fluid temperature, chip temp, engine oil temp or coolant temperature becomes hot enough to reach threshold values, the TCM will cause the transmission to enter Hot mode. This mode will automatically engage new shift and lock-up maps to reduce heat generated within the transmission. The shift map will enable the transmission to change to higher gears at lower vehicle speeds and the lock-up map will engage the lock-up clutch at lower vehicle speeds and in lower gears. The effect of this is that less heat will be generated within the transmission due to the effects of lock-up clutch slip and churning effects. There will be forced upshift strategy used in hot mode. To exit hot mode the selector lever must be moved or the brake pedal applied or the accelerator pedal applied 100%, during all of these methods of exiting from hot mode the fluid temperature must be lower than the threshold values.

Traction Control Mode

Traction Control Mode is an adaptive mode, which is automatically engaged when a traction event occurs. When driving on slippery surfaces (i.e. sand, ice) it is possible for the driven wheels to begin to spin. The TCM believes the vehicle speed is increasing and therefore it may begin to upshift. These upshifts reduce the torque at the wheel and so tend to reduce wheel slip. The downshift lines are forced downwards to prevent unwanted shifts. To reduce the effects of this, if a traction event occurs a signal is transmitted by the ABS module to the TCM over the CAN network, the TCM uses

this signal to change the currently selected shift map. The new shift map will have gearshift lines further apart, thus inhibiting the transmission shifting to a lower gear.

Hill/Trailer Towing Mode

This is an adaptive mode. When the TCM detects reduced vehicle acceleration for a certain percentage of throttle opening then this mode is automatically engaged by the TCM. When this mode is engaged a new shift map and torque converter lock-up map is selected. This new shift map is designed to reduce the number of gearshifts when towing a trailer or with the car climbing a steep hill. The shift map will cause the transmission to hold on to gears for longer this increases acceleration and reduces the number of gearshifts. This mode can also give an advantage when driving at high altitudes, where the torque produced by an engine is greatly reduced by the effects of reduced ambient pressure and airflow.

Driving Mode Priority

Each of the above modes has an associated priority i.e. Normal mode cannot over-ride cruise mode etc.

Adaptive Shift Strategies

The TCM of the six speed ZF automatic transmission incorporates adaptive strategies which improve the accessibility of the vehicle's performance in driving conditions while maintaining a relaxed driving experience when cruising.

In "Sport" mode, accelerator pedal usage and cornering behaviour are monitored to assess driving style and road conditions. When an enthusiastic driving style or a demanding road is detected, 6th gear is inhibited and the lower gears are made slightly more accessible in order to prevent unwanted "hunting" between gears. Conversely, when cruising conditions are detected, 6th gear is once again made available to maximise driving refinement and economy.

Under conditions of heavy braking, the transmission will perform one or more downshifts to improve response to a subsequent accelerator pedal application. Similarly if the accelerator pedal is released rapidly following hard acceleration, one or more upshifts are inhibited to increase engine braking and also improve subsequent response.

To complement these features, when a corner is detected transmission upshifts are inhibited. This inhibition is also maintained for a short distance after the corner allowing the driver to achieve a smooth balance through the bend without unwanted shifting mid-corner.

Safety features

The safety functions are designed to safeguard against mis-operation by the driver as well as against system malfunctions. The mis-operation system prevents reverse gear from being engaged at high forward speeds (Above 5 kph) and prevents manual downshifting at excessive engine speeds.

Great attention has been paid to safeguarding against, and detecting, malfunctions in the electronic control system. The design of the electrical and diagnostic system is such that system integrity is protected at all times.

The hydraulic system has "fail-safe" characteristics regarding its electrical energisation, i.e. as a result of the power supply being lost to the electro-hydraulic actuators the transmission engages a reliable emergency gear ratio to facilitate a basic limp-home mode.

Recognition of critical shift operation by monitoring the last element in the signal path, i.e. the solenoid valve, and checking by means of redundant measured variables, i.e. engine speed, input speed and output speed.

Measures are in place which guarantee a high degree of availability of safeguard functions, i.e. monitoring of safety circuits. For this purpose each time the vehicle is started there is a check on the entire safety hardware, this is during TCM initialization and the associated program parts and signal paths used during the TCM operation status. A malfunction in this part of the system, or triggering of the safety circuit, will be communicated to the driver by the instrument cluster message centre.

Diagnostic Strategy

No Data Available

Transmission - 3.0L NA V6 - AJ27 (44.20.01)

Special Service Tools



Powertrain Assembly Jack

HTJ1200-2

Removal

1 . Place the selector lever in the N position.

2 . Disconnect the battery ground cable.

For additional information, refer to

3 . Remove the exhaust system.

For additional information, refer to

4



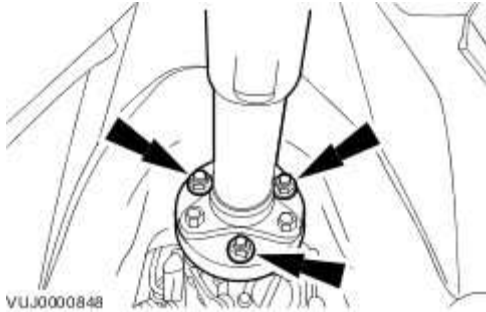
· **CAUTION:** Under no circumstances must the flexible coupling (or its fixings) be loosened or removed from the driveshaft.



CAUTION: Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.

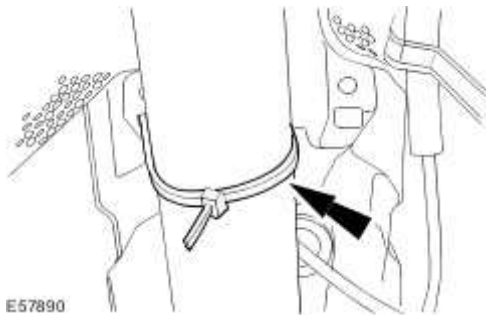
Detach the driveshaft from the transmission flange.

- Mark the position of the driveshaft in relation to the transmission flange.
- Mark the position of each nut and bolt in relation to the transmission flexible joint.

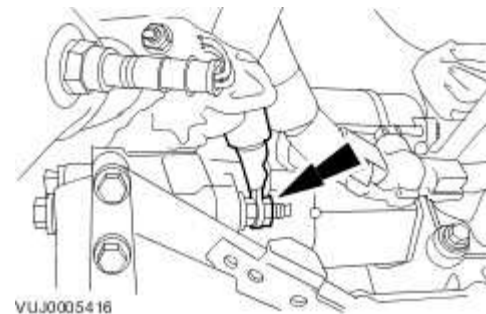


- 5
- ⚠ **CAUTION:** Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.

Using a suitable securing strap, reposition and support the driveshaft to the vehicle body.



- 6 . Detach the engine ground cable.

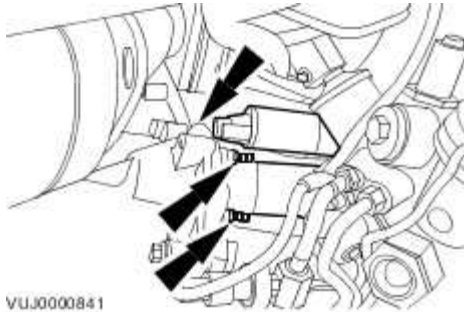


7

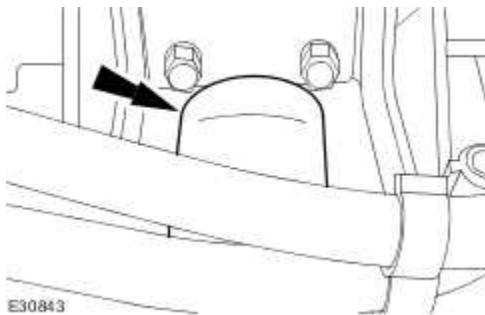


- **CAUTION:** Make sure the starter motor is supported. Failure to follow this instruction may result in damage to the vehicle.

Detach the starter motor.

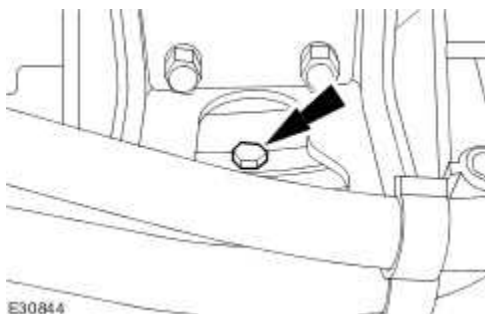


- 8 . Remove the rubber access cover.

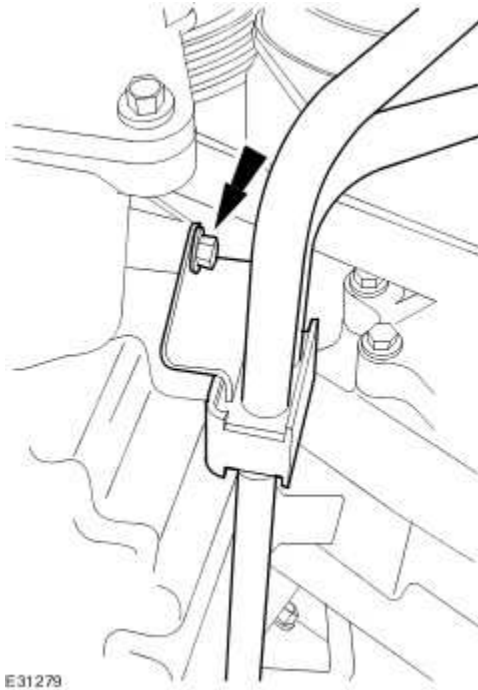


- 9 . Remove the torque converter retaining bolts.

- Rotate the torque converter to gain access to the remaining bolts.



- 10 . Detach the transmission fluid cooler tubes from the oil pan.



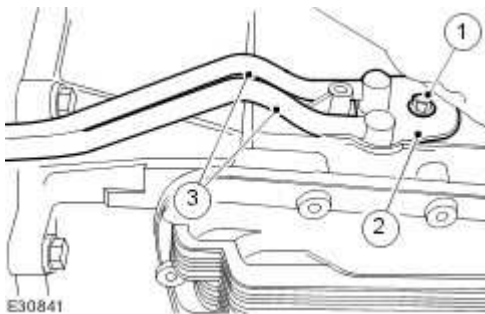
11 . Detach the transmission fluid cooler tubes.

1) Remove the retaining bolt.

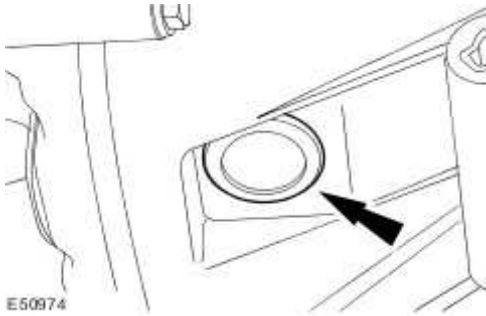
2) Remove the retaining plate.

3) Detach the transmission fluid cooler tubes.

▶ Allow the transmission fluid to drain into a suitable container.



12 . Remove the torque converter rubber inspection cover.

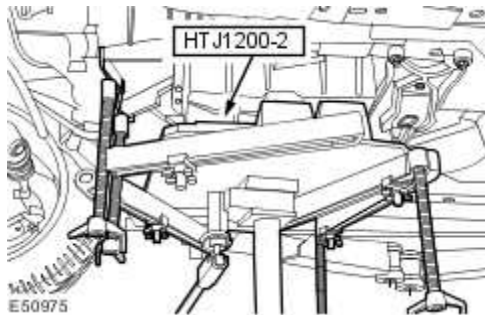


13



- CAUTION: Make sure the automatic transmission weight is evenly supported on the special tool. Failure to follow this instruction may result in damage to the vehicle.

Install the special tool.



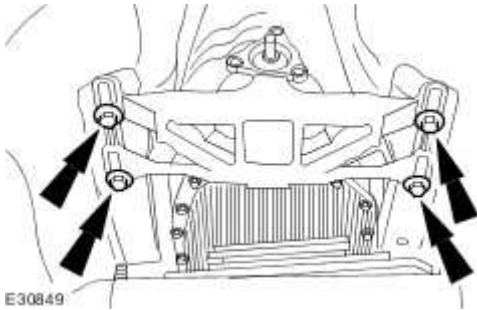
- 14 Install the rubber blocks supplied with special tool HTJ1200-2, between the front subframe and the oil pan.



- 15 . Lower the rear of the transmission.



- Remove the automatic transmission support retaining bolts.

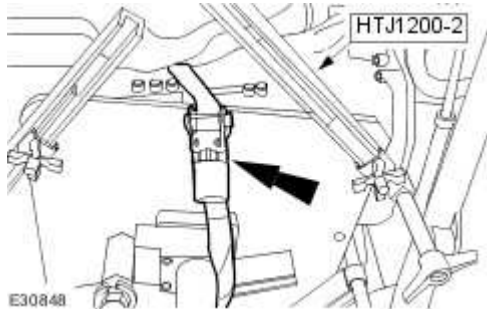


16

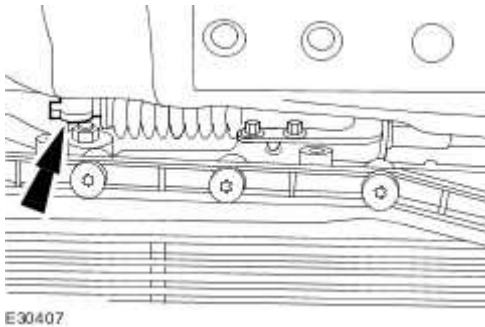


WARNING: Secure the automatic transmission to the special tool using the tie down straps. Failure to follow this instruction may result in personal injury.

Install the tie down strap.



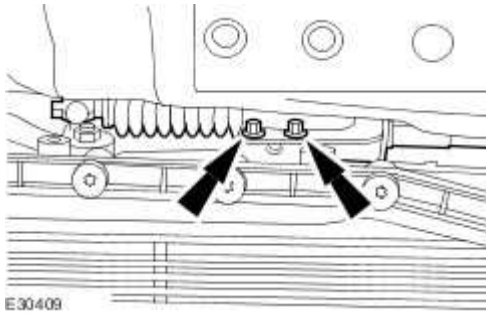
17 . Detach the selector lever cable.



18 . Reposition the selector lever cable.



Remove the retaining bolts.

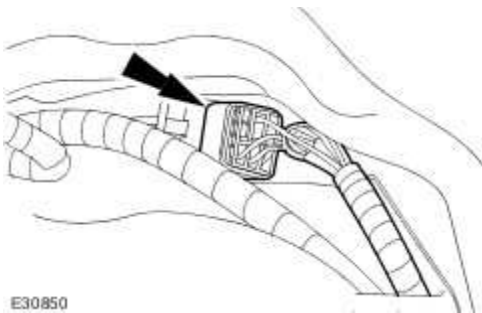


19

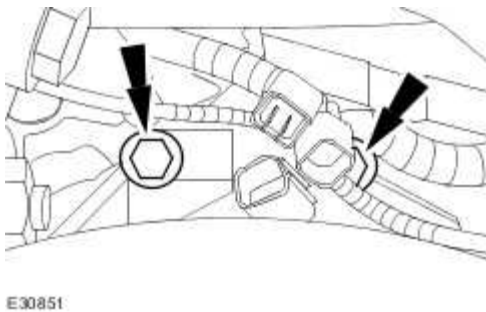


- CAUTION: Make sure the transmission control module (TCM) and main control valve body is protected against electrostatic discharge. Failure to follow this instruction may result in component damage.

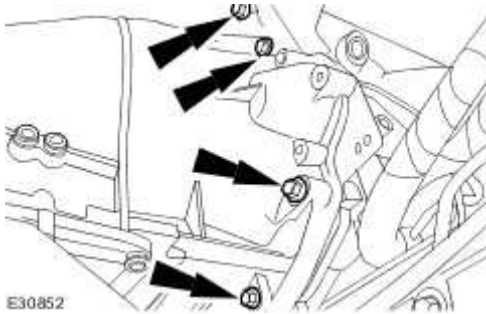
Disconnect the automatic transmission electrical connector.



20 . Remove the automatic transmission retaining bolts.



21 . Remove the automatic transmission retaining bolts.



22



WARNING: Do not let the torque converter drop out of the automatic transmission. Failure to follow this instruction may result in personal injury.

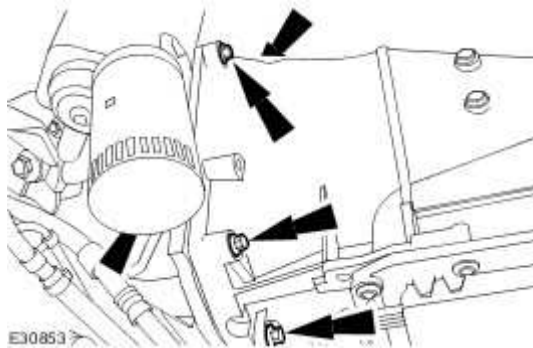
NOTE:

Special tool shown removed for clarity.

Remove the automatic transmission from the vehicle.

▶ Remove the retaining bolts.

▶ Lower the automatic transmission from the vehicle.



Transmission - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.5L NA V8 - AJV8 (44.20.01)

Special Service Tools




Powertrain Assembly Jack
HTJ1200-2


Removal

1 . Place the selector lever in the N position.

2 . Disconnect the battery ground cable.
For additional information, refer to


3 . Remove the exhaust system.
For additional information, refer to

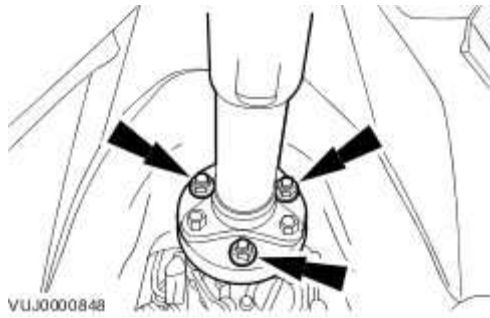
4 .  **CAUTION:** Under no circumstances must the flexible coupling (or its fixings) be loosened or removed from the driveshaft.

 **CAUTION:** Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.

Detach the driveshaft from the transmission flange.

 Mark the position of the driveshaft in relation to the transmission flange.

 Mark the position of each nut and bolt in relation to the transmission flexible joint.

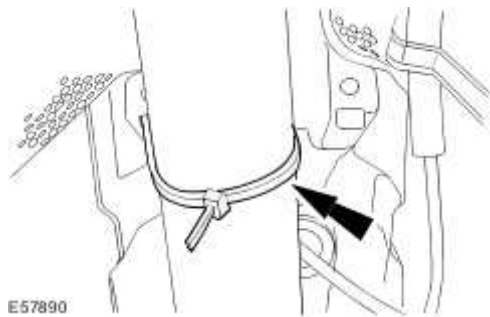


5

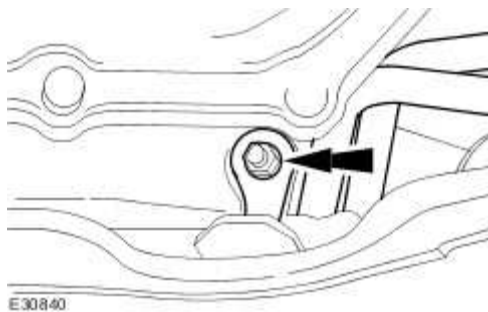


CAUTION: Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.

Using a suitable securing strap, reposition and support the driveshaft to the vehicle body.



6 . Detach the transmission fluid cooler tubes from the oil pan.



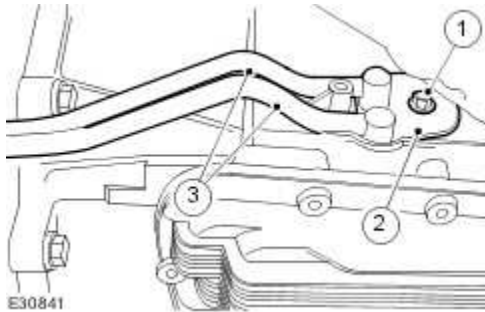
7 . Detach the transmission fluid cooler tubes.

1) Remove the retaining bolt.

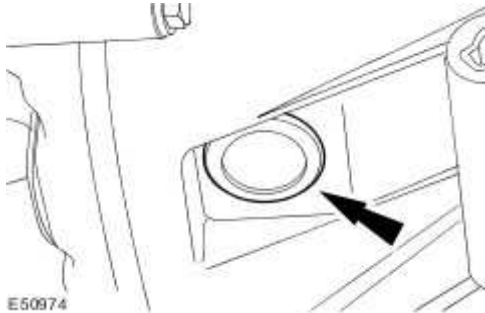
2) Remove the retaining plate.


3) Detach the transmission fluid cooler tubes.

▶ Allow the transmission fluid to drain into a suitable container.

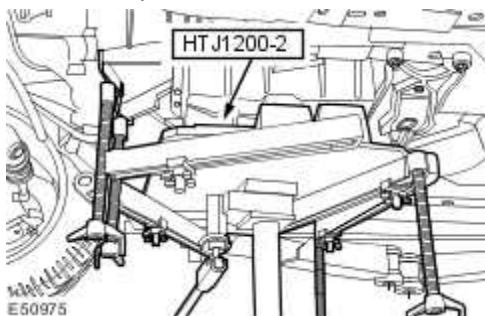


8 . Remove the torque converter rubber inspection cover.

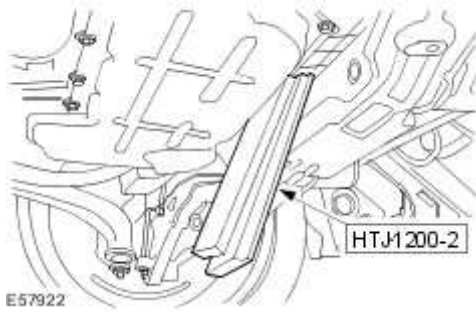


9  **CAUTION:** Make sure the automatic transmission weight is evenly supported on the special tool. Failure to follow this instruction may result in damage to the vehicle.

Install the special tool.

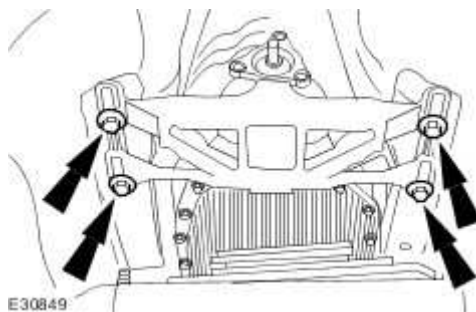


10 Install the rubber blocks supplied with special tool HTJ1200-2, between the front subframe and the oil pan.



11 . Lower the rear of the transmission.

▶ Remove the automatic transmission support retaining bolts.



12

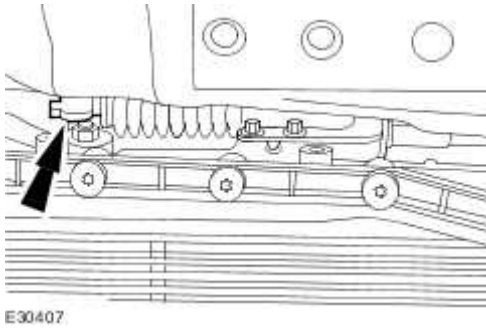


WARNING: Secure the automatic transmission to the special tool using the tie down straps. Failure to follow this instruction may result in personal injury.

Install the tie down strap.

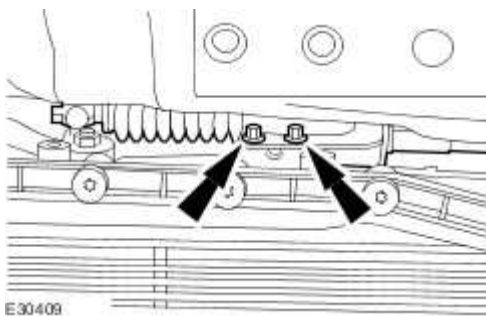


13 . Detach the selector lever cable.



14 . Reposition the selector lever cable.

▶ Remove the retaining bolts.

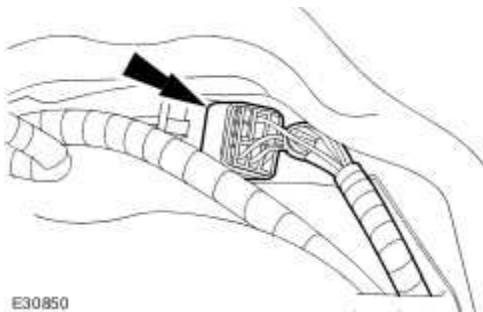


15

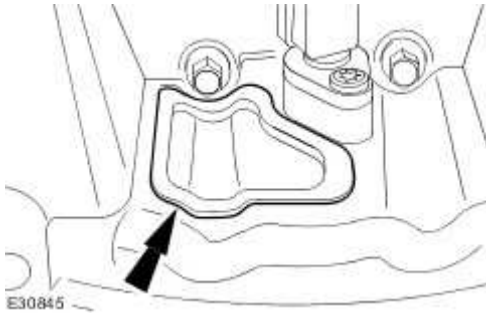


CAUTION: Make sure the transmission control module (TCM) and main control valve body is protected against electrostatic discharge. Failure to follow this instruction may result in component damage.

Disconnect the automatic transmission electrical connector.



16 . Remove the rubber access cover.



17 . Remove the torque converter retaining bolts.

▶ Rotate the torque converter to gain access to the remaining bolts.



18 . Remove the automatic transmission retaining bolts.



19



WARNING: Do not let the torque converter drop out of the automatic transmission. Failure to follow this instruction may result in personal injury.

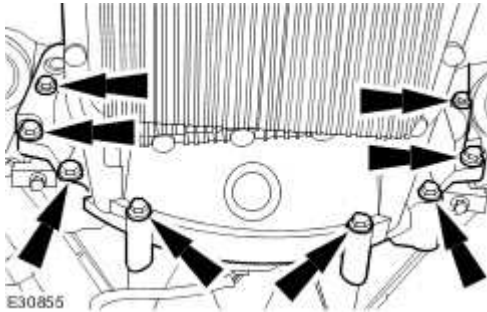
NOTE:

Special tool shown removed for clarity.

Remove the automatic transmission from the vehicle.

▶ Remove the retaining bolts.

▶ Lower the automatic transmission from the vehicle.



Transmission - 2.7L V6 - TdV6 (44.20.01)

Special Service Tools



Engine Lifting Brackets

303-1129



Engine Support Bracket

303-021

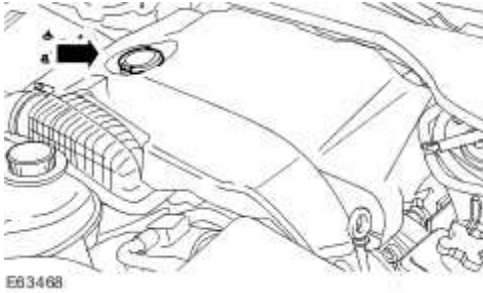


Powertrain Assembly Jack

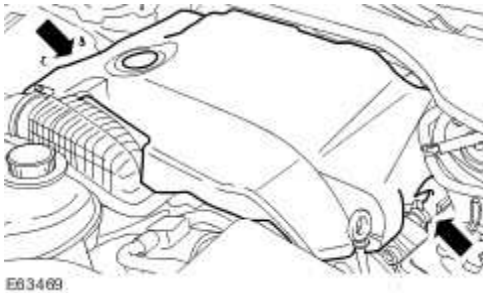
HTJ1200-2

Removal

- 1 . Move the automatic transmission selector lever to the “N” position.
- 2 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 3 . Remove the filler cap.

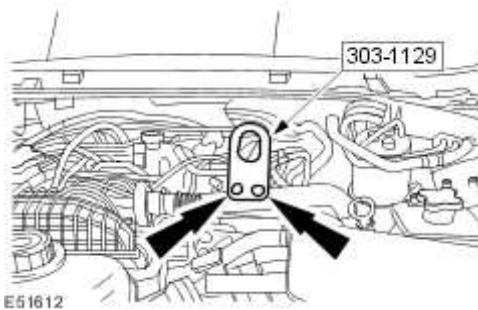


4 . Remove the engine cover.




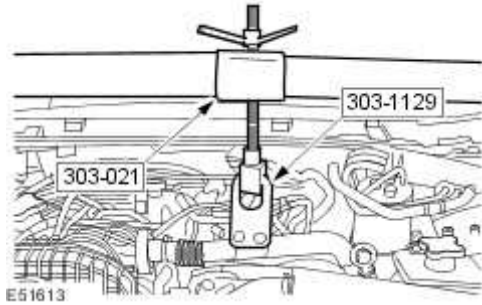
5 . Install the engine oil filler cap to prevent foreign material entering the valve cover.

6 . Install the special tool.



7 Install the special tool.

-  Rotate the special tool adjustment bolt a suitable amount of turns to support the engine.



- 8 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

- 9 . Remove the diesel particulate filter.

For additional information, refer to Diesel Particulate Filter (DPF)

- 10 . Remove both catalytic converters.

For additional information, refer to Catalytic Converter - 2.7L V6 - TdV6 (17.50.05)

- 11



CAUTION: Under no circumstances must the flexible coupling (or its fixings) be loosened or removed from the driveshaft. Failure to follow this instruction may result in damage to the vehicle.

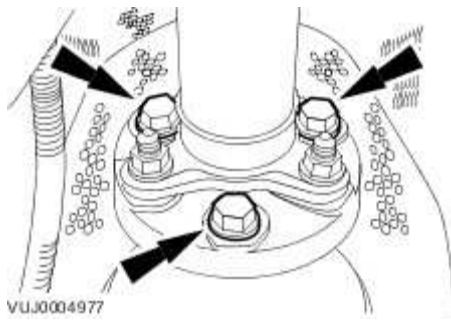


CAUTION: Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.

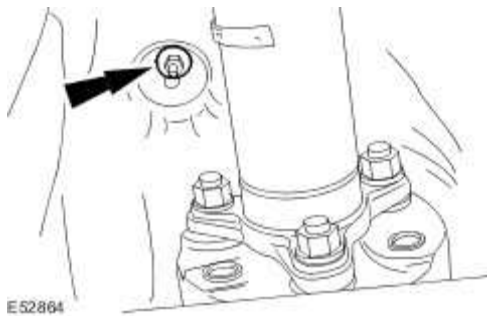
Detach the driveshaft from the automatic transmission flange.

- ▶ Mark the position of the driveshaft in relation to the automatic transmission flange.
- ▶ Mark the position of each nut and bolt in relation to the automatic transmission flexible joint.

- Detach the driveshaft from the automatic transmission flange.

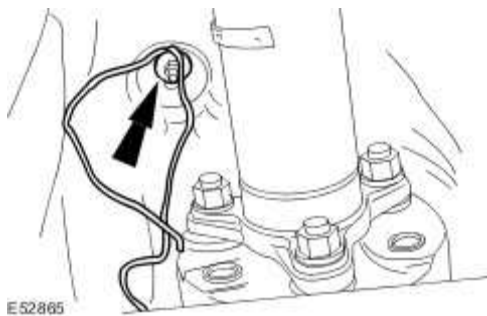


- 12 . Loosen the retaining nut.



- 13 . Install suitable cord to the heat shield retaining nut stud.

- Tighten the retaining nut.

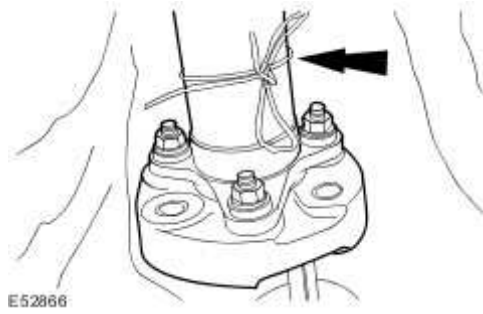


14

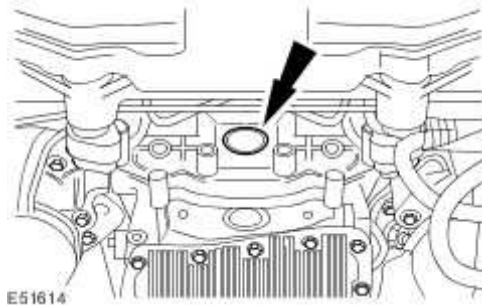


- **CAUTION:** Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.

Reposition and support the driveshaft.

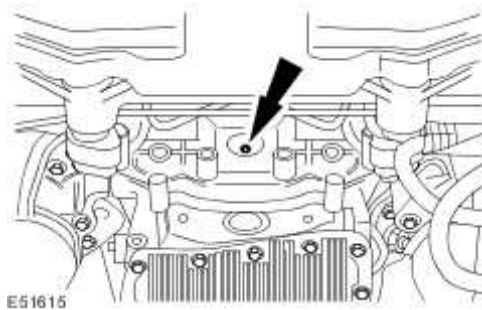


15 . Remove the rubber access cover.

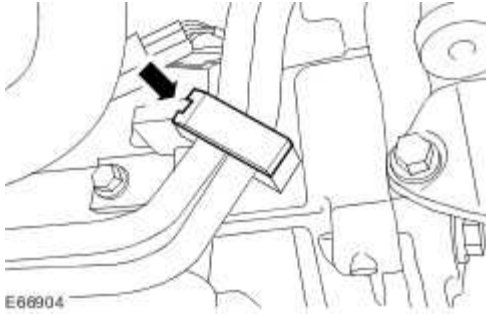


16 . Remove the retaining bolts.

► Rotate the torque converter to gain access to the remaining bolts.



17 . Release the automatic transmission fluid cooler tube retaining bracket.



18



- **CAUTION:** Make sure the transmission fluid cooler tubes are not removed from the automatic transmission by using a pry bar. Failure to follow this instruction may result in damage to the vehicle.

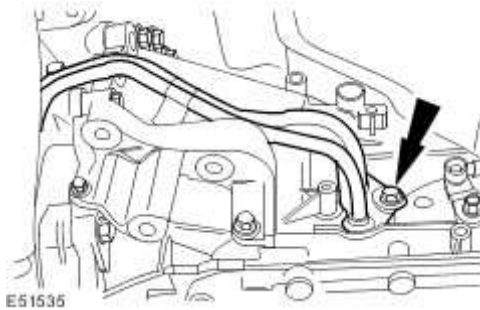
NOTE:

Discard the O-ring seals.

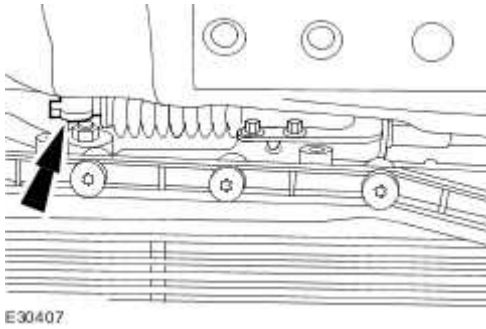
Detach the transmission fluid cooler tubes from the automatic transmission.



Allow the automatic transmission fluid to drain into a suitable container.

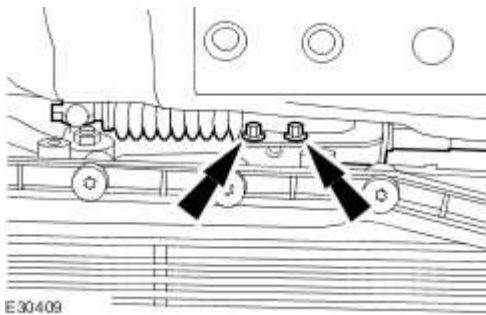


19 . Detach the selector lever cable.



20 . Reposition the selector lever cable.

▶ Remove the retaining bolts.

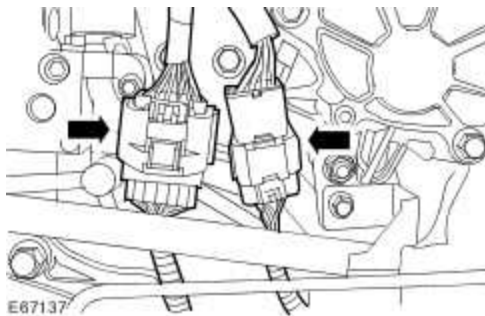


21



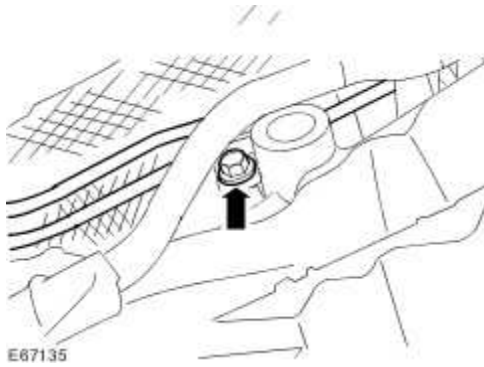
CAUTION: Make sure the automatic transmission control module (TCM) and main control valve body is protected against electrostatic discharge. Failure to follow this instruction may result in component damage.

Disconnect the automatic transmission electrical connectors.



22 Detach the diesel particulate filter high-pressure and low-pressure pipes from the automatic

. transmission.

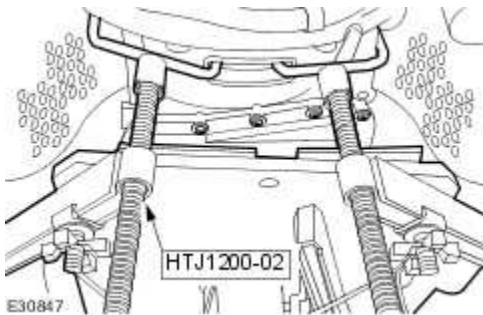


23



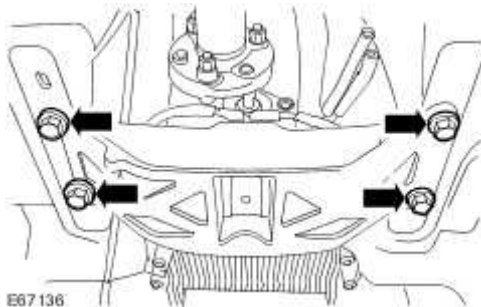
CAUTION: Make sure the automatic transmission weight is evenly supported on the special tool. Failure to follow this instruction may result in damage to the vehicle.

Install the special tool.



24 . Using the special tool, lower the rear of the automatic transmission.

▶ Remove the retaining bolts.



25

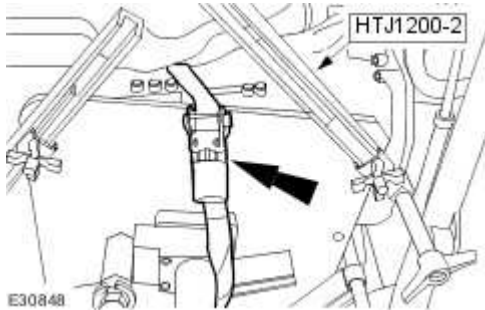


WARNING: Secure the automatic transmission to the special tool using the tie down straps. Failure to follow this instruction may result in personal injury.

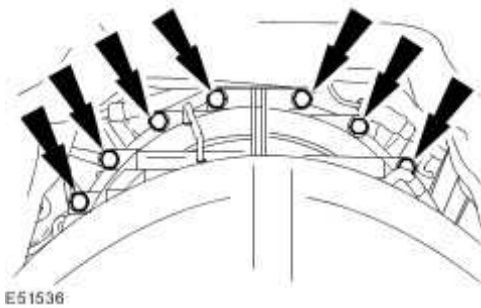


CAUTION: Make sure the tie down strap does not trap the automatic transmissions sensors or harness etc. Failure to follow this instruction may result in damage to the vehicle.

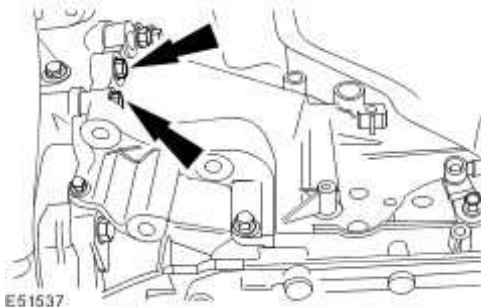
Install the tie down strap.



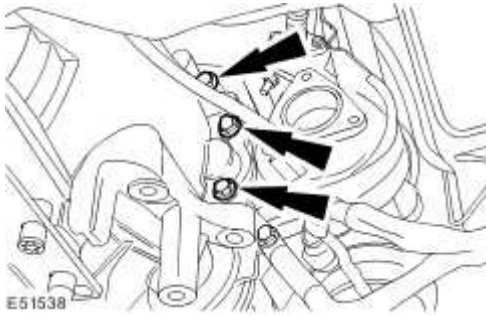
26 . Remove the retaining bolts.



27 . Remove the retaining bolts.



28 . Remove the retaining bolts.



29



WARNING: Do not allow the torque converter to become disengaged from the automatic transmission. Failure to follow this instruction may result in personal injury.

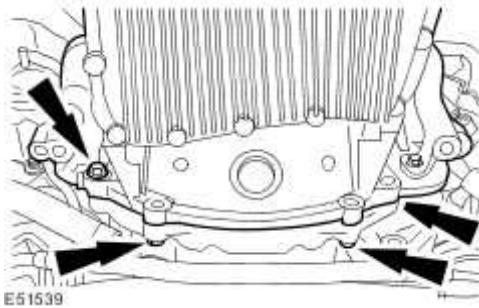
NOTE:

Shown with the powertrain assembly jack removed for clarity.

Remove the automatic transmission from the vehicle.

▶ Remove the retaining bolts.

▶ Lower the automatic transmission from the vehicle.



Transmission - 3.0L NA V6 - AJ27


(44.20.01)

Special Service Tools



Powertrain Assembly Jack
HTJ1200-2


Installation

- 1  **CAUTION:** If the automatic transmission fluid is very dirty or it contains metallic particles, then along with a new transmission, install a new automatic transmission fluid cooler and lines.

Flush the transmission oil cooler and fluid tubes.

- 2 **NOTE:**
 - Use high-temperature grease meeting Jaguar specification.

Apply a thin layer of high-temperature grease to the centering spigot bore on the torque converter.

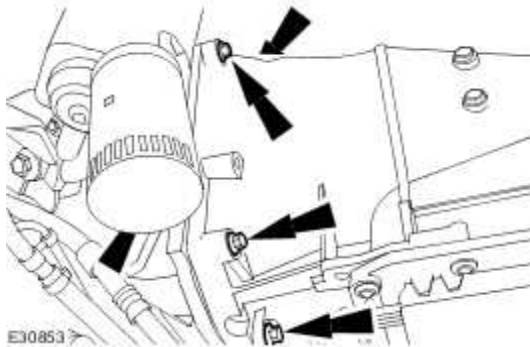
- 3  **WARNING:** Do not let the torque converter drop out of the automatic transmission. Failure to follow this instruction may result in personal injury.

 **CAUTION:** The torque converter hub must engage fully in the oil pump drive gear

throughout the whole installation procedure.

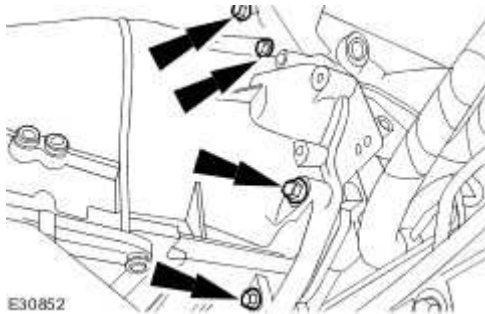
Install the automatic transmission to the vehicle.

- ▶ Raise the automatic transmission to the vehicle.
- ▶ Install the retaining bolts.
- ▶ Tighten to 48 Nm.



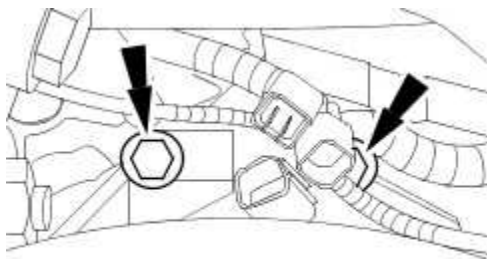
4 . Install the automatic transmission retaining bolts.

- ▶ Tighten to 48 Nm.




5 . Install the automatic transmission retaining bolts.

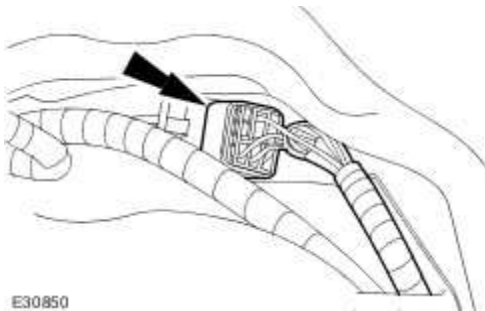
- ▶ Tighten to 48 Nm.



E30851


- 6  **CAUTION:** Make sure the transmission control module (TCM) and main control valve body is protected against electrostatic discharge. Failure to follow this instruction may result in component damage.


Connect the automatic transmission electrical connector.

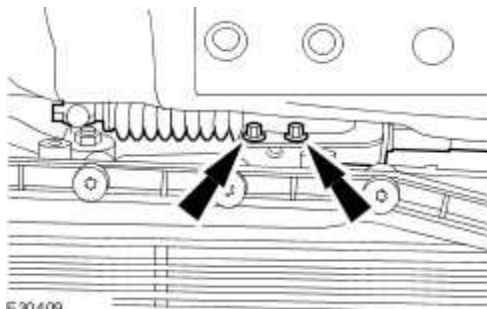


E30850

- 7 . Attach the selector lever cable.

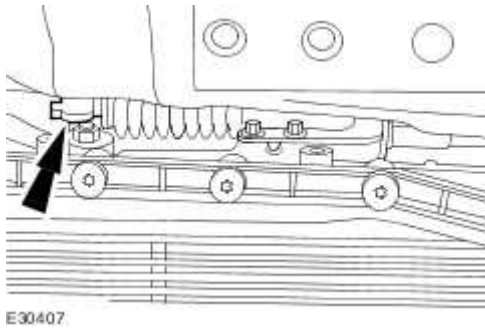
 Install the retaining bolts.

 Tighten to 11 Nm.

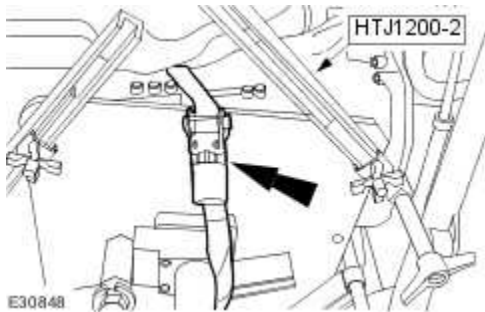


E30409

8 . Attach the selector lever cable.



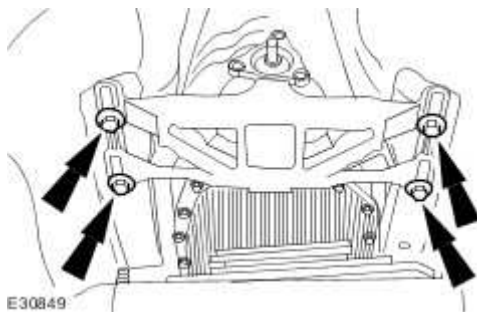
9 . Remove the tie down strap.



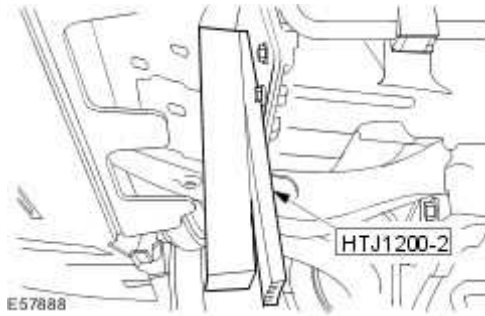
10 . Install the automatic transmission support retaining bolts.

► Raise the rear of the transmission.

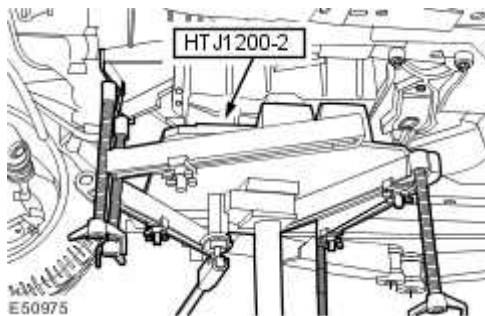
► Tighten to 50 Nm.



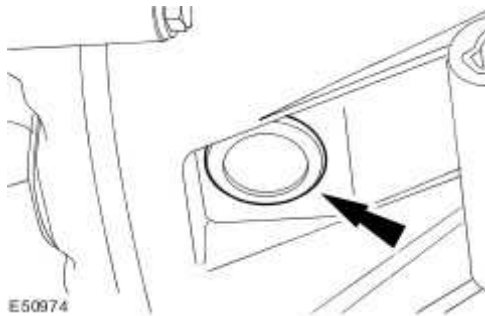
11 . Remove the rubber blocks supplied with special tool HTJ1200-2.



12 . Remove the special tool.



13 . Install the torque converter rubber inspection cover.



14 . Attach the transmission fluid cooler tubes.

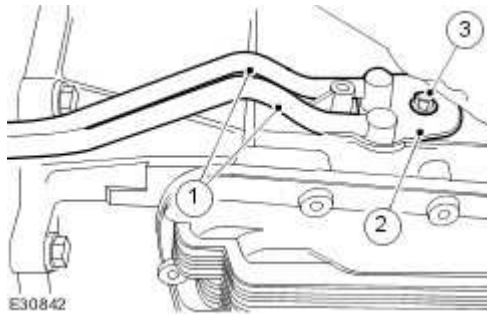
1) Attach the transmission fluid cooler tubes.

▶ Install new O-ring seals.

2) Install the retaining plate.

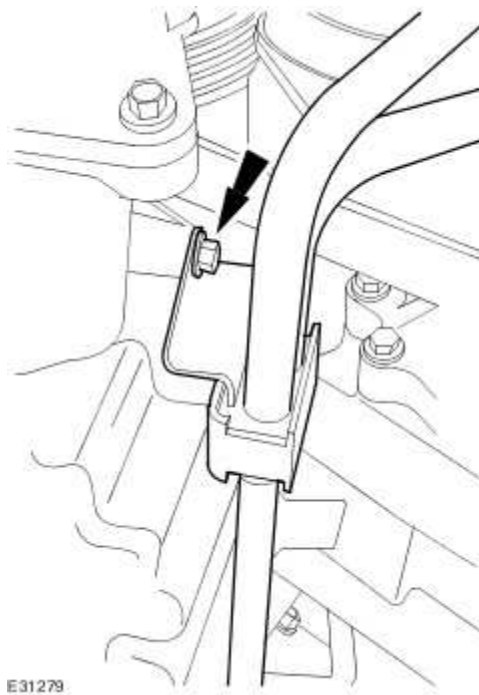
3) Install the retaining bolt.

▶ Tighten to 23 Nm.



15 . Attach the transmission fluid cooler tubes to the oil pan.

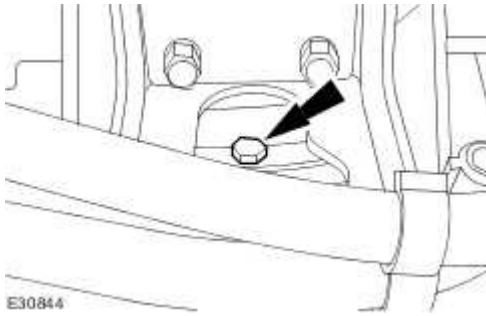
► Tighten to 10 Nm.



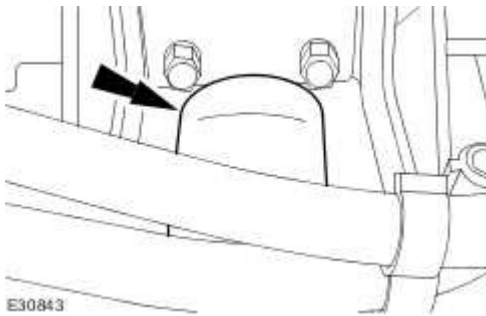
16 . Install the torque converter retaining bolts.

► Rotate the torque converter to gain access to the remaining bolts.

► Tighten to 55 Nm.

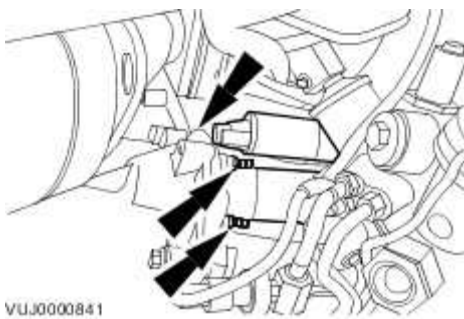


17 . Install the rubber access cover.

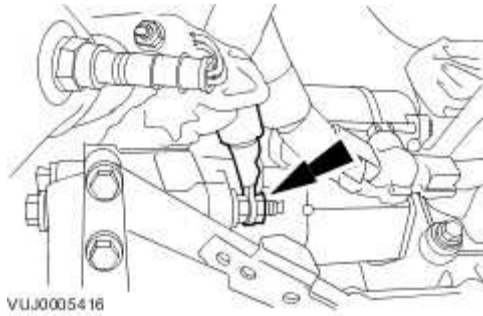


18 . Attach the starter motor.

▶ Tighten to 25 Nm.



19 . Attach the engine ground cable.

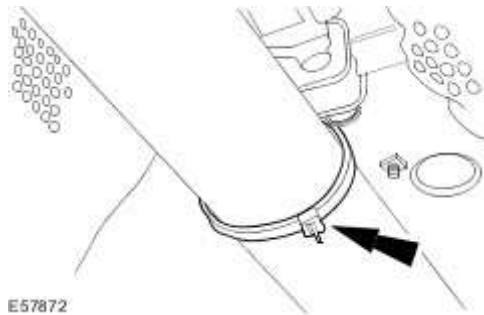


20



- **CAUTION:** Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.

Detach the driveshaft.



21



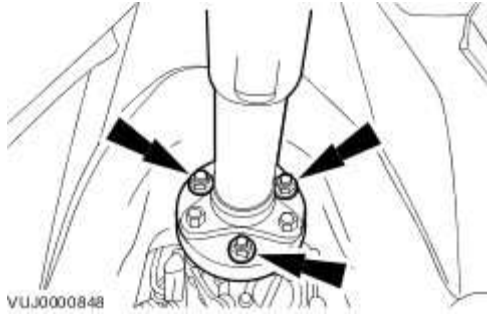
- **CAUTION:** Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure all components are installed to the position they were removed from. Failure to follow this instruction may result in damage to the vehicle.

Attach the driveshaft to the transmission flange.

▶ Tighten to 108 Nm.



22 . Install the exhaust system.

For additional information, refer to

23 . Connect the battery ground cable.

For additional information, refer to

24 . Carry out a transmission fluid level check.

For additional information, refer to

25 **NOTE:**

.

For NAS vehicles only.

If required, carry out a long drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Long Drive Cycle Self-Test


Transmission - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.5L NA V8 - AJV8 (44.20.01)

Special Service Tools



Powertrain Assembly Jack
HTJ1200-2


Installation

- 1  **CAUTION:** If the automatic transmission fluid is very dirty or it contains metallic particles, then along with a new transmission, install a new automatic transmission fluid cooler and lines.

Flush the transmission oil cooler and fluid tubes.

- 2 **NOTE:**
 - Use high-temperature grease meeting Jaguar specification.

Apply a thin layer of high-temperature grease to the centering spigot bore on the torque converter.

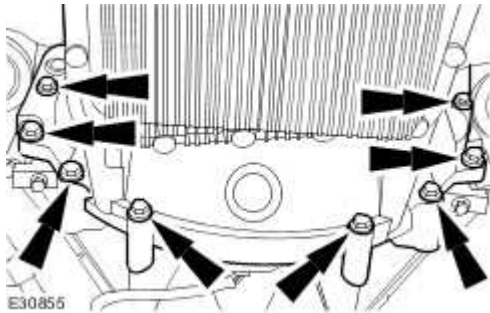
- 3  **WARNING:** Do not let the torque converter drop out of the automatic transmission. Failure to follow this instruction may result in personal injury.

 **CAUTION:** The torque converter hub must engage fully in the oil pump drive gear

throughout the whole installation procedure.

Install the automatic transmission to the vehicle.

- ▶ Raise the automatic transmission to the vehicle.
- ▶ Install the retaining bolts.
- ▶ Tighten to 48 Nm.



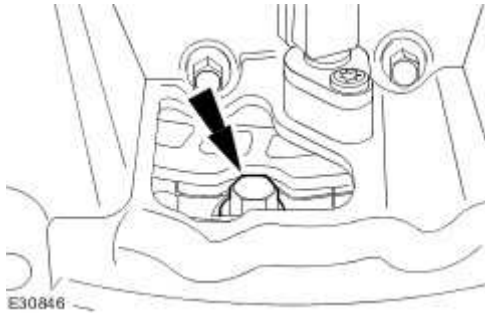
4 . Install the automatic transmission retaining bolts.

- ▶ Tighten to 48 Nm.

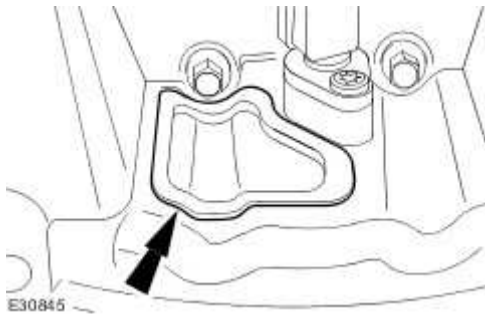



5 . Install the torque converter retaining bolts.

- ▶ Rotate the torque converter to gain access to the remaining bolts.
- ▶ Tighten to 55 Nm.

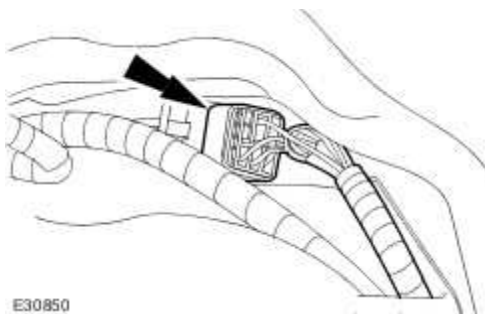


6 . Install the rubber access cover.



- 7
-  **CAUTION:** Make sure the transmission control module (TCM) and main control valve body is protected against electrostatic discharge. Failure to follow this instruction may result in component damage.

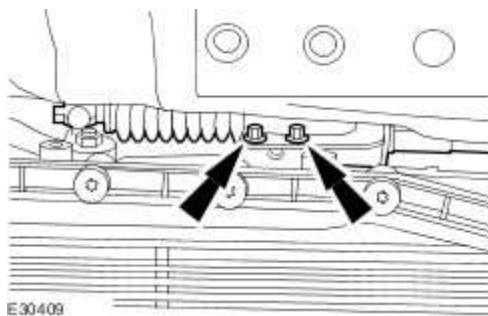
Connect the automatic transmission electrical connector.



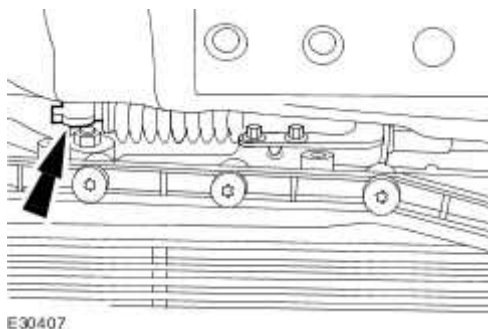
8 . Attach the selector lever cable.

▶ Install the retaining bolts.

▶ Tighten to 11 Nm.



9 . Attach the selector lever cable.



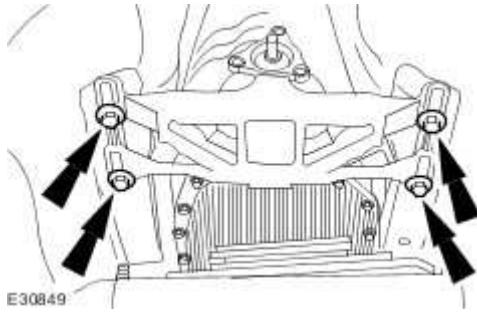
10 . Remove the tie down strap.



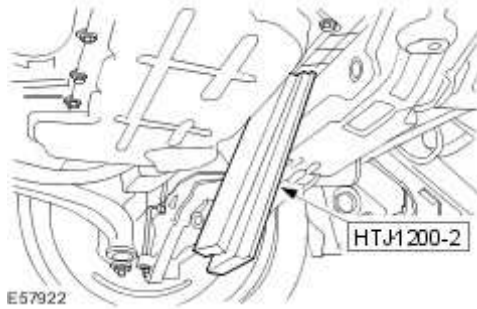
11 . Install the automatic transmission support retaining bolts.

► Raise the rear of the transmission.

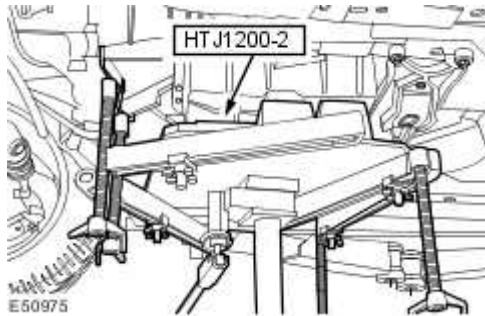
► Tighten to 50 Nm.



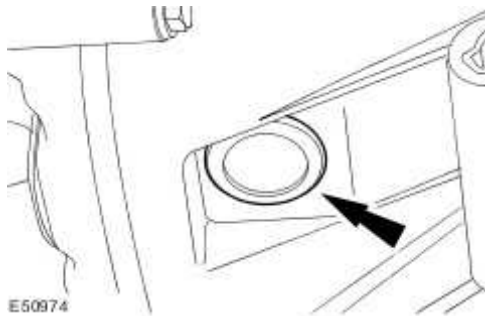
12 . Remove the rubber blocks supplied with special tool HTJ1200-2.



13 . Remove the special tool.



14 . Install the torque converter rubber inspection cover.



15 . Attach the transmission fluid cooler tubes.

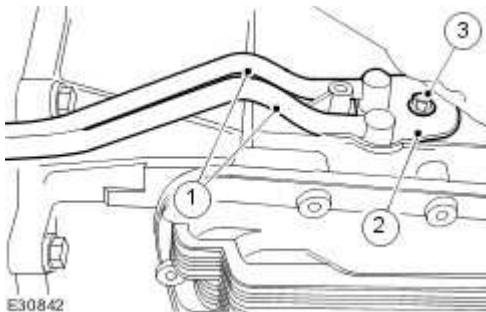
1) Attach the transmission fluid cooler tubes.

▶ Install new O-ring seals.

2) Install the retaining plate.

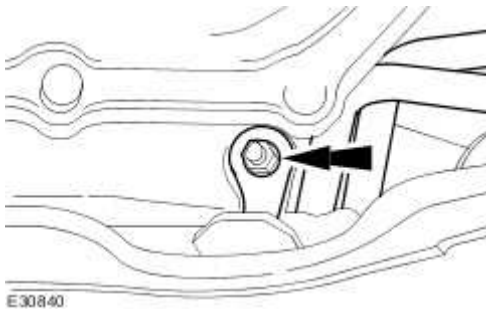
3) Install the retaining bolt.

▶ Tighten to 23 Nm.



16 . Attach the transmission fluid cooler tubes to the oil pan.

▶ Tighten to 10 Nm.

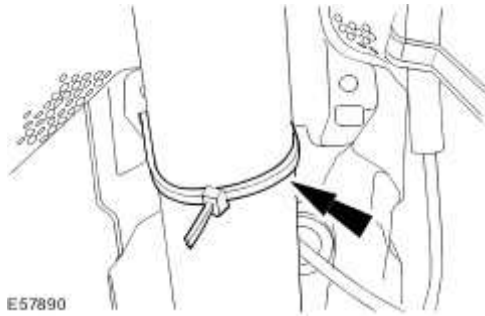


17



· **CAUTION:** Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.

Detach the driveshaft.



18



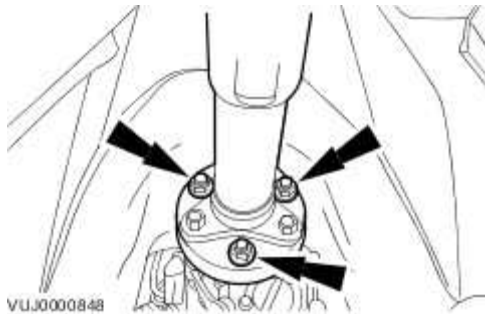
- CAUTION: Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure all components are installed to the position they were removed from. Failure to follow this instruction may result in damage to the vehicle.

Attach the driveshaft to the transmission flange.

▶ Tighten to 108 Nm.



19 . Install the exhaust system.

For additional information, refer to

20 . Connect the battery ground cable.

For additional information, refer to

21 . Carry out a transmission fluid level check.

For additional information, refer to

22 **NOTE:**

.

For NAS vehicles only.

If required, carry out a long drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Long Drive Cycle Self-Test

Transmission - 2.7L V6 - TdV6 (44.20.01)

Special Service Tools



Engine Lifting Brackets

303-1129



Engine Support Bracket


303-021



Powertrain Assembly Jack

HTJ1200-2

Installation

- 1  **CAUTION:** If the automatic transmission fluid is very dirty or it contains metallic particles, then along with a new transmission, install a new automatic transmission fluid cooler and lines.

Flush the automatic transmission fluid oil cooler and fluid tubes.

- 2 **NOTE:**

Use high-temperature grease meeting Jaguar specification.

Apply a thin layer of high-temperature grease to the centering spigot bore on the torque converter.

3



WARNING: Do not allow the torque converter to become disengaged from the automatic transmission. Failure to follow this instruction may result in personal injury.



CAUTION: The torque converter hub must engage fully into the pump drive gear throughout the whole installation procedure. Failure to follow this instruction may result in damage to the vehicle.

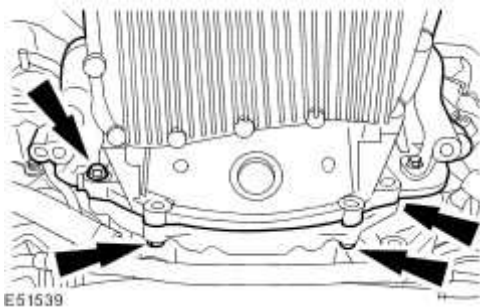
NOTE:

Shown with the powertrain assembly jack removed for clarity.

Install the automatic transmission to the vehicle.

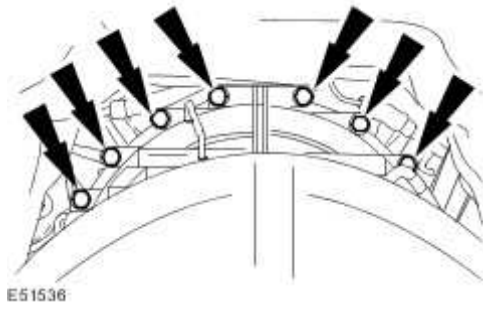
► Raise the automatic transmission to the vehicle.

► Loosely install the retaining bolts.



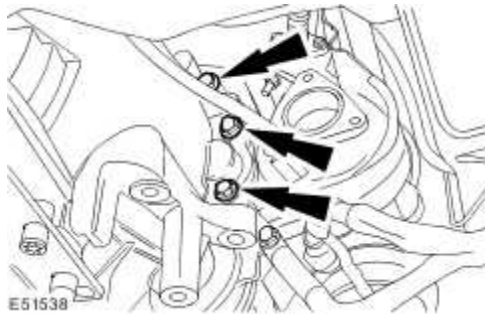
4 . Install the retaining bolts.

► Tighten to 48 Nm.



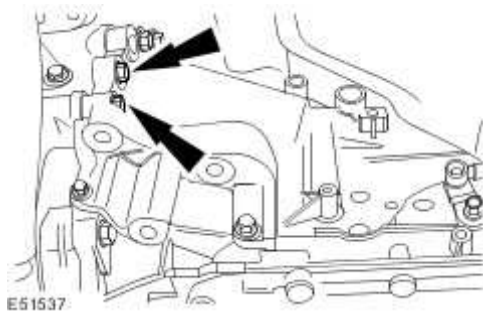
5 . Install the retaining bolts.

▶ Tighten to 48 Nm.

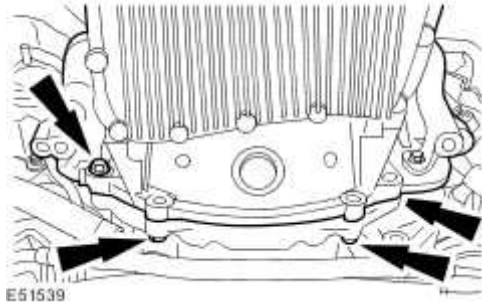


6 . Install the retaining bolts.

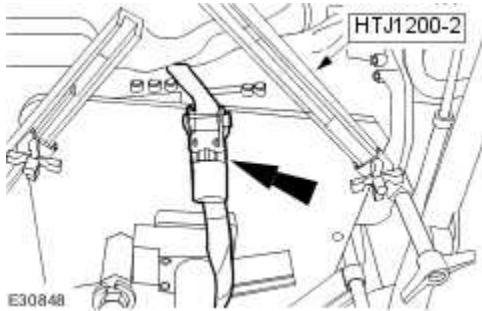
▶ Tighten to 48 Nm.



7 . Tighten to 48 Nm.



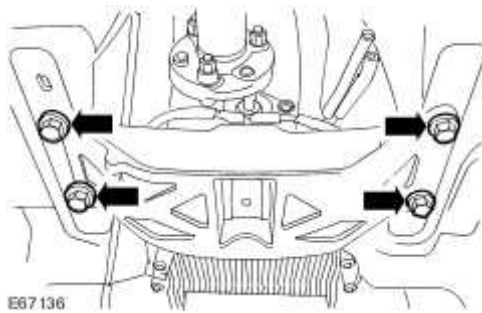
8 . Remove the tie down strap.



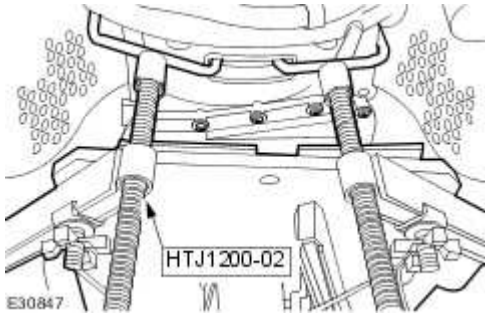
9 . Install the automatic transmission mount retaining bolts.

► Raise the rear of the automatic transmission.

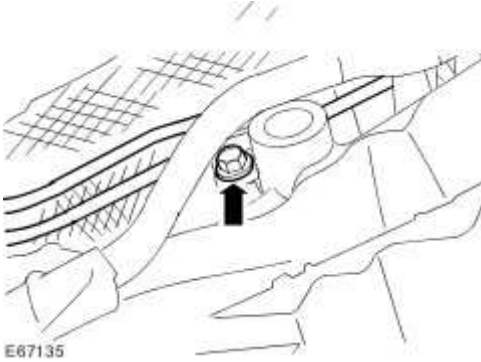
► Tighten to 50 Nm.




10 . Remove the special tool.

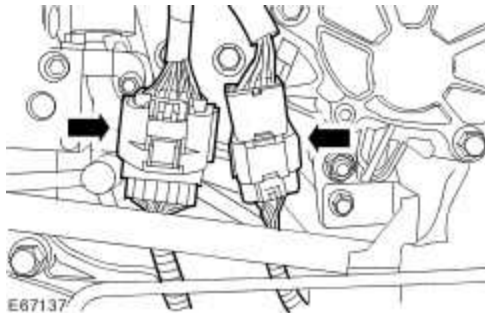


- 11 Attach the diesel particulate filter high-pressure and low-pressure pipes to the automatic transmission.




- 12  **CAUTION:** Make sure the automatic transmission control module (TCM) and main control valve body is protected against electrostatic discharge. Failure to follow this instruction may result in component damage.

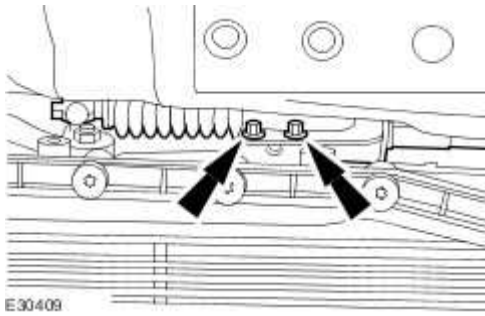
Connect the automatic transmission electrical connectors.



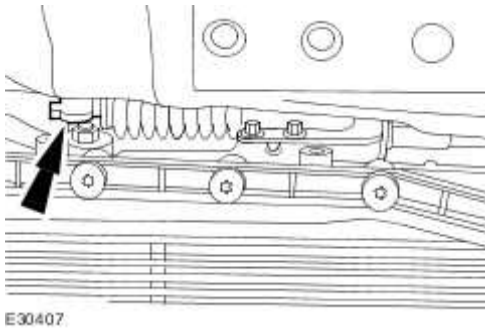
- 13 . Attach the selector lever cable.

 Install the retaining bolts.

► Tighten to 11 Nm.



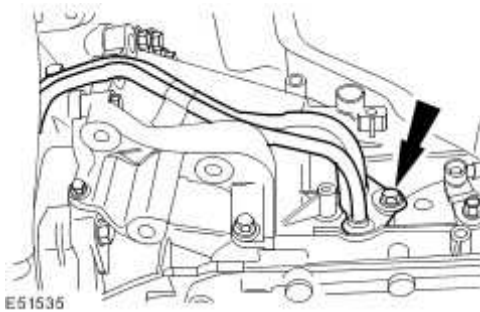
14 . Attach the selector lever cable.



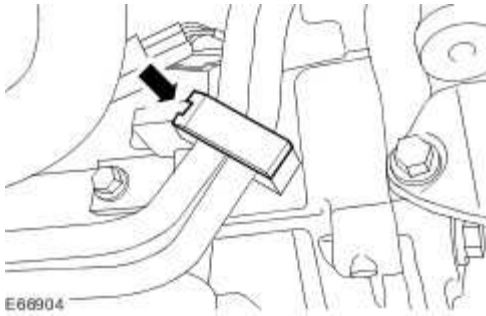
15 . Attach the automatic transmission fluid cooler tubes to the automatic transmission.

► Install new O-ring seals.

► Tighten to 23 Nm.



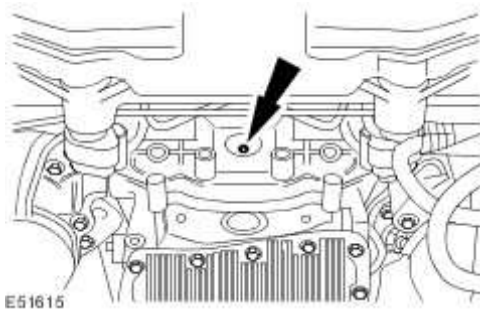
16 . Attach the automatic transmission fluid cooler tube retaining bracket.



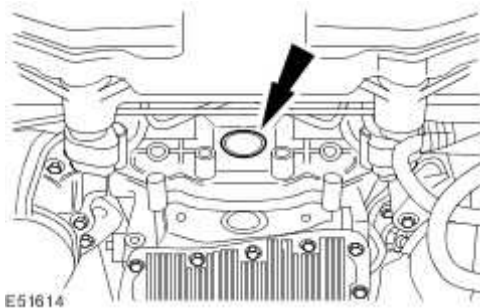
17 . Install the retaining bolts.

▶ Rotate the torque converter to gain access to the remaining bolts.

▶ Tighten to 55 Nm.



18 . Install the rubber access cover.



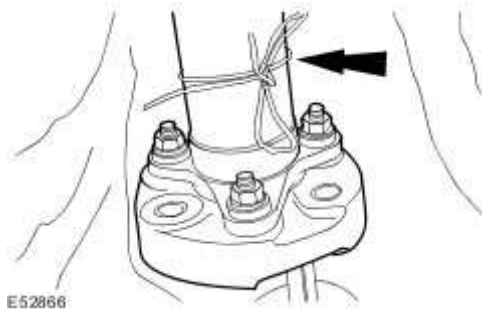
19



CAUTION: Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.

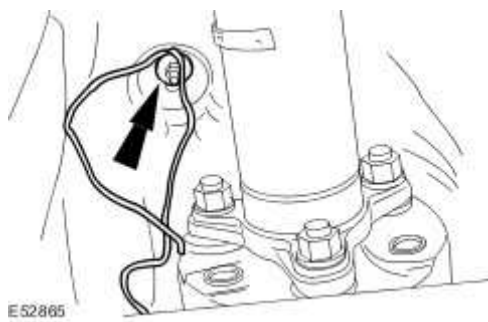
Reposition the driveshaft.

▶ Undo the cord.

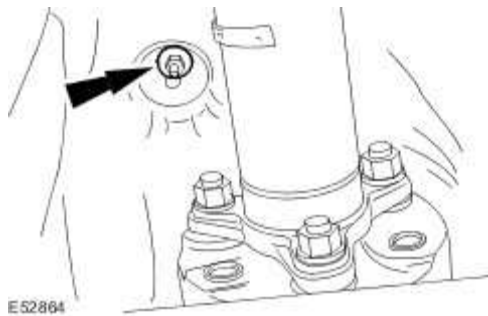


20 . Loosen the retaining nut.

▶ Remove the cord from the heat shield retaining nut stud.



21 . Tighten the retaining nut.



22



CAUTION: Make sure the front of the driveshaft does not put an excessive load on

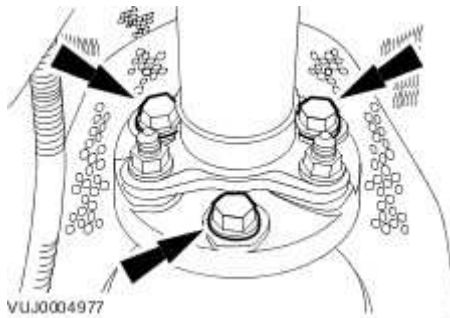
the center bearing. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure all components are installed to the position they were removed from. Failure to follow this instruction may result in damage to the vehicle.

Attach the driveshaft to the automatic transmission flange.

► Tighten to 88 Nm.



23 . Install both catalytic converters.

For additional information, refer to Catalytic Converter - 2.7L V6 - TdV6 (17.50.05)

24 . Install the diesel particulate filter.

For additional information, refer to Diesel Particulate Filter (DPF)

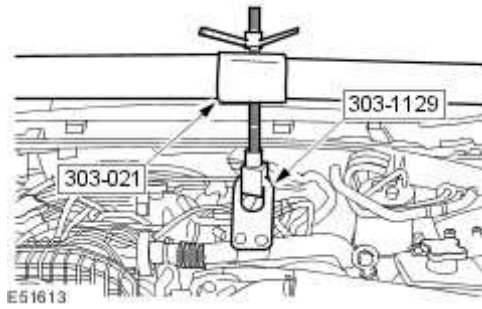
25 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

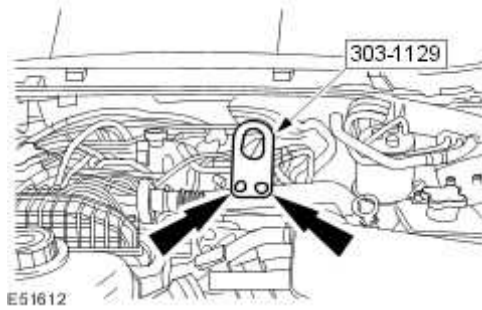
26 . Remove the special tool.



Loosen the special tool adjustment bolt.

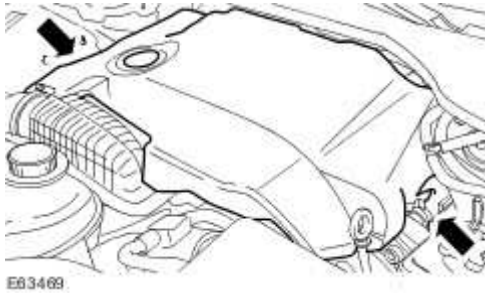


27 . Remove the special tool.

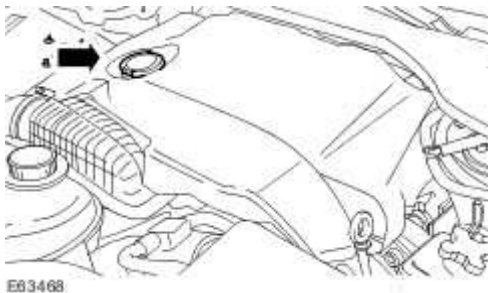


28 . Remove the oil filler cap.

29 . Install the engine cover.



30 . Install the oil filler cap.



- 31 . Connect the battery ground cable.
For additional information, refer to Battery Connect (86.15.15)

- 32 . Carry out a transmission fluid level check.
For additional information, refer to Transmission Fluid Level Check

Extension Housing Seal (44.20.18)

Special Service Tools



303D121

Crankshaft Damper Remover

303-D121



205053

Output Shaft Flange Holding Tool

205-053



204-264

Pinion Seal Replacer

204-264



HTJ12002

Powertrain Assembly Jack

HTJ1200-2



308-375

Seal Remover Input and Output
308-375



Slide Hammer
100-012



Slide Hammer Adaptor
100-012-01



Socket Output Flange Remover/Installer
205-789

Removal

Vehicles with diesel engine

- 1 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)
- 2 . Remove the diesel particulate filter.
For additional information, refer to Diesel Particulate Filter (DPF)

All vehicles

3



- **CAUTION:** Under no circumstances must the flexible coupling (or its fixings) be loosened or removed from the driveshaft. Failure to follow this instruction may result in

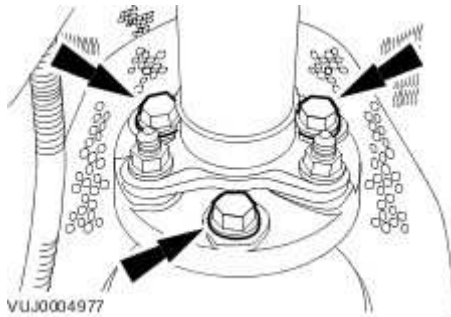
damage to the vehicle.



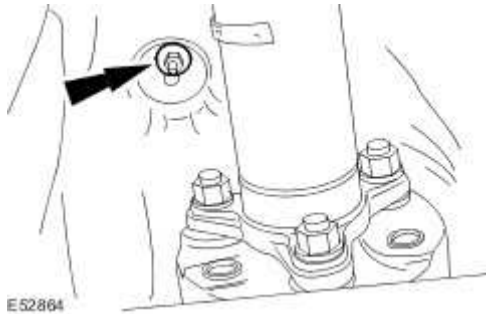
CAUTION: Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.

Detach the driveshaft from the transmission flange.

- ▶ Mark the position of the driveshaft in relation to the transmission flange.
- ▶ Mark the position of each nut and bolt in relation to the transmission flexible joint.

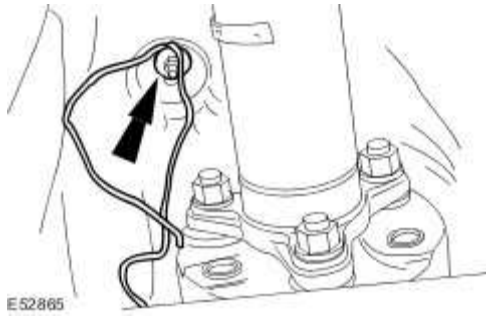


4 . Loosen the heat shield retaining nut.

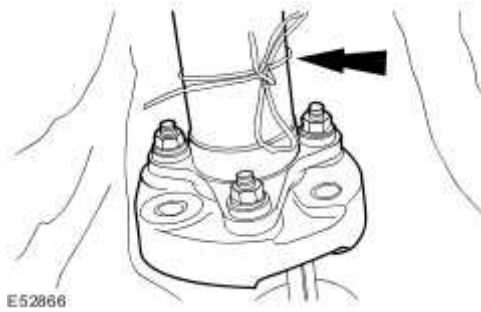


5 . Install suitable cord to the heat shield retaining nut stud.

- ▶ Tighten the retaining nut.

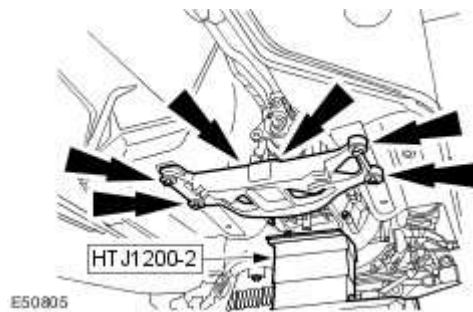


6 . Reposition the driveshaft.

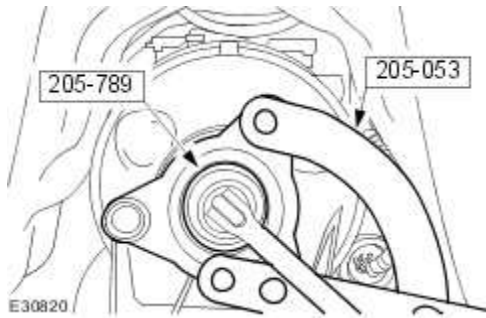


7 . Using the special tool, remove the transmission support.

▶ Lower the transmission to a suitable height.

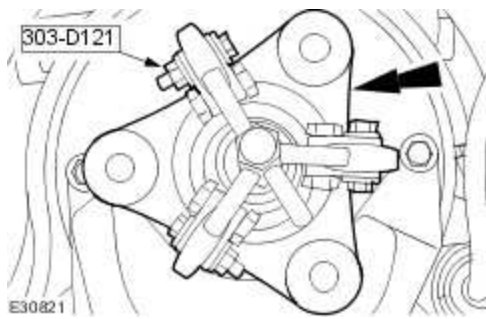



8 . Using the special tools, remove and discard the output shaft flange retaining nut.



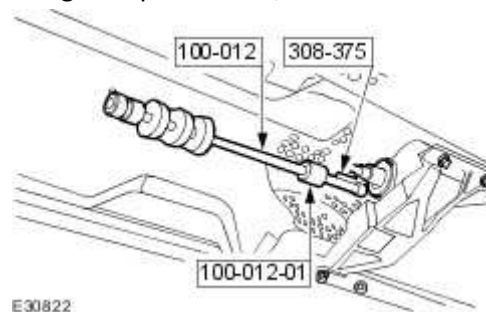
9 . Using the special tool, remove the output shaft flange.

▶ Remove the output shaft flange spacing shim.



10  **CAUTION:** Make sure the transmission housing seal face is not damaged when removing the extension housing seal. Failure to follow this instruction may result in damage to the vehicle.

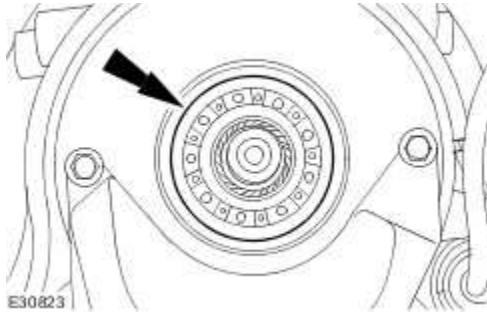
Using the special tools, remove the extension housing seal.



11 **NOTE:**

Using a suitable metal surface cleaner meeting Jaguar specification, clean the seal face on the housing before installing the new seal.

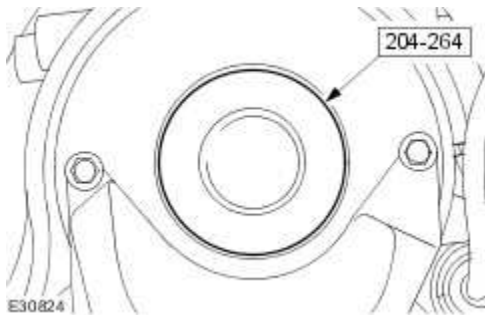
Clean and inspect the transmission housing seal face.



Installation

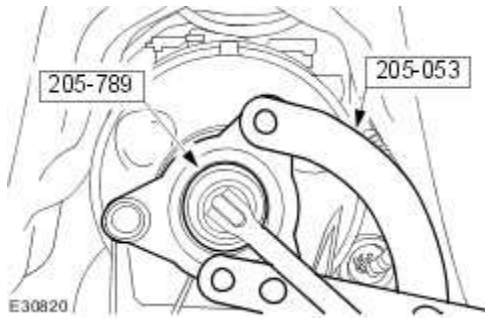
All vehicles

- 1 . Using the special tool, install the extension housing seal.



- 2 . Using the special tools install a new output shaft flange retaining nut.

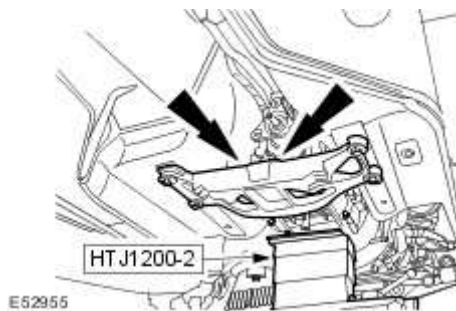
- ▶ Install the output shaft flange spacing shim.
- ▶ Install the output shaft flange.
- ▶ Tighten to 60 Nm.



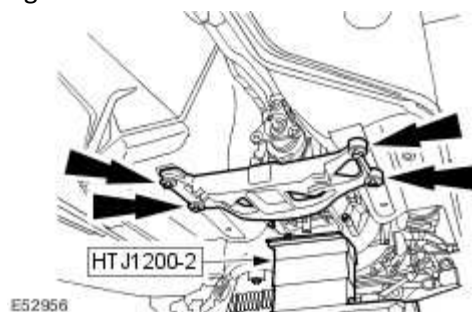
3 . Install the transmission support.

► Using the special tool, raise the transmission.

► Tighten to 55 Nm.



4 . Tighten to 48 Nm.



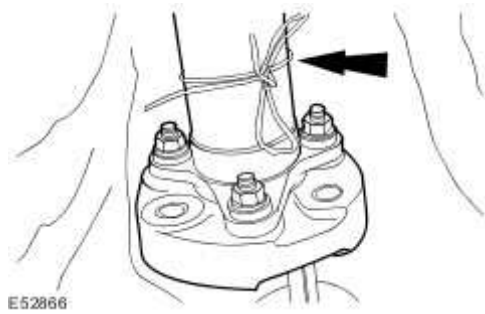
5



CAUTION: Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.

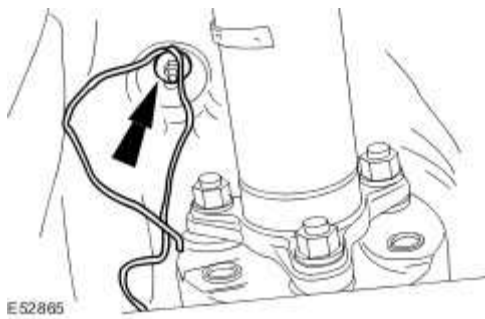
Reposition the driveshaft.

- Undo the cord.

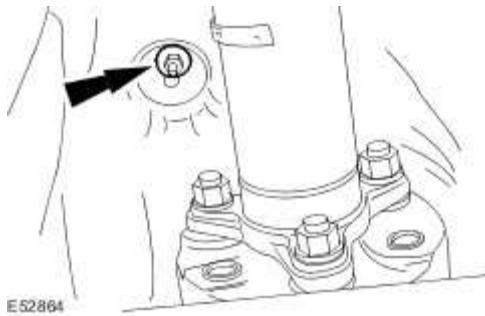


- 6 . Loosen the retaining nut.

- Remove the cord from the heat shield retaining nut stud.



- 7 . Tighten the retaining nut.



8



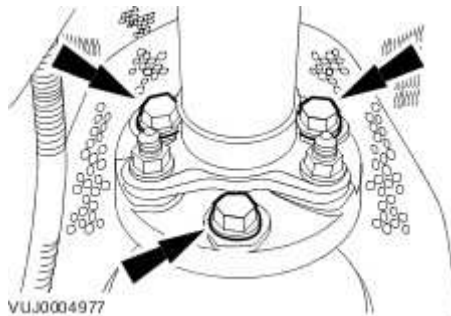
- **CAUTION:** Make sure the front of the driveshaft does not put an excessive load on the center bearing. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure all components are installed to the position they were removed from. Failure to follow this instruction may result in damage to the vehicle.

Attach the driveshaft to the transmission flange.

► Tighten to 88 Nm.



- 9 . Carry out a transmission fluid level check.
For additional information, refer to

Vehicles with diesel engine

- 10 . Install the diesel particulate filter.
For additional information, refer to Diesel Particulate Filter (DPF)
- 11 . Install the air deflector.
For additional information, refer to Air Deflector (76.11.41)

Transmission Fluid Pan, Gasket and Filter (44.24.07)

Removal

All vehicles

- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect

Vehicles with diesel engine

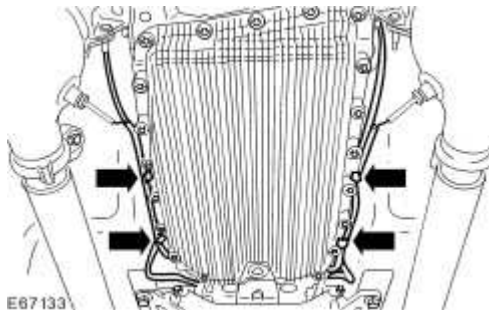
- 2 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)

All vehicles

- 3 . Drain the transmission.
For additional information, refer to Transmission Fluid Drain and Refill (44.24.02)

Vehicles with diesel engine

- 4 . Detach the catalytic converter temperature sensor wiring harness from the fluid pan.




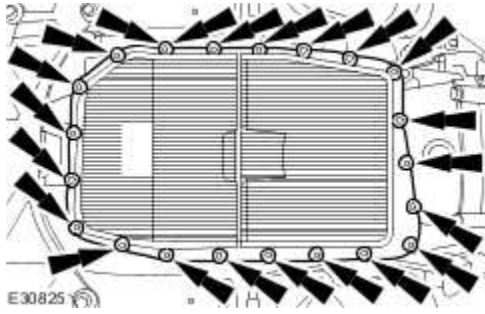
All vehicles

- 5 . **NOTE:**

Discard the fluid pan, gasket and filter.

Remove the fluid pan, gasket and filter.

 Remove the retaining bolts.

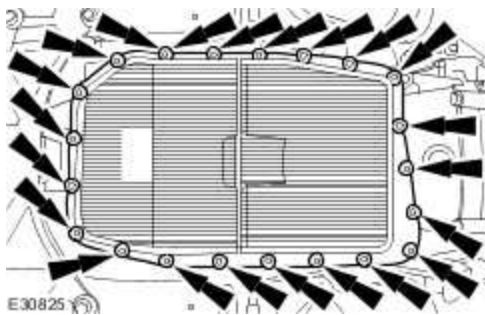


Installation

All vehicles

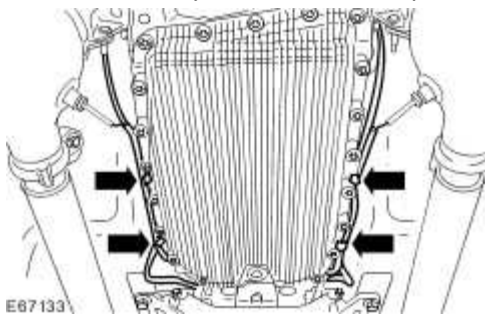
- 1 . Install the new fluid pan, gasket and filter.

▶ Tighten to 8 Nm.



Vehicles with diesel engine

- 2 . Attach the catalytic converter temperature sensor wiring harness onto the fluid pan.



All vehicles

- 3 . Fill the transmission.

For additional information, refer to Transmission Fluid Drain and Refill (44.24.02)

Vehicles with diesel engine

- 4 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

All vehicles

- 5 . Lower the vehicle.

- 6 . Connect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)

Transmission Control Module (TCM) and Main Control Valve Body

Removal

- 1 . Remove the fluid pan, gasket and filter.

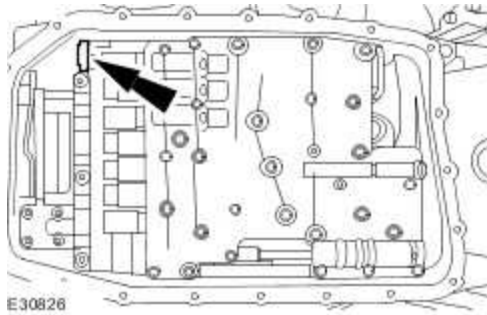
For additional information, refer to Transmission Fluid Pan, Gasket and Filter (44.24.07)

2



CAUTION: Make sure the transmission control module (TCM) and main control valve body are protected against electrostatic discharge. Failure to follow this instruction may result in component damage.

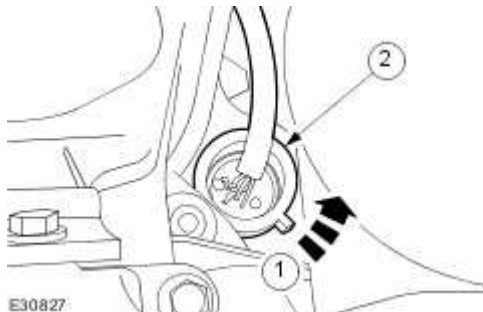
Reposition the locking device.



- 3 . Disconnect the TCM and main control valve body electrical connector.

1) Reposition the electrical connector retaining ring.

2) Disconnect the electrical connector.

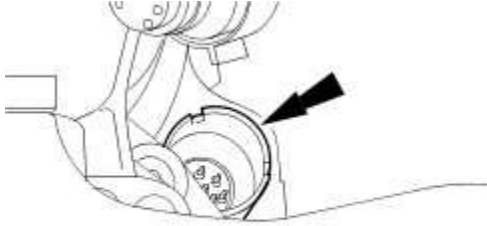


4



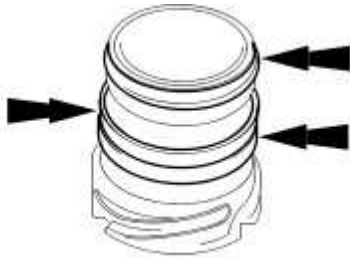
- **CAUTION:** Make sure all suitable safety precautions are taken to protect the TCM and main control valve body electrical connector pins against electrostatic discharge.

Remove the sealing tube.



E30828

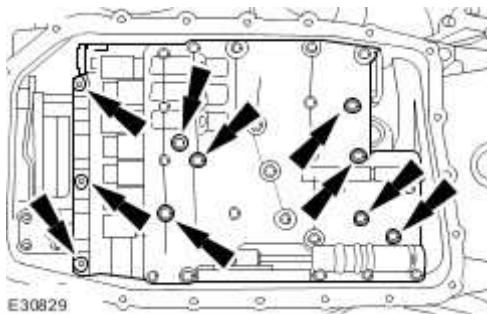
5 . Remove and discard the seals.



E30831

6 . Remove the TCM and main control valve body.

- ▶ Remove the retaining bolts.

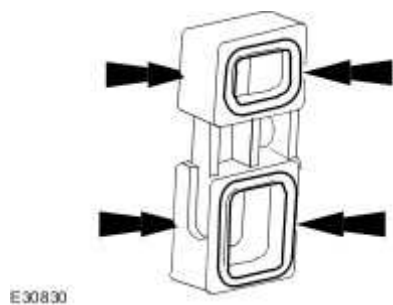


E30829

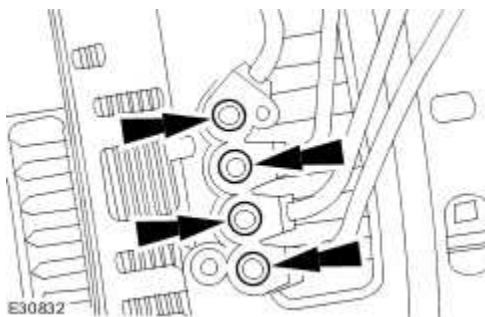
7 . Remove the TCM and main control valve body sealing block.



8 . Remove and discard the seals.

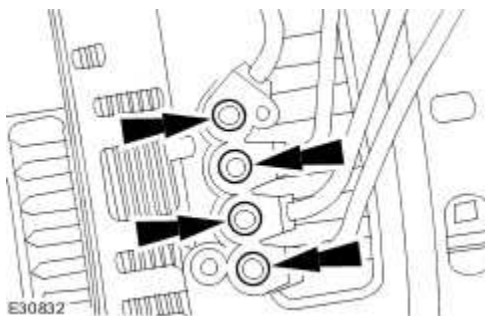


9 . Remove and discard the seals.

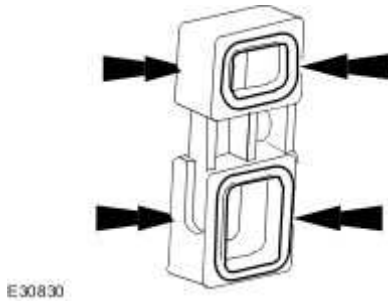


Installation

1 . Install the new seals.



2 . Install the new seals.



3 . Install the TCM and main control valve body sealing block.

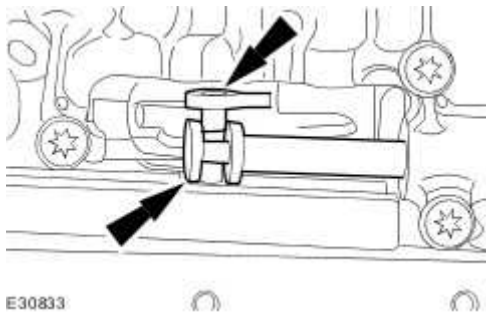


4




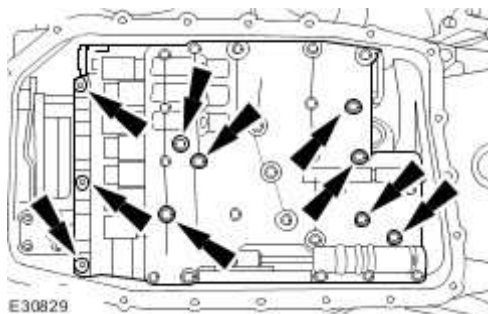
CAUTION: Make sure the TCM and main control valve body are protected against electrostatic discharge. Failure to follow this instruction may result in component damage.

Align the transmission selector shaft to the TCM and main control valve body.

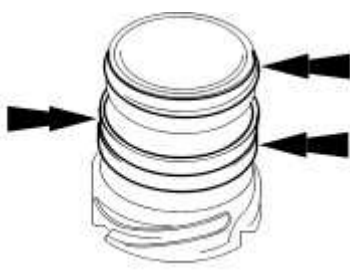


5 . Install the TCM and main control valve body retaining bolts.

 Tighten to 8 Nm.



6 . Install the new seals.

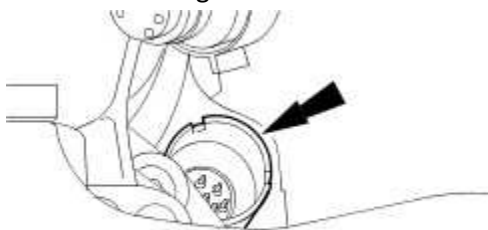


7



CAUTION: Make sure all suitable safety precautions are taken to protect the TCM and main control valve body electrical connector pins against electrostatic discharge.

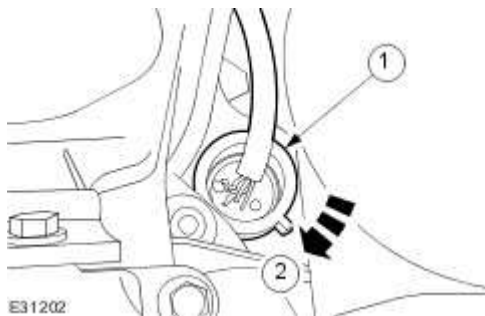
Install the sealing tube.



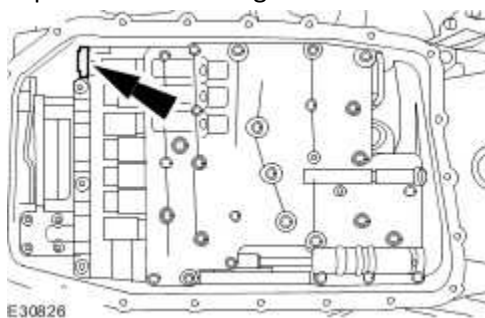
8 . Reposition the TCM and main control valve body electrical connector retaining ring.

1) Connect the electrical connector.

2) Reposition the electrical connector retaining ring.



9 . Reposition the locking device.

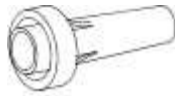


10 . Install the fluid pan, gasket and filter.

For additional information, refer to Transmission Fluid Pan, Gasket and Filter (44.24.07)

Input Shaft Seal (44.32.07)

Special Service Tools



308246

Front Seal Installer

308-246



308-375

Seal Remover Input and Output

308-375



100012

Slide Hammer

100-012



100-012-01

Slide Hammer Adaptor

100-012-01




307-139

Torque Converter Handles

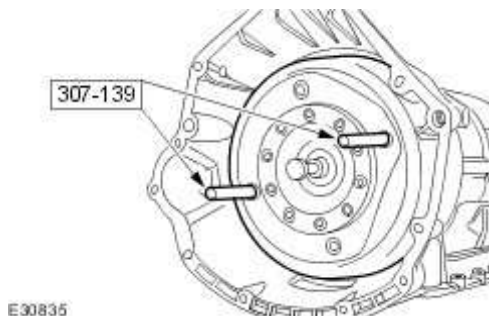
307-139


- 1 Remove the transmission assembly.
 - For additional information, refer to Transmission - 3.0L NA V6 - AJ27 (44.20.01)
 - For additional information, refer to Transmission - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.5L NA V8 - AJV8 (44.20.01)
 - For additional information, refer to Transmission - 2.7L V6 - TdV6 (44.20.01)

- 2  **WARNING:** Do not let the torque converter drop out of the transmission. Failure to follow this instruction may result in personal injury.

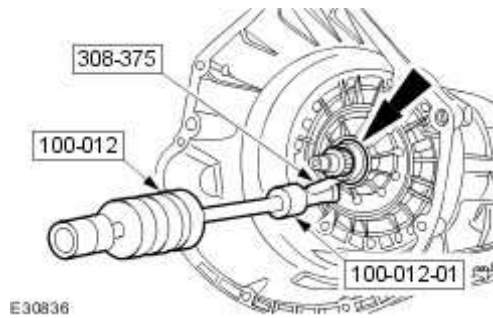
Using the special tools, remove the torque converter.

- Drain any remaining fluid into a suitable container.



- 3  **CAUTION:** Make sure the transmission housing seal face is not damaged when removing the torque converter seal. Failure to follow this instruction may result in damage to the vehicle.

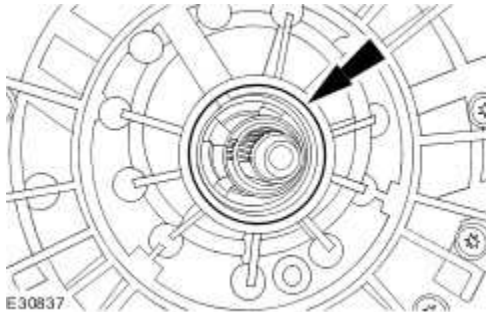
Using the special tools, remove the input shaft seal.



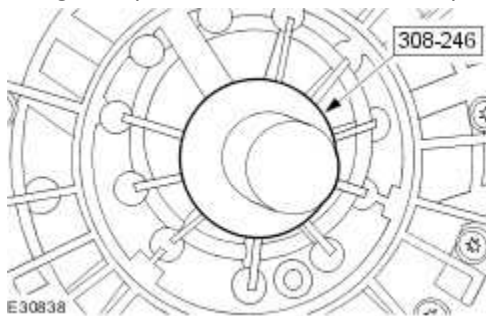
4 NOTE:

Using a suitable metal surface cleaner meeting Jaguar specification, clean the seal face on the housing before fitting the new seal.

Clean and inspect the transmission housing seal face.



5 . Using the special tool, install a new input shaft seal.



6

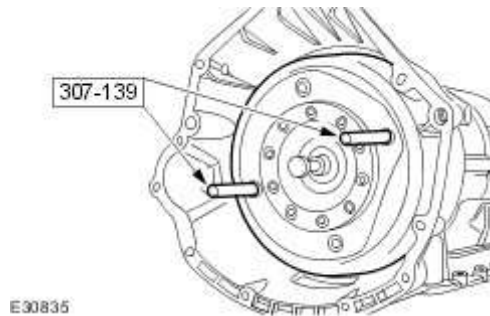


WARNING: Do not let the torque converter drop out of the transmission. Failure to follow this instruction may result in personal injury.

NOTE:

The torque converter hub must engage fully in the oil pump drive gear.

Using the special tools, install the torque converter.



7 Install the transmission assembly.

- . For additional information, refer to Transmission - 3.0L NA V6 - AJ27 (44.20.01)
For additional information, refer to Transmission - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.5L
NA V8 - AJV8 (44.20.01)
For additional information, refer to Transmission - 2.7L V6 - TdV6 (44.20.01)

307-02 : Transmission/Transaxle Cooling

Specifications

Specifications

General Specifications

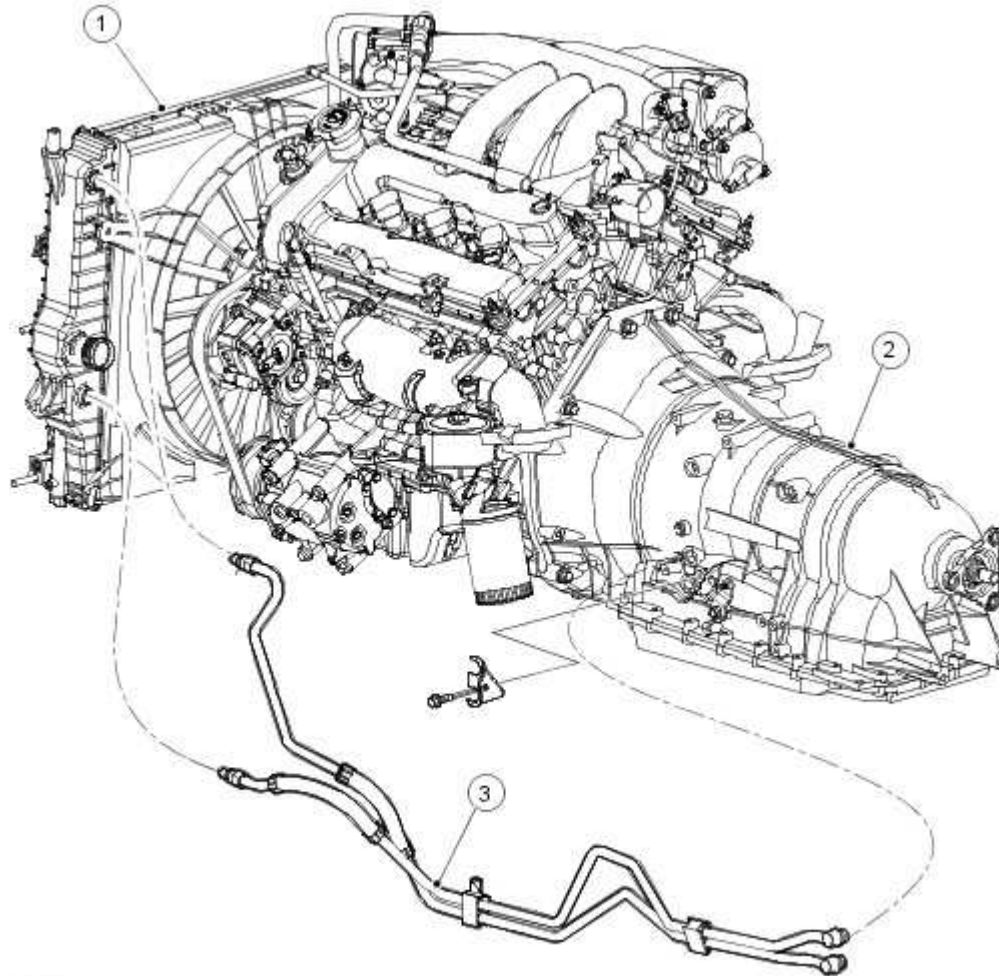
Item	Specification
Transmission fluid type	ATF Shell M1375.4

Torque Specifications

Description	Nm	lb-ft	lb-in
Transmission fluid cooler tube to transmission fluid cooler retaining bolt - Vehicles with diesel engines	10	-	89
Transmission fluid cooler tubes to transmission fluid cooler retaining bolt - Vehicles without diesel engines	20	15	-
Transmission fluid cooler tubes to transmission	22	16	-
Transmission fluid cooler tubes to engine oil pan	22	16	-

Transmission Cooling

All except vehicles with diesel engine



E31043

Item	Part Number	Description
1	—	Fluid cooler
2	—	Transmission
3	—	Fluid cooler tubes

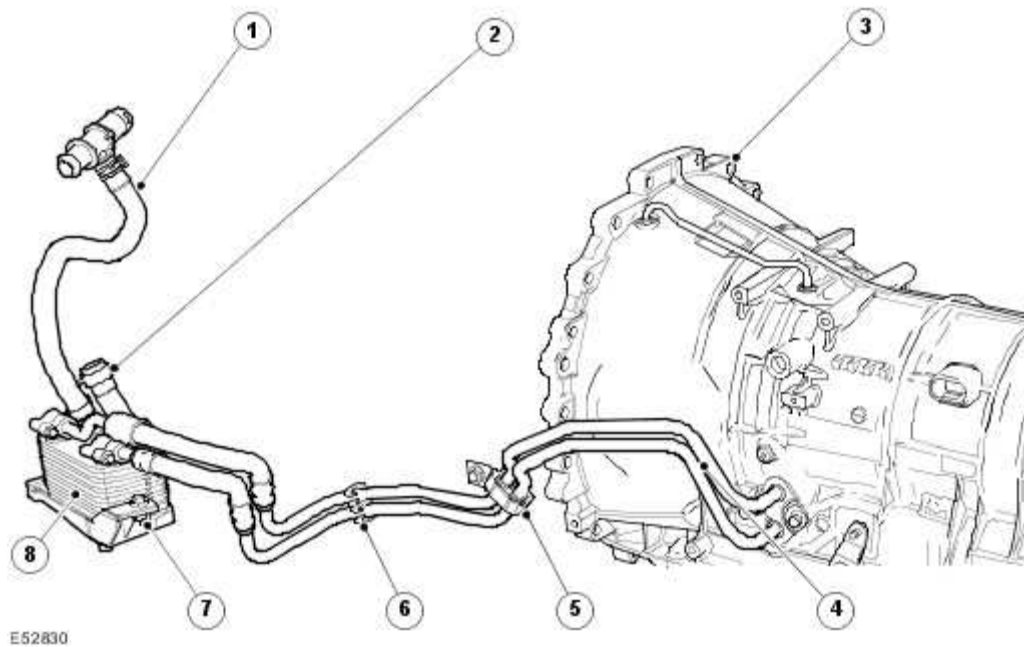
Fluid Cooler

The fluid cooler is of an aluminium construction consisting of a tube and louvered fin core-type, the tubes are arranged horizontally for the crossflow of the fluid.

It is divided into two sections to provide cooling for both the transmission and the engine, each section is separate within the same unit.

When carrying out any transmission procedures the drained fluid should be checked thoroughly for any metal filings or particles, in the event of this the transmission fault should be located followed by a thorough flushing of the fluid cooler and fluid cooler tubes.

Vehicles with diesel engine



Item	Part Number	Description
1	—	Fluid cooler inlet hose
2	—	Fluid cooler outlet hose
3	—	Transmission
4		Fluid cooler tubes
5		Fluid cooler tube retaining bracket
6		Fluid cooler tube retaining bracket
7		Fluid cooler retaining bracket
8		Fluid cooler

Fluid Cooler

The fluid cooler is mounted to the left-hand side of the front subframe via a retaining bracket. The fluid cooler is cooled by the engine coolant system.

When carrying out any transmission procedures the drained fluid should be checked thoroughly for any metal filings or particles, in the event of this the transmission fault should be located followed by a thorough flushing of the fluid cooler and fluid cooler tubes.

Transmission Cooling

Inspection and Verification

- 1 . Verify the customer concern by operating the system.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical
Feed and return tubes
Connections to the automatic transmission and the automatic transmission fluid cooler
Automatic transmission fluid level

- 1 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 2 . If the concern is not visually evident, verify the symptom and refer to the Symptom chart.

Symptom chart

Condition	Possible sources	Action
Over heating of the automatic transmission.	Obstruction in the automatic transmission fluid cooler.	Flush out the automatic transmission fluid cooler with new automatic transmission fluid. If the flushing is unsuccessful install a new automatic transmission fluid cooler.
Over heating of the automatic transmission.	Obstruction in the automatic transmission fluid tubes.	Flush out the automatic transmission fluid cooler tubes with new automatic transmission fluid. If the flushing is unsuccessful install new automatic transmission fluid cooler tubes.
Loss of automatic transmission fluid	Connections to the automatic transmission and the automatic transmission fluid cooler.	Check the torque of the tubes. Check the tubes, connections and seals.

Loss of automatic transmission fluid	Leak at oil cooler.	<p>Check the torque of the tubes.</p> <p>Check the tubes, connections and seals.</p> <p>INSTALL new oil cooler.</p>
--------------------------------------	---------------------	---

Transmission Fluid Cooler - 2.7L V6 - TdV6 (44.24.10)

Special Service Tools

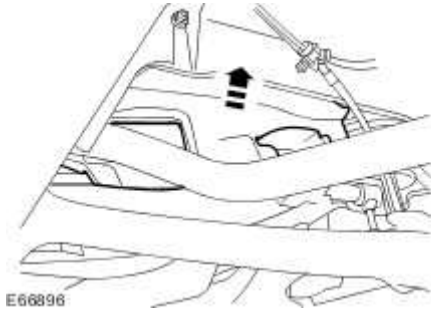


Remover/Installer, Cooling Hose Clamp
303-397 (24-003)

Removal

- 1 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)

- 2 . Reposition the left-hand splash shield.

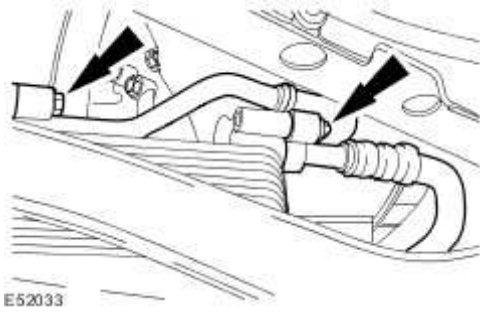


- 3 . **NOTE:**

Discard the O-ring seals.

Detach the transmission fluid cooler tubes.

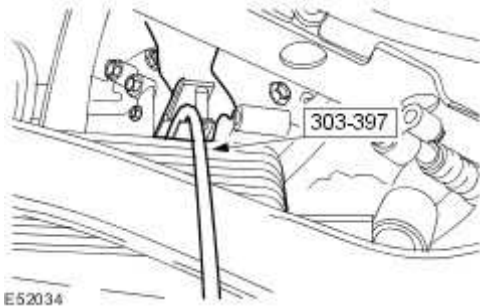
▶ Allow the transmission fluid to drain into a suitable container.



4 . NOTE:

Install a suitable pipe clamp to minimize coolant loss.

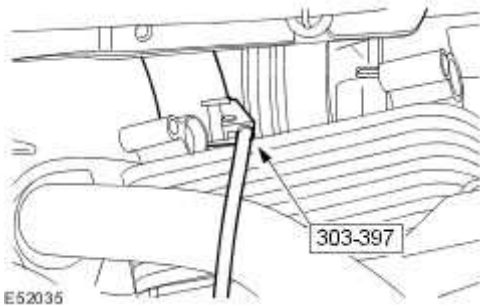
Using the special tool, detach the transmission fluid cooler coolant hose.



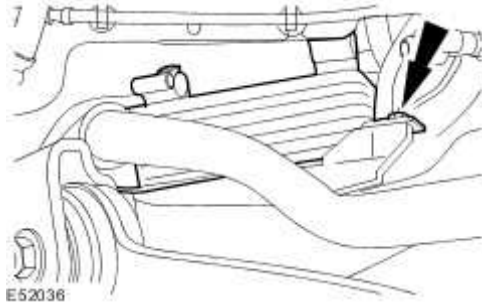
5 . NOTE:

Install a suitable pipe clamp to minimize coolant loss.

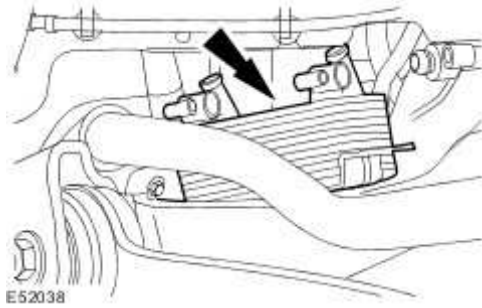
Using the special tool, detach the transmission fluid cooler coolant hose.



6 . Detach the transmission fluid cooler.

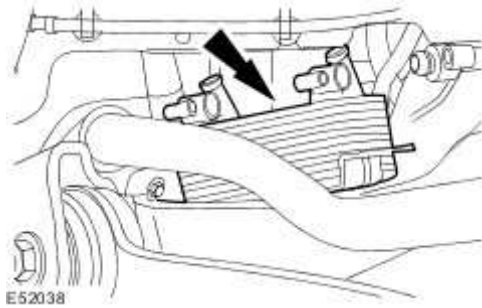


7 . Remove the transmission fluid cooler.



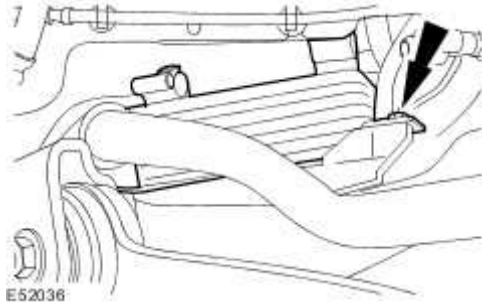
Installation

1 . Install the transmission fluid cooler.



2 . Attach the transmission fluid cooler.

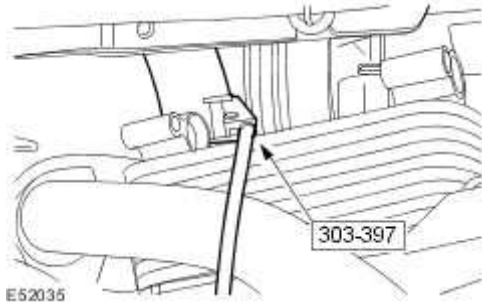
► Tighten to 5 Nm.



3 . NOTE:

Remove the pipe clamp.

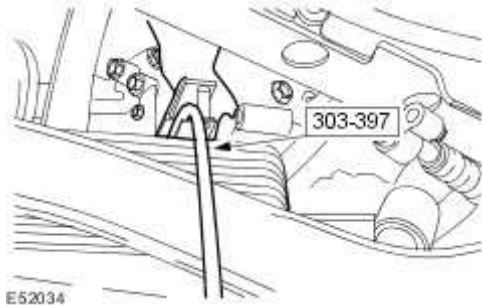
Using the special tool, attach the transmission fluid cooler coolant hose.



4 . NOTE:

Remove the pipe clamp.

Using the special tool, attach the transmission fluid cooler coolant hose.

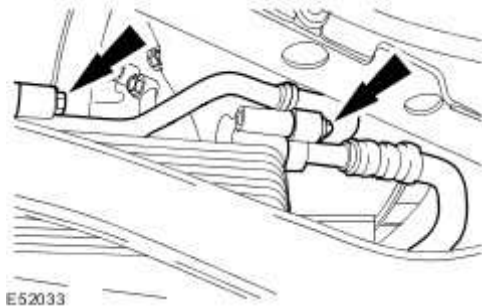


5 . NOTE:

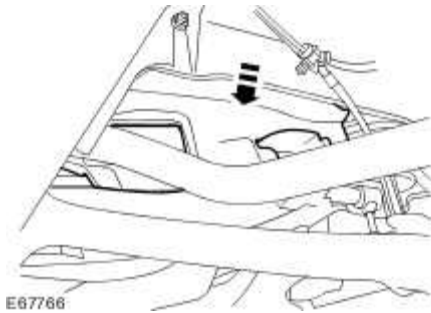
Install new O-ring seals.

Attach the transmission fluid cooler tubes.

▶ Tighten to 10 Nm.



6 . Reposition the left-hand splash shield.



7 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

8 . Carry out a transmission fluid level check.

For additional information, refer to Transmission Fluid Level Check

9 . Check and top up the cooling system.

For additional information, refer to Cooling System Draining, Filling and Bleeding

Transmission Fluid Cooler Tubes - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (44.24.19)

Removal

Vehicles with 3.0L engine

- 1 . Remove the air cleaner. <<303-12A>>

Vehicles with 3.5L or 4.2L engine

- 2 . Remove the air cleaner. <<303-12B>>

All vehicles

- 3 . Remove the radiator splash shield. <<501-02>>

- 4 . Lower the vehicle.

- 5 . Disconnect the transmission fluid cooler tubes.

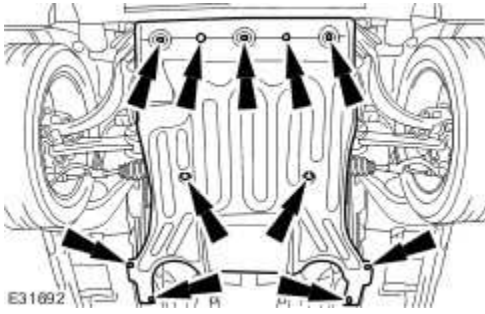
▶ Drain fluid into a suitable container.

▶ Remove and discard transmission fluid cooler tube O-ring seals.



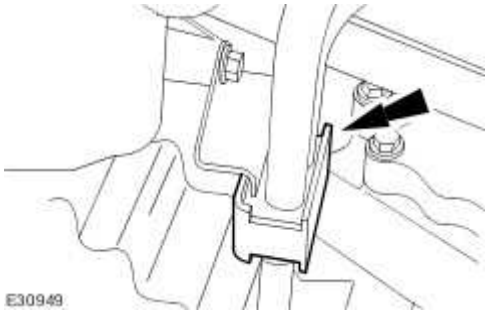
- 6 . Raise the vehicle.

7 . Remove the air deflector.

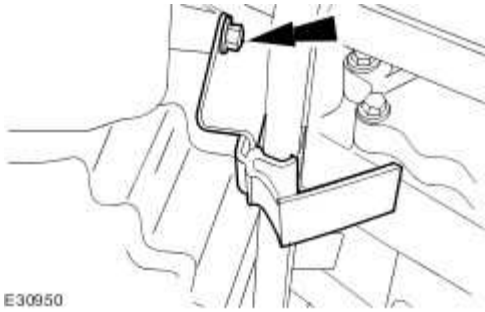


Vehicles with 3.0L engine

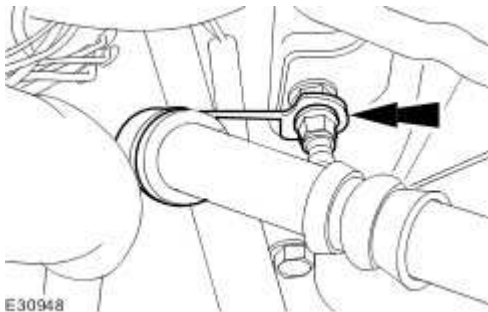
8 . Release the transmission fluid cooler tube retaining bracket.



9 . Remove the transmission fluid cooler tube retaining bracket.

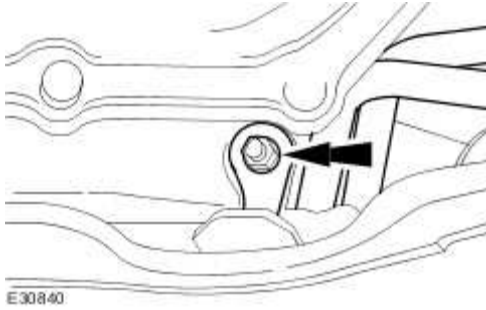


10 . Remove the power steering pump to steering gear pressure line retaining nut.



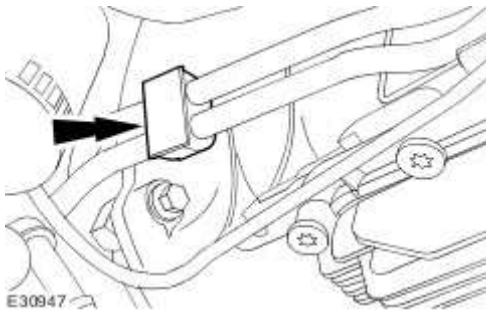
Vehicles with 3.5L or 4.2L engine

11 . Remove the transmission fluid cooler tube retaining bracket.



All vehicles

12 . Remove the transmission fluid cooler tube retaining bracket.



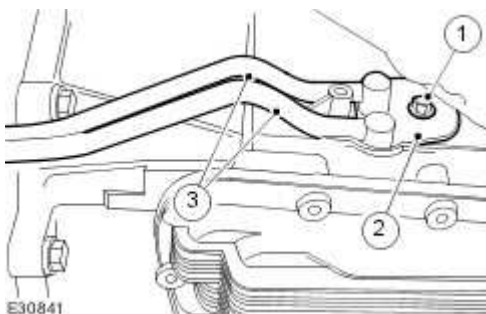
13 . Remove the transmission fluid cooler pipes.

1) Remove the retaining bolt.

2) Remove the retaining plate.

3) Remove the transmission fluid cooler pipes.

▶ Allow the transmission fluid to drain into a suitable container.



Installation

All vehicles

1 . Install the transmission fluid cooler tubes.

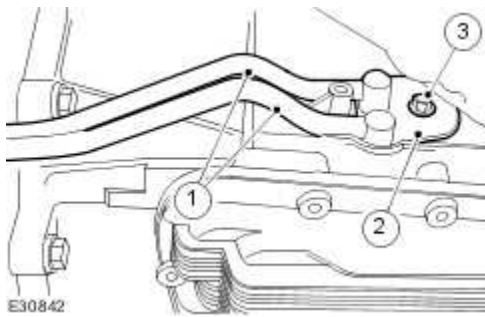
1) Install the transmission fluid cooler tubes.

2) Install the retaining plate.

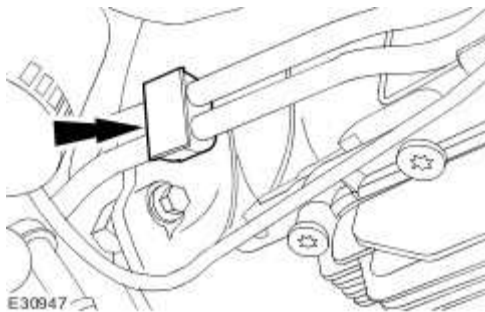
3) Install the retaining bolt .

▶ Install new O-ring seals.

▶ Tighten to 23 Nm.



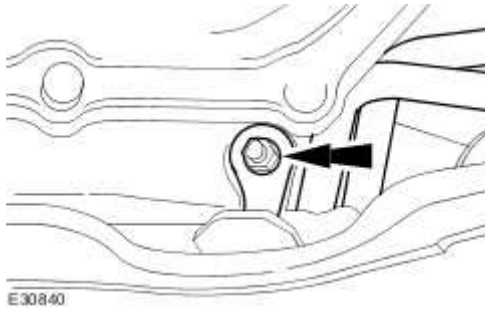
2 . Install the transmission fluid cooler tube retaining bracket.



Vehicles with 3.5L or 4.2L engine

3 . Install the transmission fluid cooler tube retaining bracket.

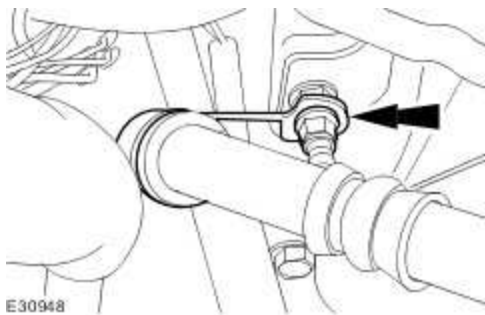
1) Tighten to 10 Nm.



Vehicles with 3.0L engine

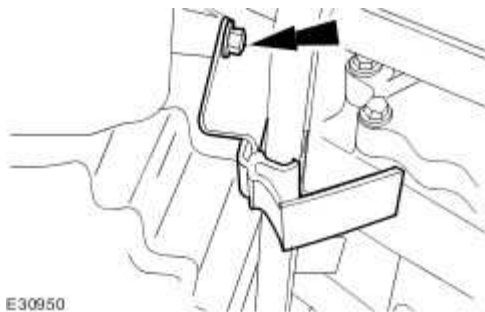
4 . Install the power steering pump to steering gear pressure line retaining nut.

▶ Tighten to 10 Nm.

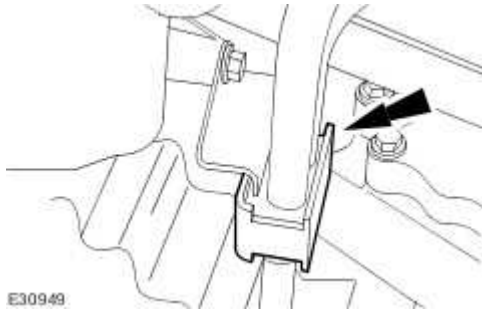


5 . Install the transmission fluid cooler tube retaining bracket.

▶ Tighten to 10 Nm

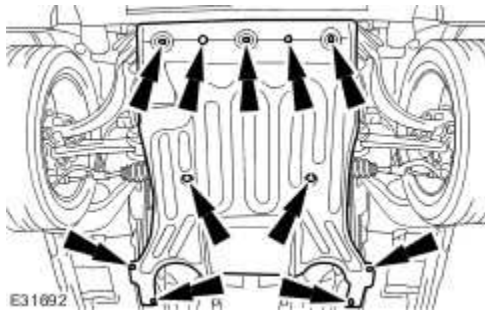


6 . Attach the transmission fluid cooler tube retaining bracket.



All vehicles

7 . Install the air deflector.



8 . Install the radiator splash shield. <<501-02>>

9 . Lower the vehicle.

10 . Connect the transmission fluid cooler tubes.

▶ Install new O-ring seals.

▶ Tighten to 20 Nm.



Vehicles with 3.5L or 4.2L engine

11 . Install the air cleaner. <<303-12B>>

Vehicles with 3.0L engine

12 . Install the air cleaner. <<303-12A>>

All vehicles

13 . Carry out transmission fluid level check. <<307-01>>

Transmission Fluid Cooler Tubes - 2.7L V6 - TdV6 (44.24.19)

Removal

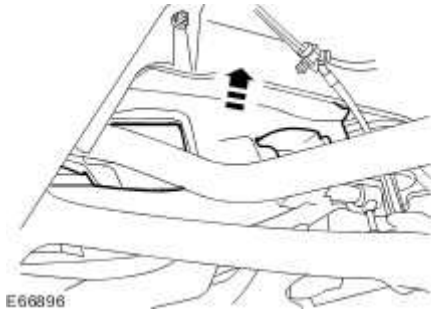
- 1 . Center the steering wheel.

▶ Lock in position, remove the ignition key.

- 2 . Remove the catalytic converter.

For additional information, refer to Catalytic Converter - 2.7L V6 - TdV6 (17.50.05)

- 3 . Reposition the left-hand splash shield.

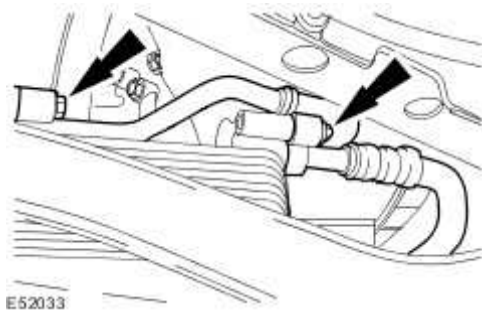


- 4 . **NOTE:**

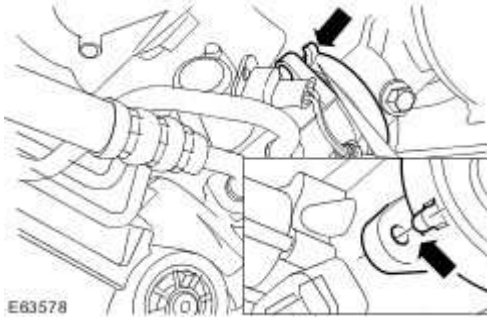
Discard the O-ring seals.

Detach the transmission fluid cooler tubes.

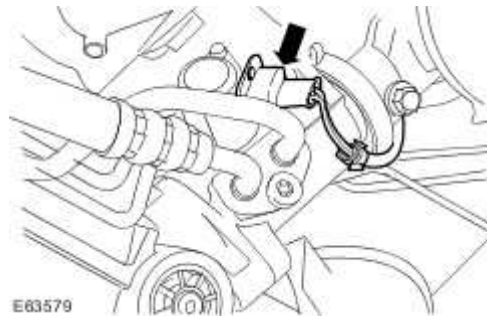
▶ Allow the transmission fluid to drain into a suitable container.



- 5 Make sure the alignment mark on the steering gear pinion seal protection cover is central to the steering gear pinion casting.

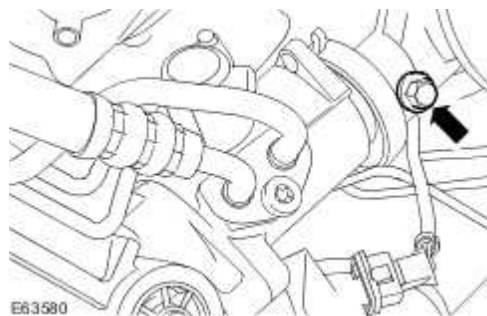


- 6 . Disconnect the power steering control valve actuator electrical connector.



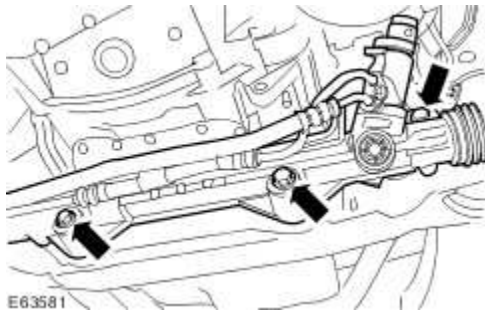
- 7 . Detach the lower steering column.

- ▶ Remove the steering gear shaft pinch bolt.

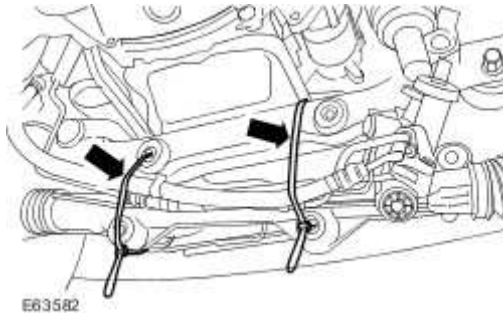


- 8 . Detach the steering gear.

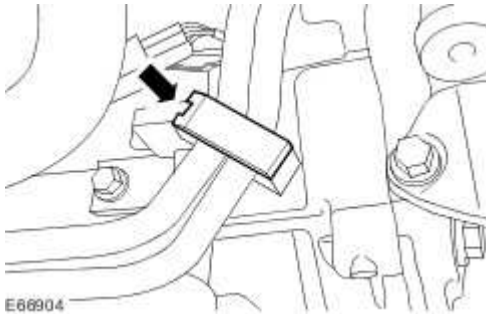
- ▶ Remove the steering gear retaining bolts.



9 . Using a suitable piece of string, secure the steering gear.



10 . Release the transmission fluid cooler tube retaining bracket.



11



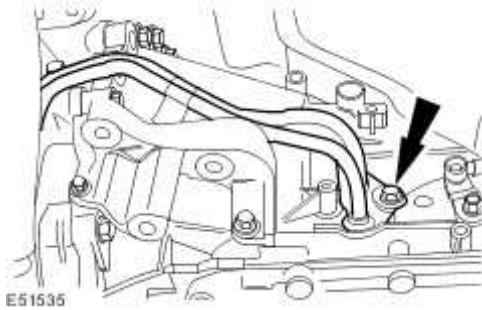
CAUTION: Make sure that the transmission fluid cooler tubes are not removed from the automatic transmission by using a pry bar. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

Discard the O-ring seals.

Remove the transmission fluid cooler tubes.

▶ Allow the transmission fluid to drain into a suitable container.



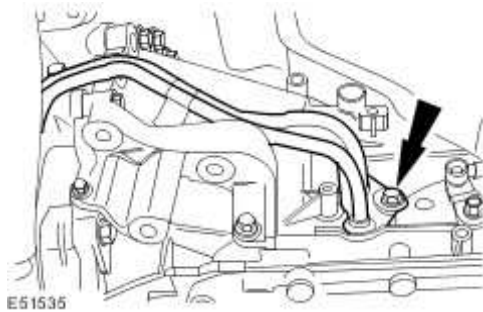
Installation

1 . NOTE:

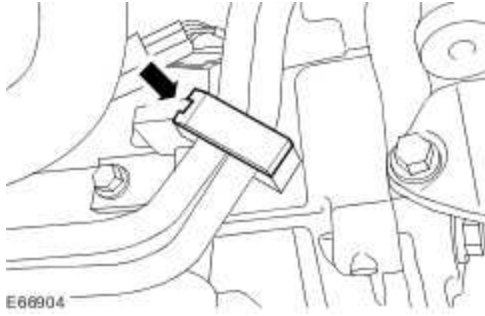
Install new O-ring seals.

Install the transmission fluid cooler tubes.

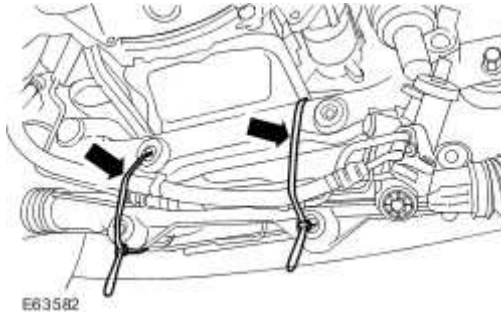
▶ Tighten to 23 Nm.



2 . Attach the transmission fluid cooler tube retaining bracket.

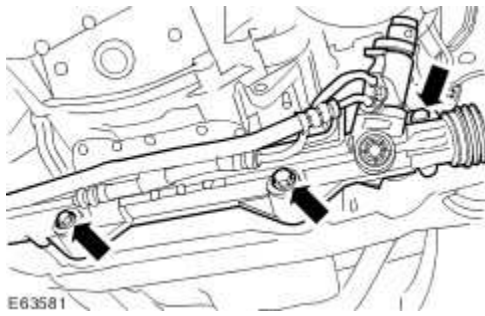


3 . Detach the steering gear.



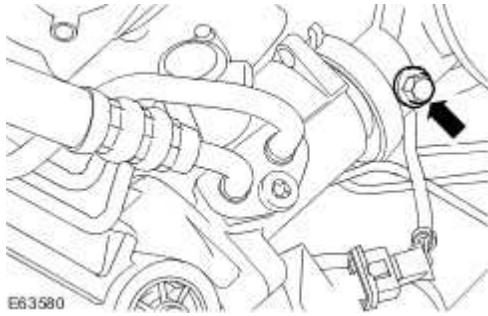
4 . Attach the steering gear.

► Tighten to 100 Nm.

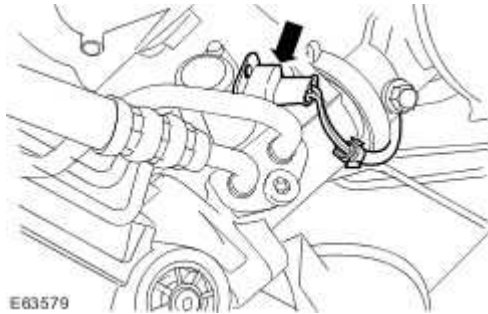


5 . Attach the lower steering column.

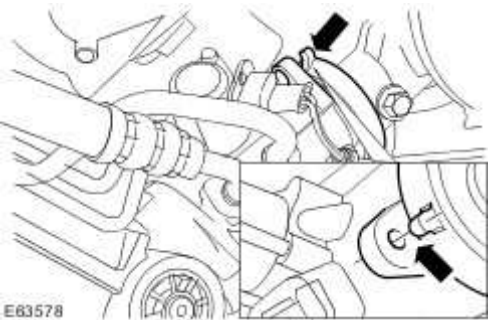
► Tighten to 35 Nm.



6 . Connect the power steering control valve actuator electrical connector.



7 Make sure that the alignment mark on the steering gear pinion seal protection cover is central
 . to the steering gear pinion casting.

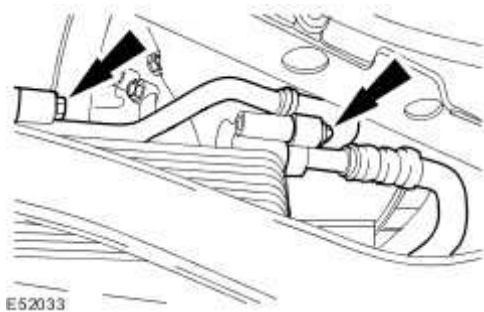


8 . **NOTE:**

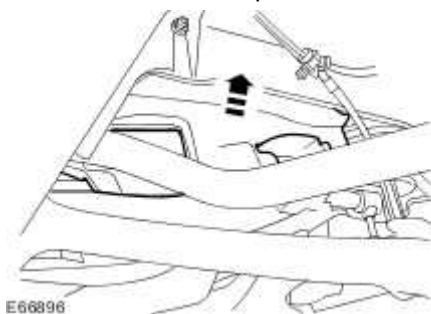
Install new O-ring seals.

Attach the transmission fluid cooler tubes.

► Tighten to 10 Nm.



- 9 . Install the left-hand splash shield.



- 10 . Install the catalytic convertor.

For additional information, refer to Catalytic Converter - 2.7L V6 - TdV6 (17.50.05)

- 11 . Carry out a transmission fluid level check.

For additional information, refer to Transmission Fluid Level Check

307-05 : Automatic Transmission/Tranxle External Controls

Specifications

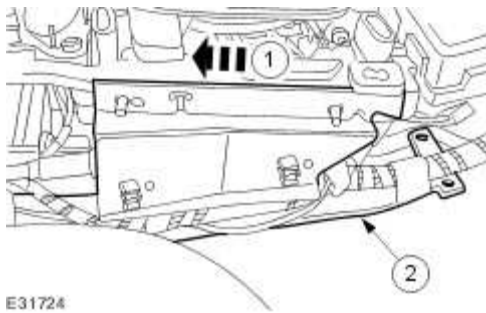
Specifications

Torque Specifications

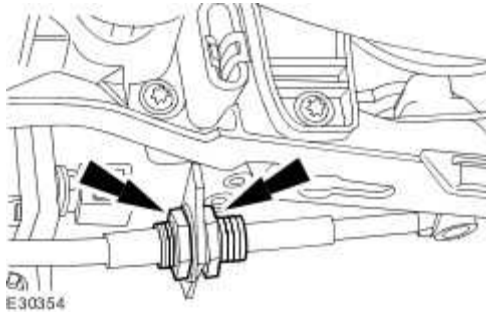
Description	Nm	lb-ft	lb-in
Transmission selector lever retaining bolts	11	8	-
Selector lever cable bracket retaining bolts	11	8	-
Selector lever cable retaining nuts	20	15	-

Selector Lever Cable Adjustment (44.15.07)

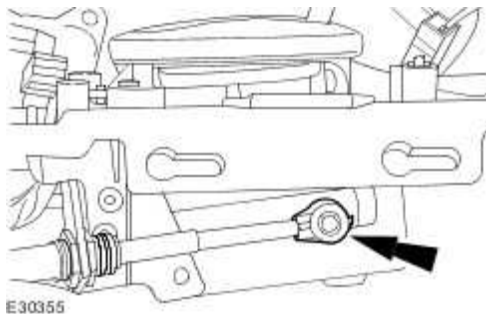
1. Remove the floor console. <<501-12>>
2. Move the transmission selector lever to the 'R' position.
3. Detach the wiring harness bracket.
 - Reposition the wiring harness.
 - Detach the wiring harness bracket.



4. Loosen the selector lever cable retaining nuts.



5. Detach the selector lever cable.



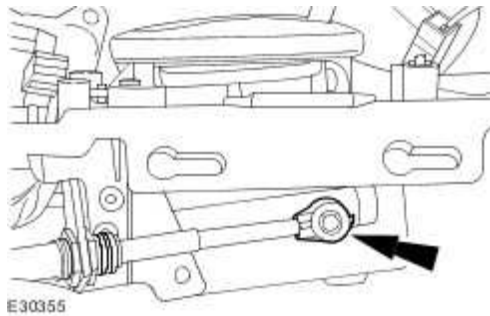
6. **NOTE:**

Fully extend the selector cable, then retract the selector cable one detent.

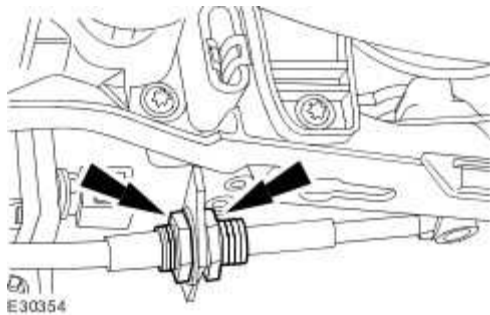
Make sure the selector lever cable is in the 'R' position.

7. Make sure the transmission selector lever is in the 'R' position.

8. Connect the selector lever cable.



9. Adjust the selector lever cable retaining nuts to lock against the retaining bracket without moving the set position of either the shift lever or the selector lever cable.



10. **NOTE:**

Make sure all transmission selector lever positions select the relevant automatic transmission states.

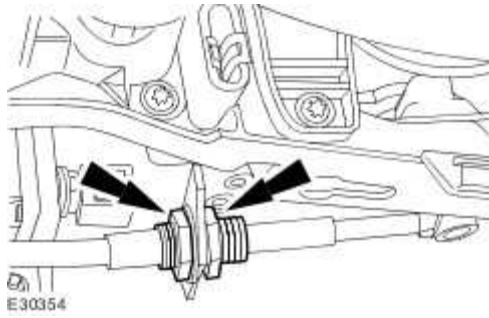
Move the transmission selector lever to all positions.

11. **NOTE:**

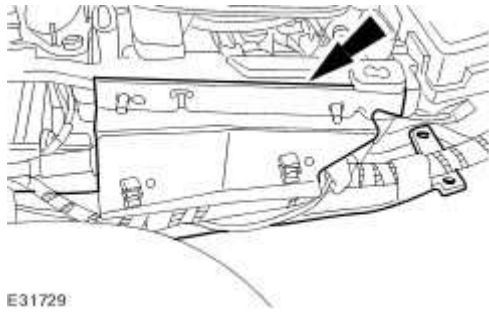
When tightening the selector lever cable retaining nuts, make sure both retaining nuts are tightened to the specified torque simultaneously.

Tighten the selector lever cable retaining nuts.

- Tighten to 20 Nm.

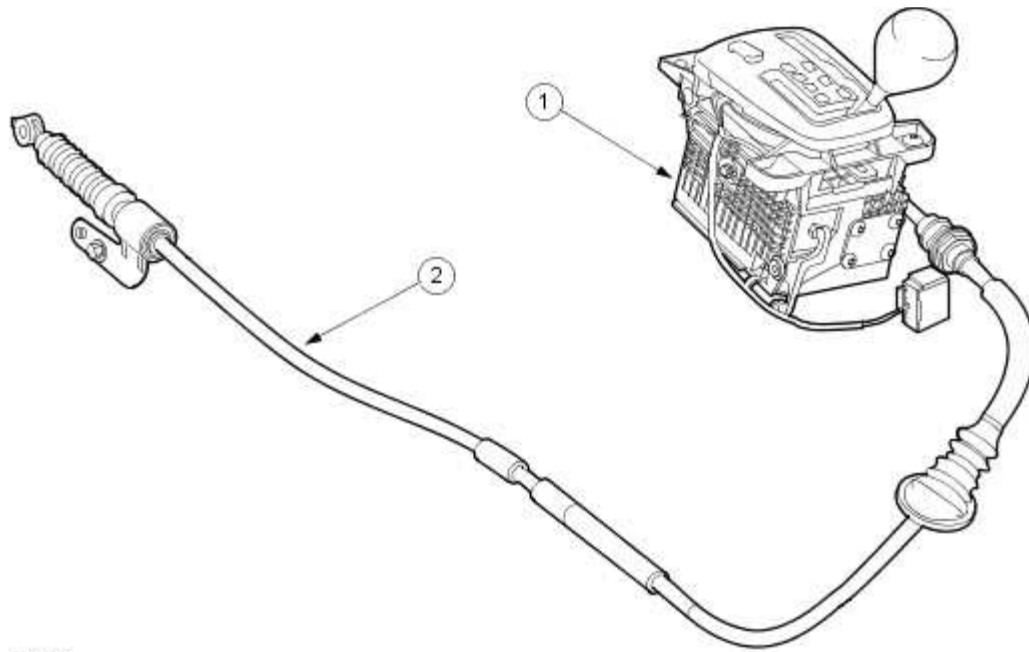


12. Attach the wiring harness bracket.



13. Install the floor console. <<501-12>>

External Controls



Item	Part Number	Description
1	—	Transmission selector lever
2	—	Selector cable and bracket

Transmission selector lever

The transmission selector lever:

has eight positions: Park, Reverse, Neutral, Drive, Fifth, Fourth, Third and Second.

operates the transmission selector shaft in the Park, Reverse, Neutral, Drive positions by means of a cable.

communicates the transmission selector lever position to the transmission control module (TCM) using electronic code through the Controlled Area Network (CAN) bus.

uses "Hall Effect" switches and a micro controller inside the transmission selector lever to generate the electronic code.

when moved to the left-hand side of the transmission selector lever, allows manual electronic selection of Fifth, Fourth, Third and Second gears.

The transmission selector illumination:

is provided by the TCM by using electronic code.

is possible by decoding the electronic code received by the transmission selector lever from the TCM and illuminating the relevant transmission selector lever position.

provides a red transmission lever position illumination to indicate the selected gear.

provides a green background for the transmission selector lever module and is hard-wired to the front electronics module (FEM).

The eight transmission selector positions are:

P: The transmission is mechanically locked (starting available).

R: Reverse gear.

N: No power to the rear wheels (starting available).

D: All six forward gears available.

5: Upshift to fifth gear only.

4: Upshift to fourth gear only.

3: Upshift to third gear only.

2: Upshift to second gear only.

Sport mode switch

The sport mode switch:

allows the driver to select or de-select the automatic transmission sport mode.

allows the automatic transmission to operate normally when the sport mode is selected, but under acceleration the gear shift points are extended to make full use of the engine's power reserves.

allows the driver to drive the vehicle in the "D" position with the full automatic transmission shift or manually shift gears in the "second, third, fourth and fifth" positions.

is illuminated when Sport mode is selected.

communicates with the TCM through the CAN network to show the sport mode switch status.

Transmission unit gear selector

The gear selector at the transmission unit:

is connected to the transmission selector lever module by a selector cable.

operates the manual selector valve, which is part of the electro-hydraulic control unit.

Transmission selector lever interlock solenoid

Transmission selector lever interlock solenoid:

prevents the transmission selector lever from being moved from the Park position, unless the ignition switch is in the "ON" position and the brake pedal is applied.

is controlled by an input from the brake pedal switch through the CAN bus.

Transmission selector lever interlock solenoid operation

When the driver first enters the vehicle and turns the ignition switch to the "ON" position, the transmission selector lever position indicator "P" will flash. If the driver then applies the brake pedal while the transmission selector lever position indicator "P" is flashing, the driver will then be able to move the transmission selector lever out of the "P" position.

Once the transmission selector lever has been moved out of the "P" position, the transmission selector lever interlock solenoid will de-energise after 5 seconds. If the transmission selector lever is moved back into the "P" position before the 5 seconds have elapsed, the transmission selector lever interlock solenoid will de-energise as soon as the transmission selector lever detects it is in the "P" position.

If the transmission selector lever is moved into a gear selection position for longer than 5 seconds and then returned to the "P" position whilst the brake pedal is applied. The transmission selector lever interlock solenoid will remain de-energised and the transmission selector lever position indicator "P" will flash. The driver must release and re-apply the brake pedal to allow the transmission selector lever to be moved from the "P" position.

If the driver runs the vehicle for a short period of time, with the brake pedal applied and then turns the vehicle off without moving the transmission selector lever out of the "P" position. The driver will not be able to remove the key from the ignition switch, until the brake pedal has been released.

External Controls

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.



WARNING: Danger of accident. Apply the parking brake. Shift the gear selector lever to "P". Failure to follow these instructions may result in personal injury.

Visual Inspection Chart

Mechanical	Electrical
Visibly damaged or worn parts.	Fuse(s).
Loose or missing nuts or bolts.	Loose or corroded electrical connector(s).

- 1 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 2 . If the cause is not visually evident, verify the symptom and refer to the Jaguar Approved Diagnostic System.

Pinpoint Tests

PINPOINT TEST G189073p1 : J-GATE SYSTEM CIRCUIT CHECKS

G189073t1 : CHECK FOR IGNITION FEED TO THE J-GATE

1. Disconnect the J-gate assembly electrical connector CA245.
2. Turn the ignition to the "ON" position.
3. Measure the voltage at CA245 Pin 1 (GO).

Is the voltage greater than 10 Volts?

-> Yes

GO to Pinpoint Test G189073t6.

-> **No**

Repair the electrical circuit between the J-gate assembly electrical connector CA245 Pin 1 (GO) and the rear power distribution box FUSE 3. Clear the DTC. TEST the system for normal operation. NOTE: This circuit incorporates the ignition switch and the primary junction box. For additional information, refer to the vehicle wiring diagrams.

G189073t6 : CHECK THE GROUND SUPPLY TO THE J-GATE

1. Measure the resistance between the J-gate assembly electrical connector CA245 Pin 2 (B) and GROUND.

Is the resistance less than 5.0 Ohms?

-> **Yes**

GO to Pinpoint Test G189073t2.

-> **No**

Repair the circuit between the J-gate assembly electrical connector CA245 Pin 2 (B) and GROUND. Clear the DTC. TEST the system for normal operation.

G189073t2 : CHECK FOR J-GATE ILLUMINATION FEED

1. Turn the ignition to the "ON" position. 2. Measure the voltage at CA245 Pin 3 (UY).

Is the voltage greater than 10 Volts?

-> **Yes**

GO to Pinpoint Test G189073t3.

-> **No**

Repair the electrical circuit between the J-gate assembly electrical connector CA245 Pin 3 (UY) and the front electronics module electrical connector. For additional information, refer to the vehicle wiring diagrams. Clear the DTC. TEST the system for normal operation.

G189073t3 : CHECK FOR KEY INTERLOCK FEED CIRCUIT FOR CONTINUITY

1. Disconnect the J-gate assembly electrical connector CA245. 2. Disconnect the ignition switch electrical connector FC018. 3. 3) Measure the resistance between the J-gate assembly electrical connector CA245 Pin 4 (Y) and the ignition switch electrical connector FC018 Pin 3 (Y).

Is the resistance less than 5.0 Ohms?

-> **Yes**

GO to Pinpoint Test G189073t4.

-> **No**

Repair the electrical circuit between the J-gate assembly electrical connector CA245 Pin 4 (Y) and the ignition switch electrical connector FC018 Pin 3 (Y). Clear the DTC. TEST the system for normal operation.

G189073t4 : CHECK FOR KEY INTERLOCK ACTION

1. Check for continuity between Pin 3 and Pin 4 of the ignition switch lock cylinder.

Is the circuit continuous?

-> Yes

Install a new J-gate. For additional information,
Clear the DTC. TEST the system for normal operation.

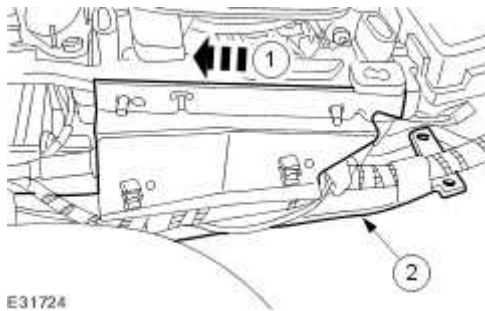
-> No

Install a new ignition switch lock cylinder. For additional information, <<211-04>> Clear the DTC. TEST the system for normal operation.

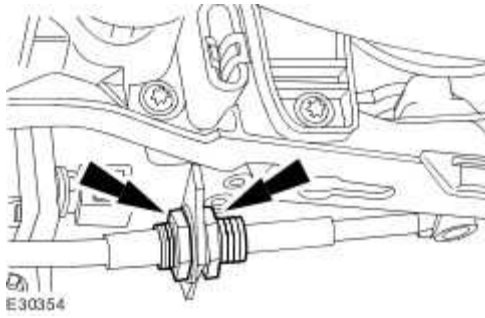
Selector Lever Cable and Bracket (44.15.08)

Removal

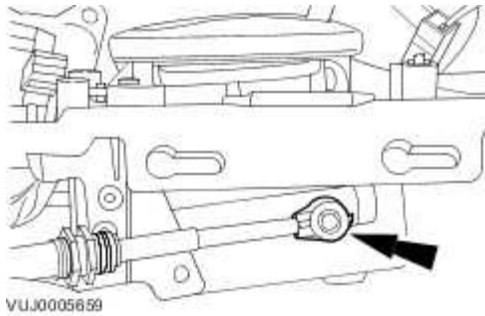
- 1 . Remove the floor console. <<501-12>>
- 2 . Move the transmission selector lever to the "R" position.
- 3 . Detach the wiring harness bracket.
 - 1) Reposition the wiring harness.
 - 2) Detach the wiring harness bracket.



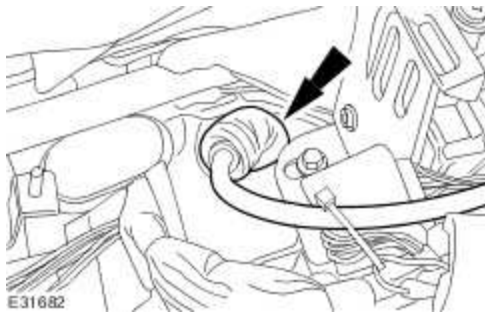
- 4 . Detach the selector lever cable.
 - ▶ Loosen the selector lever cable retaining nuts.



5 . Detach the selector lever cable.

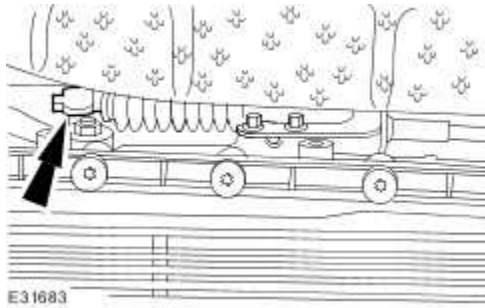


6 . Detach the selector lever cable.

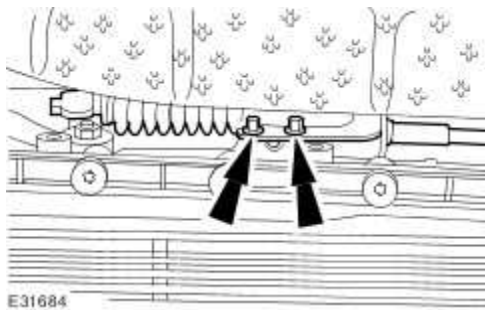


7 . Raise and support the vehicle. <<100-02>>

8 . Detach the selector lever cable.



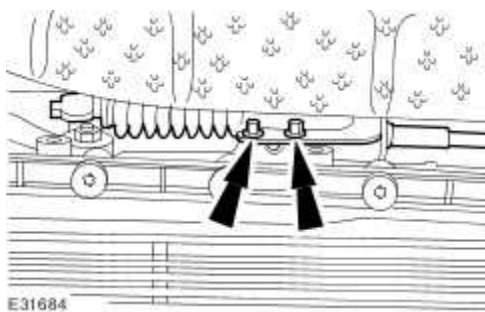
9 . Remove the selector lever cable.



Installation

1 . Install the selector lever cable.

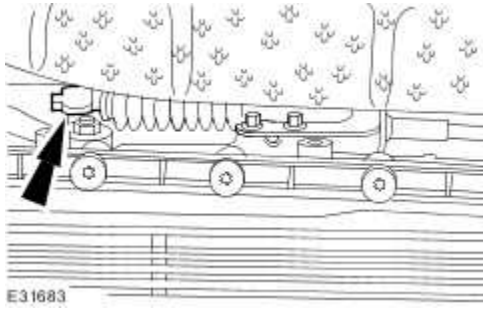
▶ Tighten to 11 Nm.



2 **NOTE:**

Make sure the selector lever cable is fully seated to the transmission unit gear selector pivot ball.

Attach the selector lever cable.

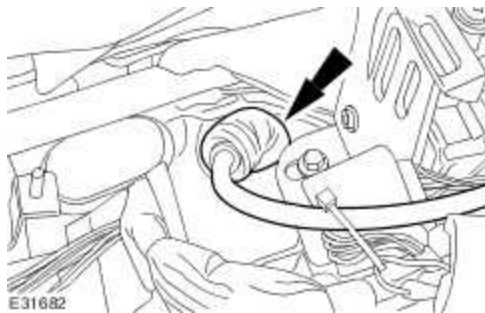


3 . Lower the vehicle.

4 . **NOTE:**

Make sure the selector lever cable grommet is seated correctly.

Attach the selector lever cable.



5 . **NOTE:**

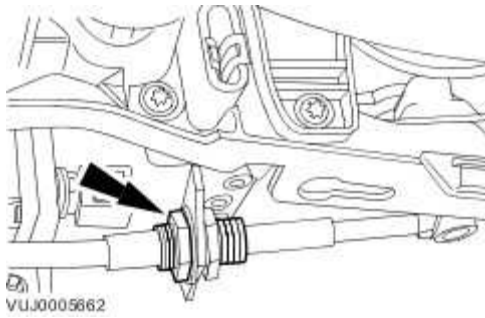
Fully extend the selector cable, then retract the selector cable one detent.

Make sure the selector lever cable is in the "R" position.

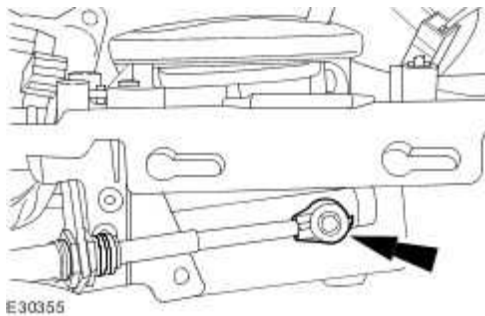
6 . Make sure the transmission selector lever is in the "R" position.

7 . Attach the selector lever cable.

▶ Do not tighten the selector lever cable retaining nuts.

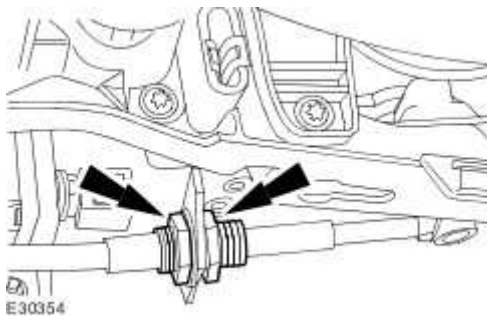


8 . Connect the selector lever cable.



9 Adjust the selector lever cable retaining nuts to lock against the retaining bracket without
moving the set position of either the shift lever or the selector lever cable.

▶ Do not tighten the selector lever cable retaining nuts.



10 **NOTE:**

Make sure all transmission selector lever positions are illuminated to indicate the


selected gear and the automatic transmission selects the relevant transmission state.

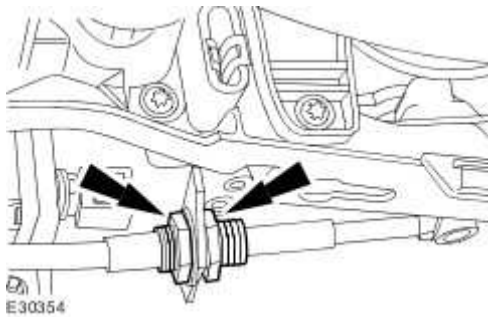
Move the transmission selector lever to all positions.

11 NOTE:

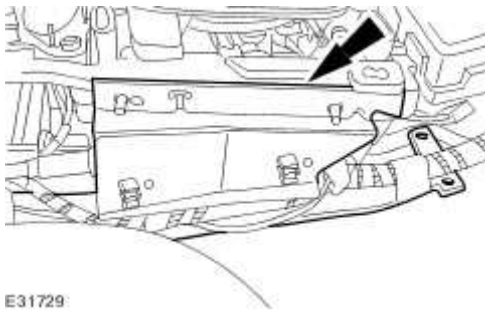
When tightening the selector lever cable retaining nuts, make sure both retaining nuts are tightened to the specified torque simultaneously.

Tighten the selector lever cable retaining nuts.

 Tighten to 20 Nm.



12 . Attach the wiring harness bracket.



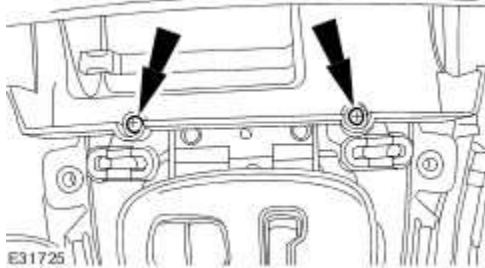
13 . Install the floor console. <<501-12>>

Selector Lever Assembly (44.15.04)

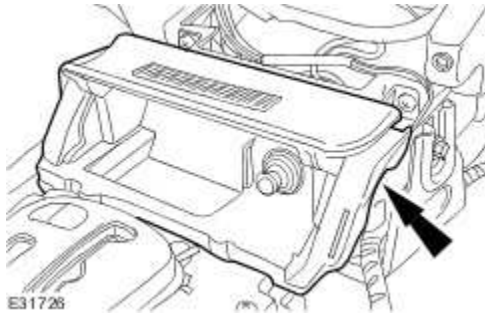
Removal

1 . Remove the instrument panel console. <<501-12>>

2 . Remove the ash tray retaining screws.



3 . Detach the ash tray.

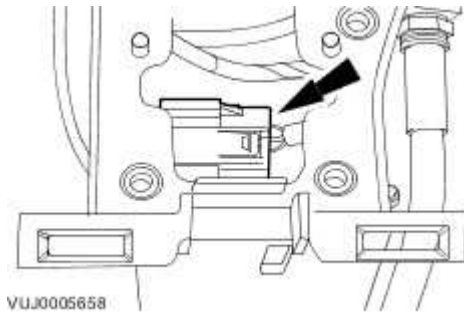


4 . Place the transmission selector lever to the "R" position.

5 . **NOTE:**

Shown with the electric parking brake switch removed for clarity.

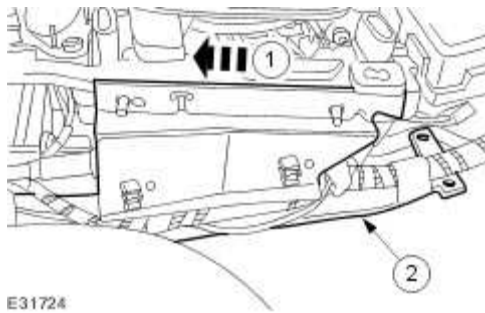
Disconnect the electrical connector.



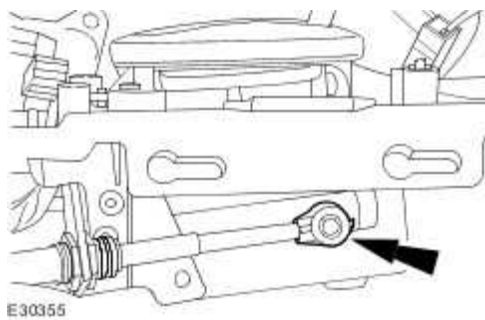
6 . Detach the wiring harness bracket.

1) Reposition the wiring harness.

2) Detach the wiring harness bracket.

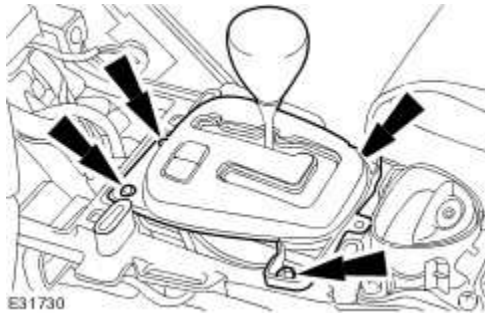


7 . Detach the selector lever cable.



8 . Detach the transmission selector lever.

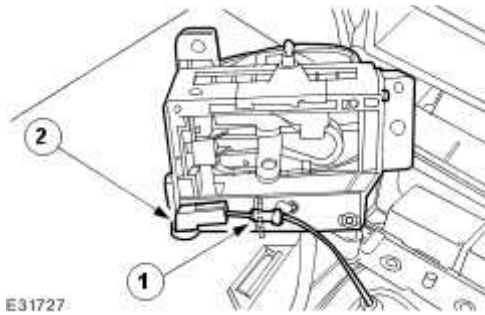
▶ Remove the retaining bolts.



9 . Disconnect the ignition switch interlock cable.

1) Detach the ignition switch interlock cable.

2) Disconnect the ignition switch interlock cable.

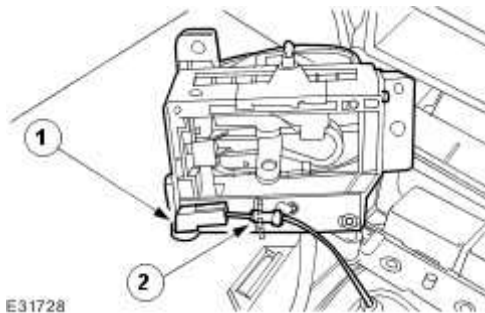


Installation

1 . Attach the ignition switch interlock cable.

1) Connect the ignition switch interlock cable.

2) Attach the ignition switch interlock cable.



2 . Attach the transmission selector lever.

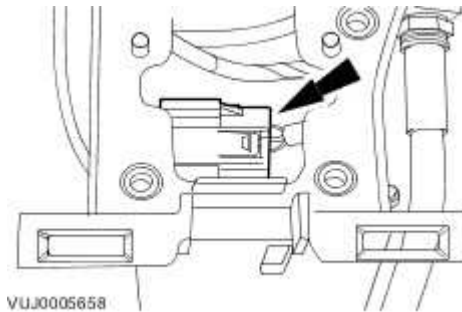
▶ Tighten to 11 Nm.



3 . **NOTE:**

Shown with the electric parking brake switch removed for clarity.

Connect the electrical connector.



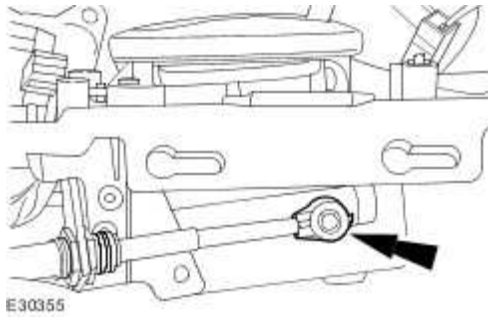
4 . **NOTE:**

Fully extend the selector cable, then retract the selector cable one detent.

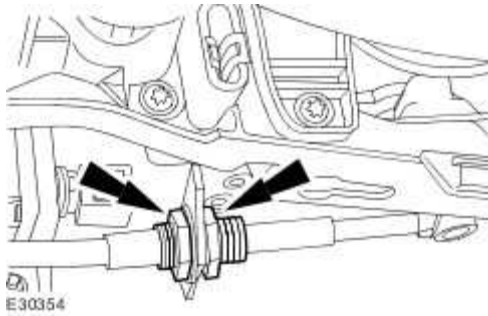
Make sure the selector lever cable is in the "R" position.

5 . Make sure the transmission selector lever is in the "R" position.

6 . Attach the selector lever cable.

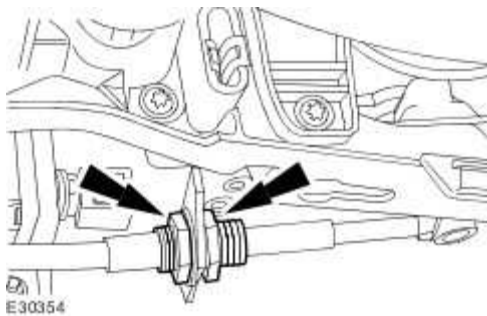


7 . Loosen the selector lever cable lock nuts.



8 Adjust the selector lever cable lock nuts to lock against the retaining bracket without moving
the set position of either the shift lever or the selector lever cable.

▶ Do not fully tighten the selector lever cable lock nuts.



9 **NOTE:**

Make sure all transmission selector lever positions select the relevant automatic transmission states.

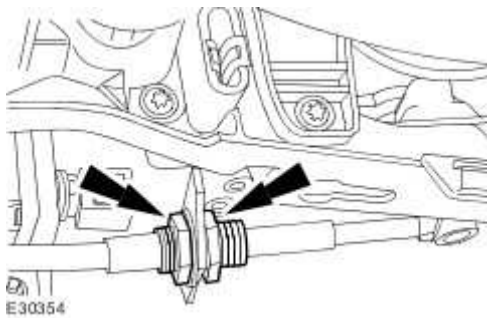
Move the transmission selector lever to all positions.

10 NOTE:

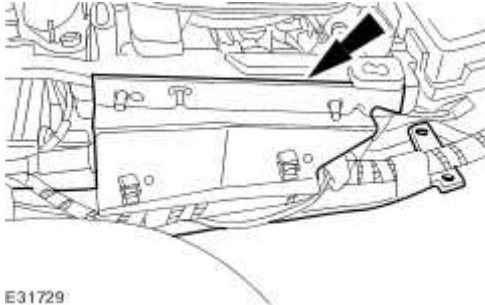
When tightening the selector lever cable lock nuts, make sure both lock nuts are tightened to the specified torque simultaneously.

Tighten the selector lever cable lock nuts.

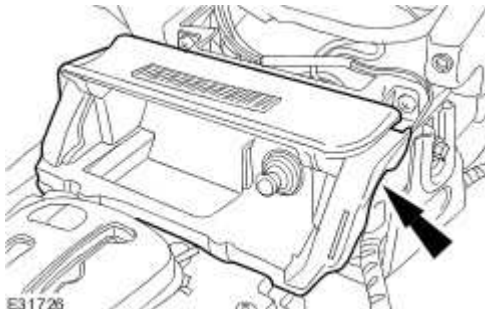
▶ Tighten to 20 Nm.



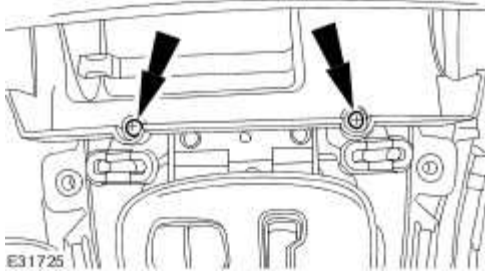
11 . Attach the wiring harness bracket.



12 . Attach the ash tray.



13 . Install the ash tray retaining screws.



14 . Install the instrument panel console. <<501-12>>

309 : Exhaust System

309-00 : Exhaust System

Specifications

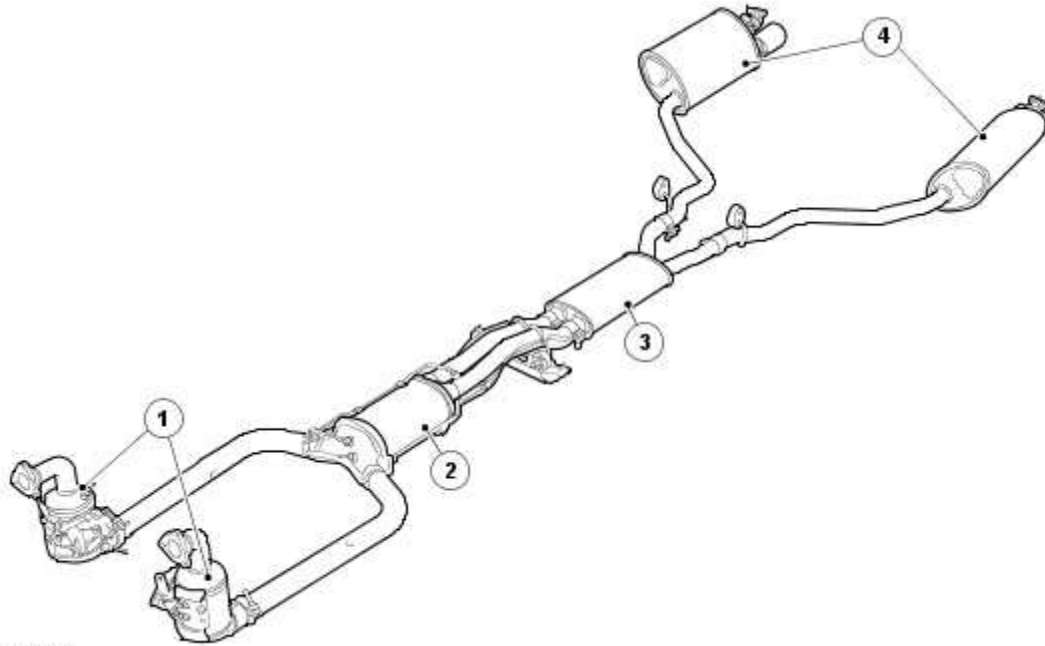
Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Exhaust manifold to catalytic converter retaining nuts - Vehicles without diesel engines	40	30	-
Catalytic convertor retaining clamp - Vehicles without diesel engines	55	41	-
Front muffler retaining clamps - Vehicles without diesel engines	55	41	-
Muffler and tailpipe retaining clamp	55	41	-
Heated oxygen (HO ₂ S) sensors - Vehicles without diesel engines	40	30	-
Catalyst monitor sensors - Vehicles without diesel engines	40	30	-
Catalyst temperature sensors - Vehicles with diesel engines	35	26	-
Diesel particulate filter temperature sensor - Vehicles with diesel engines	35	26	-
Turbocharger to catalytic convertor retaining studs - Vehicles with diesel engines	15	11	-
Turbocharger to downpipe catalytic convertor retaining nuts - Vehicles with diesel engines*	25	18	-
Catalytic convertor to diesel particulate filter retaining clamp retaining bolts - Vehicles diesel engines	11	8	-
Diesel particulate filter to front muffler retaining clamp retaining bolts - Vehicles diesel engines	55	41	-
Diesel particulate filter differential pressure sensor retaining nuts - Vehicles diesel engines	5	4	-

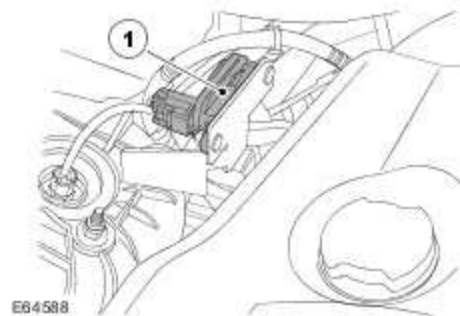
*For vehicles prior to VIN 5B001494, refit old fixings and tighten to 22 Nm (16 lb.ft)

Exhaust System



E64587

Item	Part Number	Description
1		Catalytic converters
2		Diesel particulate filter
3		Front muffler
4		Muffler and tailpipes



E64588

Item	Part Number	Description
1		Diesel particulate filter differential pressure sensor

The exhaust system for various engines are of similar design but utilize different internal elements to achieve a distinct exhaust note for each variant.

Catalytic Converters

The catalytic converters are of a monolithic structure and are coated in platinum. The platinum coating is used to control the emissions of hydrocarbons (HC), carbon monoxide (CO) and oxides of nitrogen (NOx) and to convert them into less harmful products for example carbon dioxide (CO) nitrogen (N) and water (H₂O).

The catalytic converters are connected to the turbocharger by a three nut flange and is sealed by a gasket. Exhaust jointing compound must not be applied to these joints due to the possibility of catalytic converter contamination. Avoid allowing any foreign particles of debris into the catalytic downpipe as this can result in damage to the catalytic converter.

Diesel Particulate Filter

In order to meet strict Euro IV emission limits there is now a stipulation to reduce gaseous and particulate emissions greatly. The primary component within the exhaust system of the diesel is the diesel particulate filter. The diesel particulate filter uses new filter technology based on a combined filter and oxidation catalytic converter to store, and when conditions allow, destroy the particulates. The diesel particulate filter is of a silicon carbide filter construction. It has an additional wash coating on its filter surface of platinum and other active components which are used in the manufacture of oxidation catalytic converters. The exhaust gasses pass through the filter, leaving the particulates behind that are too big to pass through the filters pores. With engine management intervention and the catalytic coating this will promote particulate combustion and oxidation of carbon monoxide (CO) and hydrocarbon (HC) emissions. By carrying out this process, this will regenerate the diesel particulate filter to prevent increased back-pressure and the possibility of a completely blocked filter.

Diesel particulate filter differential pressure sensor

The diesel particulate filter differential pressure sensor monitors the differential pressure in the pipeline, upstream and downstream of the diesel particulate filter. The filtering of the particulates will lead to a greater resistance to the exhaust gas flow through the diesel particulate filter. This leads to a greater pressure difference upstream and downstream of the diesel particulate filter. The diesel particulate filter differential pressure sensor is a membrane sensor with strain resistances. The strain resistances change depending on the pressure difference. This leads to a change in the signal voltage. This signal is one of the parameters required for the strategy of the regeneration of the diesel particulate filter.

Exhaust System

Overview

2006MY sees the introduction of diesel to X350 and is accompanied by a diesel particulate filter (DPF) system to comply with strict stage four emissions requirements. The engine management system (EMS) makes use of 7-digit diagnostic trouble codes (DTCs) rather than the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

For information on the operation of the system,
Exhaust System

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Leaks	
Metal fatigue	Battery charge and condition
Pipes, mufflers and catalytic converters	Wiring harness
Diesel particulate filter (DPF)	Electrical connector(s)
DPF differential pressure sensor tubes	5 volt sensor supply
Joints	Sensor(s)
Mountings	Engine control module (ECM)
Clearance around components	

- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

- 4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC index, or the symptom chart if no DTCs are set.

Symptom Chart

Symptom	Possible source	Action
Noisy or leaking exhaust	Exhaust system/components	Install new components as necessary. Exhaust System - 2.7L V6 - TdV6
Lack of power	Air intake system fault Diesel particulate filter (DPF) blocked/restricted Restricted exhaust system Low fuel pressure Exhaust gas recirculation (EGR) valve(s) fault Turbocharger(s) fault	Check the air intake system, Intake Air Distribution and Filtering Check for a blocked DPF or catalytic converter, install new components as necessary. Diesel Particulate Filter (DPF) or Catalytic Converter - 2.7L V6 - TdV6 (17.50.05) Check the fuel pressure, Fuel Charging and Controls For EGR tests, Engine Emission Control For turbocharger tests, Turbocharger

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of powertrain DTCs,
Electronic Engine Controls

P024B00	Diesel particulate filter (DPF) temperature sensor - catalyst downstream circuit range/performance (right hand bank)	Temperature sensor - catalyst downstream circuit: high resistance Temperature sensor - catalyst downstream circuit: short	For temperature sensor - catalyst downstream circuit tests, GO to Pinpoint Test G552286p2.
---------	--	--	--

		<p>circuit to ground</p> <p>Temperature sensor - catalyst downstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst downstream failure</p>	
P042600	<p>Diesel particulate filter (DPF) temperature sensor - catalyst upstream circuit range/performance (right hand bank)</p>	<p>Temperature sensor - catalyst upstream circuit: high resistance</p> <p>Temperature sensor - catalyst upstream circuit: short circuit to ground</p> <p>Temperature sensor - catalyst upstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst upstream failure</p>	<p>For temperature sensor - catalyst upstream circuit tests, GO to Pinpoint Test G552286p1.</p>
P042700	<p>Diesel particulate filter (DPF) temperature sensor - catalyst upstream circuit low (right hand bank)</p>	<p>Temperature sensor - catalyst upstream circuit: high resistance</p> <p>Temperature sensor - catalyst upstream circuit: short circuit to ground</p> <p>Temperature sensor - catalyst upstream failure</p>	<p>For temperature sensor - catalyst upstream circuit tests, GO to Pinpoint Test G552286p1.</p>
P042800	<p>Diesel particulate filter (DPF) temperature sensor - catalyst upstream circuit high (right hand bank)</p>	<p>Temperature sensor - catalyst upstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst upstream</p>	<p>For temperature sensor - catalyst upstream circuit tests, GO to Pinpoint Test G552286p1.</p>

		failure	
P042C00	Diesel particulate filter (DPF) temperature sensor - catalyst downstream circuit low (right hand bank)	<p>Temperature sensor - catalyst downstream circuit: high resistance</p> <p>Temperature sensor - catalyst downstream circuit: short circuit to ground</p> <p>Temperature sensor - catalyst downstream failure</p>	For temperature sensor - catalyst downstream circuit tests, GO to Pinpoint Test G552286p2.
P042D00	Diesel particulate filter (DPF) temperature sensor - catalyst downstream circuit high (right hand bank)	<p>Temperature sensor - catalyst downstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst downstream failure</p>	For temperature sensor - catalyst downstream circuit tests, GO to Pinpoint Test G552286p2.
P043600	Diesel particulate filter (DPF) temperature sensor - catalyst upstream circuit range/performance (left hand bank)	<p>Temperature sensor - catalyst upstream circuit: high resistance</p> <p>Temperature sensor - catalyst upstream circuit: short circuit to ground</p> <p>Temperature sensor - catalyst upstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst upstream failure</p>	For temperature sensor - catalyst upstream circuit tests, GO to Pinpoint Test G552286p3.
P043700	Diesel particulate filter (DPF) temperature sensor - catalyst upstream circuit low	<p>Temperature sensor - catalyst upstream circuit: high resistance</p>	For temperature sensor - catalyst upstream circuit tests, GO to Pinpoint Test G552286p3.

	(left hand bank)	<p>Temperature sensor - catalyst upstream circuit: short circuit to ground</p> <p>Temperature sensor - catalyst upstream failure</p>	
P043800	Diesel particulate filter (DPF) temperature sensor - catalyst upstream circuit high (left hand bank)	<p>Temperature sensor - catalyst upstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst upstream failure</p>	For temperature sensor - catalyst upstream circuit tests, GO to Pinpoint Test G552286p3.
P043B00	Diesel particulate filter (DPF) temperature sensor - catalyst downstream circuit range/performance (left hand bank)	<p>Temperature sensor - catalyst downstream circuit: high resistance</p> <p>Temperature sensor - catalyst downstream circuit: short circuit to ground</p> <p>Temperature sensor - catalyst downstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst downstream failure</p>	For temperature sensor - catalyst downstream circuit tests, GO to Pinpoint Test G552286p4.
P043C00	Diesel particulate filter (DPF) temperature sensor - catalyst downstream circuit low (left hand bank)	<p>Temperature sensor - catalyst downstream circuit: high resistance</p> <p>Temperature sensor - catalyst downstream circuit: short circuit to ground</p>	For temperature sensor - catalyst downstream circuit tests, GO to Pinpoint Test G552286p4.

		Temperature sensor - catalyst downstream failure	
P043D00	Diesel particulate filter (DPF) temperature sensor - catalyst downstream circuit high (left hand bank)	<p>Temperature sensor - catalyst downstream circuit: short circuit to power</p> <p>Temperature sensor - catalyst downstream failure</p>	For temperature sensor - catalyst downstream circuit tests, GO to Pinpoint Test G552286p4.
P242B00	Diesel particulate filter (DPF) temperature sensor circuit range/performance	<p>DPF temperature sensor circuit: high resistance</p> <p>DPF temperature sensor circuit: short circuit to ground</p> <p>DPF temperature sensor circuit: short circuit to power</p> <p>DPF temperature sensor failure</p>	For DPF temperature sensor circuit tests, GO to Pinpoint Test G552286p5.
P242C00	Diesel particulate filter (DPF) temperature sensor circuit low	<p>DPF temperature sensor circuit: high resistance</p> <p>DPF temperature sensor circuit: short circuit to ground</p> <p>DPF temperature sensor failure</p>	For DPF temperature sensor circuit tests, GO to Pinpoint Test G552286p5.
P242D00	Diesel particulate filter (DPF) temperature sensor circuit high	<p>DPF temperature sensor circuit: short circuit to power</p> <p>DPF temperature sensor failure</p>	For DPF temperature sensor circuit tests, GO to Pinpoint Test G552286p5.

P242E00	Diesel particulate filter (DPF) temperature sensor circuit intermittent/erratic	<p>DPF temperature sensor circuit: high resistance</p> <p>DPF temperature sensor circuit: short circuit to ground</p> <p>DPF temperature sensor circuit: short circuit to power</p> <p>DPF temperature sensor failure</p>	For DPF temperature sensor circuit tests, GO to Pinpoint Test G552286p5.
P244A00	Diesel particulate filter (DPF) exhaust back pressure too low	<p>Differential pressure sensor tubes/hoses split/leaking</p> <p>DPF split/leaking</p> <p>DPF differential pressure sensor failure</p>	Check the DPF and differential pressure sensor tubes/hoses for leaks/damage, install new components as necessary. Diesel Particulate Filter (DPF) For DPF differential pressure sensor circuit tests, GO to Pinpoint Test G552286p6.
P244B00	Diesel particulate filter (DPF) exhaust back pressure too high	<p>Differential pressure tubes/hoses blockage/restriction</p> <p>DPF blockage/restriction</p> <p>DPF differential pressure sensor failure</p>	Check the DPF and differential pressure sensor tubes/hoses for blockages/damage, install new components as necessary. Diesel Particulate Filter (DPF) For DPF differential pressure sensor circuit tests, GO to Pinpoint Test G552286p6.
P245300	Diesel particulate filter (DPF) differential pressure sensor value too high before engine start	<p>Exhaust blockage/restriction</p> <p>DPF blockage/restriction</p> <p>Differential pressure sensor circuit: high resistance</p>	Check the DPF and differential pressure sensor tubes/hoses for blockages/damage, install new components as necessary. Diesel Particulate Filter (DPF) For DPF differential pressure sensor circuit tests, GO to Pinpoint Test G552286p6.

		<p>Differential pressure sensor circuit: short circuit to ground</p> <p>Differential pressure sensor circuit: short circuit to power</p> <p>Differential pressure sensor failure</p>	
P245400	Diesel particulate filter (DPF) differential pressure sensor circuit low	<p>Differential pressure sensor circuit: high resistance</p> <p>Differential pressure sensor circuit: short circuit to ground</p> <p>Differential pressure sensor failure</p>	For DPF differential pressure sensor circuit tests, GO to Pinpoint Test G552286p6.
P245500	Diesel particulate filter (DPF) differential pressure sensor circuit high	<p>Differential pressure sensor circuit: short circuit to power</p> <p>Differential pressure sensor failure</p>	For DPF differential pressure sensor circuit tests, GO to Pinpoint Test G552286p6.
P245600	Diesel particulate filter (DPF) differential pressure sensor circuit intermittent/erratic	<p>Differential pressure tubes/hoses split/leaking</p> <p>DPF split/leaking</p> <p>Differential pressure sensor circuit: high resistance</p> <p>Differential pressure sensor circuit: short circuit to ground</p> <p>Differential pressure sensor circuit: short circuit to power</p>	<p>Check the DPF and differential pressure sensor tubes/hoses for leaks/damage, install new components as necessary.</p> <p>Diesel Particulate Filter (DPF) For DPF differential pressure sensor circuit tests, GO to Pinpoint Test G552286p6.</p>

		Differential pressure sensor failure	
P245900	Diesel particulate filter (DPF) regeneration frequency	Driving conditions not appropriate for DPF regeneration	Carry out DPF service remedy, drive the vehicle, preferably on a main road or motorway, until the engine reaches its normal operating temperature. The vehicle should then be driven for approximately a further 20 minutes, preferably at a speed of 48 km/h (30 mph) or more, but always observing speed limits and road conditions. Successful regeneration of the DPF is indicated by the warning message and AMBER priority indicator being extinguished from the message centre. For additional information refer to the owner's handbook

Pinpoint tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

NOTE:

If DTCs are recorded and a fault is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

PINPOINT TEST G552286p1 : RIGHT HAND TEMPERATURE SENSOR - CATALYST UPSTREAM

G552286t1 : CHECK THE RIGHT HAND TEMPERATURE SENSOR - CATALYST UPSTREAM SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Right hand temperature sensor - catalyst upstream connector, GB09

Circuit	Pin
Right hand temperature sensor catalyst upstream - signal	01
Right hand temperature sensor catalyst upstream - ground	02

2. Engine control module (ECM) connector, C100

Circuit	Pin
Right hand temperature sensor catalyst upstream - signal	B1

Circuit	Pin
Right hand temperature sensor catalyst upstream - ground	F4

3. Key off. 4. Disconnect the right hand temperature sensor - catalyst upstream connector, GB09. 5. Measure the resistance between:

GB09, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552286t2.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t2 : CHECK THE RIGHT HAND TEMPERATURE SENSOR - CATALYST UPSTREAM SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

GB09, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552286t3.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t3 : CHECK THE RIGHT HAND TEMPERATURE SENSOR - CATALYST UPSTREAM GROUND CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

GB09, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552286t4.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t4 : CHECK THE RIGHT HAND TEMPERATURE SENSOR - CATALYST UPSTREAM SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM connector, C100. 2. Measure the resistance between:

GB09, harness side	C100, harness side
Pin 01	B1

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552286t5.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t5 : CHECK THE RIGHT HAND TEMPERATURE SENSOR - CATALYST UPSTREAM GROUND CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM connector, C101. 2. Measure the resistance between:

GB09, harness side	C100, harness side
Pin 02	F4

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Right hand temperature sensor - catalyst upstream connector. - Right hand temperature sensor - catalyst upstream. - ECM connector(s). - ECM.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552286p2 : RIGHT HAND TEMPERATURE SENSOR - CATALYST DOWNSTREAM

G552286t6 : CHECK THE RIGHT HAND TEMPERATURE SENSOR - CATALYST DOWNSTREAM SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Right hand temperature sensor - catalyst downstream connector, GB07

Circuit	Pin
Right hand temperature sensor catalyst downstream - signal	01
Right hand temperature sensor catalyst downstream - ground	02

2. Engine control module (ECM) connector, C101

Circuit	Pin
Right hand temperature sensor catalyst downstream - signal	E3
Right hand temperature sensor catalyst downstream - ground	F4

3. Key off. 4. Disconnect the right hand temperature sensor - catalyst downstream connector, GB07.
5. Measure the resistance between:

GB07, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552286t7.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t7 : CHECK THE RIGHT HAND TEMPERATURE SENSOR - CATALYST DOWNSTREAM SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

GB07, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552286t8.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t8 : CHECK THE RIGHT HAND TEMPERATURE SENSOR - CATALYST DOWNSTREAM GROUND CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

GB07, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552286t9.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t9 : CHECK THE RIGHT HAND TEMPERATURE SENSOR - CATALYST DOWNSTREAM SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM connector, C101. 2. Measure the resistance between:

GB07, harness side	C101, harness side
---------------------------	---------------------------

Pin 01	E3
--------	----

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552286t10.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t10 : CHECK THE RIGHT HAND TEMPERATURE SENSOR - CATALYST DOWNSTREAM GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

GB07, harness side	C101, harness side
Pin 02	F4

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Right hand temperature sensor - catalyst downstream connector. - Right hand temperature sensor - catalyst downstream. - ECM connector. - ECM.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552286p3 : LEFT HAND TEMPERATURE SENSOR - CATALYST UPSTREAM

G552286t11 : CHECK THE LEFT HAND TEMPERATURE SENSOR - CATALYST UPSTREAM SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Left hand temperature sensor - catalyst upstream connector, GB08

Circuit	Pin
Left hand temperature sensor catalyst upstream - signal	01
Left hand temperature sensor catalyst upstream - ground	02

2. Engine control module (ECM) connector, C101

Circuit	Pin
Left hand temperature sensor catalyst upstream - signal	A4
Left hand temperature sensor catalyst upstream - ground	F3

3. Key off. 4. Disconnect the left hand temperature sensor - catalyst upstream connector, GB08. 5. Measure the resistance between:

GB08, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552286t12.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t12 : CHECK THE LEFT HAND TEMPERATURE SENSOR - CATALYST UPSTREAM SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

GB08, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552286t13.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t13 : CHECK THE LEFT HAND TEMPERATURE SENSOR - CATALYST UPSTREAM GROUND CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

GB08, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552286t14.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t14 : CHECK THE LEFT HAND TEMPERATURE SENSOR - CATALYST UPSTREAM SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM connector, C101. 2. Measure the resistance between:

GB08, harness side	C101, harness side
Pin 01	A4

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G552286t15.

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t15 : CHECK THE LEFT HAND TEMPERATURE SENSOR - CATALYST UPSTREAM GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

GB08, harness side	C101, harness side
Pin 02	F3

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Left hand temperature sensor - catalyst upstream connector. - Left hand temperature sensor - catalyst upstream. - ECM connector. - ECM.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552286p4 : LEFT HAND TEMPERATURE SENSOR - CATALYST DOWNSTREAM

G552286t16 : CHECK THE LEFT HAND TEMPERATURE SENSOR - CATALYST DOWNSTREAM SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Left hand temperature sensor - catalyst downstream connector, GB06

Circuit	Pin
Left hand temperature sensor catalyst downstream - signal	01
Left hand temperature sensor catalyst downstream - ground	02

2. Engine control module (ECM) connector, C101

Circuit	Pin
----------------	------------

Left hand temperature sensor catalyst downstream - signal	E4
Left hand temperature sensor catalyst downstream - ground	F3

3. Key off. 4. Disconnect the left hand temperature sensor - catalyst downstream connector, GB06. 5. Measure the resistance between:

GB06, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552286t17.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t17 : CHECK THE LEFT HAND TEMPERATURE SENSOR - CATALYST DOWNSTREAM SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

GB06, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552286t18.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t18 : CHECK THE LEFT HAND TEMPERATURE SENSOR - CATALYST DOWNSTREAM GROUND CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

GB06, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552286t19.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t19 : CHECK THE LEFT HAND TEMPERATURE SENSOR - CATALYST DOWNSTREAM SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM connector, C101. 2. Measure the resistance between:

GB06, harness side	C101, harness side
Pin 01	E4

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G552286t20.

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t20 : CHECK THE LEFT HAND TEMPERATURE SENSOR - CATALYST DOWNSTREAM GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

GB06, harness side	C101, harness side

Pin 02	F3
--------	----

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Left hand temperature sensor - catalyst downstream connector. - Left hand temperature sensor - catalyst downstream. - ECM connector. - ECM.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552286p5 : DIESEL PARTICULATE FILTER (DPF) TEMPERATURE SENSOR

G552286t21 : CHECK THE DPF TEMPERATURE SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Diesel particulate filter (DPF) temperature sensor connector, GB10

Circuit	Pin
Diesel particulate filter (DPF) temperature sensor - signal	01
Diesel particulate filter (DPF) temperature sensor - ground	02

2. Engine control module (ECM) connector, C101

Circuit	Pin
Diesel particulate filter (DPF) temperature sensor - signal	D4
Diesel particulate filter (DPF) temperature sensor - ground	F3

3. Key off. 4. Disconnect the DPF temperature sensor connector, GB10. 5. Measure the resistance between:

GB10, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552286t22.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t22 : CHECK THE DPF TEMPERATURE SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

GB10, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552286t23.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t23 : CHECK THE DPF TEMPERATURE SENSOR GROUND CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

GB10, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552286t24.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t24 : CHECK THE DPF TEMPERATURE SENSOR SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM connector, C101. 2. Measure the resistance between:

GB10, harness side	C101, harness side
Pin 01	D4

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552286t25.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t25 : CHECK THE DPF TEMPERATURE SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

GB10, harness side	C101, harness side
Pin 02	F3

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - DPF temperature sensor connector. - DPF temperature sensor. - ECM connector. -

ECM.

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552286p6 : DIESEL PARTICULATE FILTER (DPF) DIFFERENTIAL PRESSURE SENSOR

G552286t26 : CHECK THE POWER SUPPLY TO THE DPF DIFFERENTIAL PRESSURE SENSOR

1. Diesel particulate filter (DPF) differential pressure sensor connector, EC65

Circuit	Pin
Diesel particulate filter (DPF) differential pressure sensor - signal	01
Diesel particulate filter (DPF) differential pressure sensor - ground	02
Diesel particulate filter (DPF) differential pressure sensor - supply	03

2. Engine control module (ECM) connector, C101

Circuit	Pin
Diesel particulate filter (DPF) differential pressure sensor - signal	D3
Diesel particulate filter (DPF) differential pressure sensor - ground	D2
Diesel particulate filter (DPF) differential pressure sensor - supply	C3

3. Key off. 4. Disconnect the DPF differential pressure sensor connector, EC65. 5. Key on, engine off. 6. Measure the voltage between:

EC65, harness side	Battery
Pin 03	Negative terminal

Is the voltage between 4.8 and 5.2 volts?

-> **Yes**

GO to Pinpoint Test G552286t27.

-> **No**

REPAIR the power supply circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t27 : CHECK THE DPF DIFFERENTIAL PRESSURE SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

EC65, harness side	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552286t28.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t28 : CHECK THE DPF DIFFERENTIAL PRESSURE SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

EC65, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552286t29.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t29 : CHECK THE DPF DIFFERENTIAL PRESSURE SENSOR SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM connector, C101. 2. Measure the resistance between:

EC65, harness side	C101, harness side
Pin 01	D3

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552286t30.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552286t30 : CHECK THE DPF DIFFERENTIAL PRESSURE SENSOR GROUND CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

EC65, harness side	C101, harness side
Pin 02	D2

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - DPF differential pressure sensor connector. - DPF differential pressure sensor. - ECM connector. - ECM.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

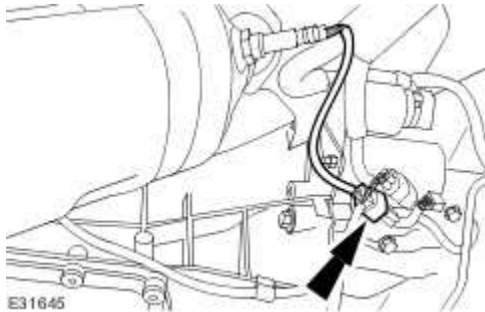
Catalytic Converter - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (17.50.05)

Removal

- 1 . Raise and support the vehicle.
For additional information, refer to
- 2 . Remove the air deflector.
For additional information, refer to Air Deflector (76.11.41)
- 3 . Support the exhaust system with suitable stands.
- 4 . **NOTE:**

Right-hand shown, left-hand similar.

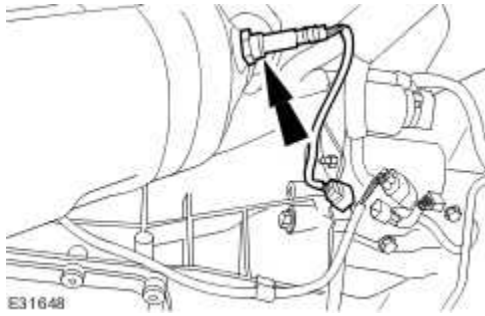
Disconnect the heated oxygen sensor electrical connector (HO2S).



- 5 . **NOTE:**

Right-hand shown, left-hand similar.

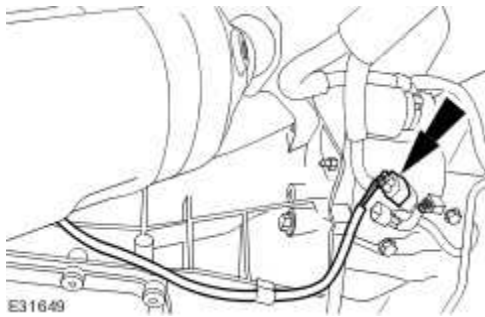
Remove the (HO2S).



6 . NOTE:

Right-hand shown, left-hand similar.

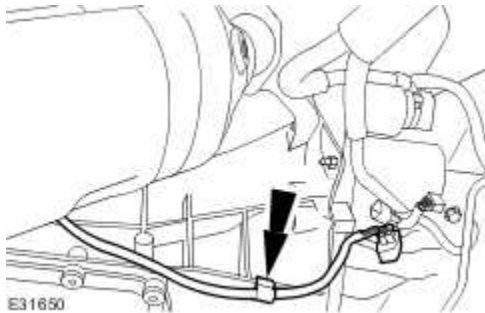
Disconnect the catalyst monitor sensor electrical connector.



7 . NOTE:

Right-hand shown, left-hand similar.

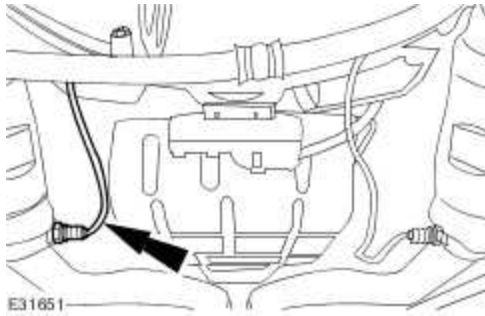
Detach the catalyst monitor sensor.



8 . NOTE:

Right-hand shown, left-hand similar.

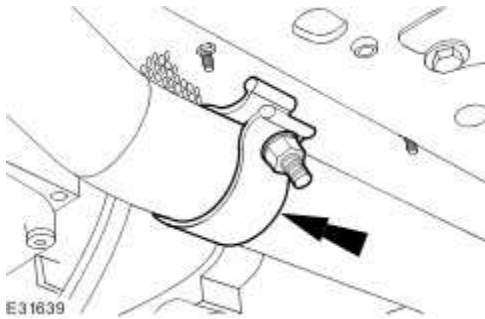
Remove the catalyst monitor sensor.



9 . **NOTE:**

Left-hand shown, right-hand similar.

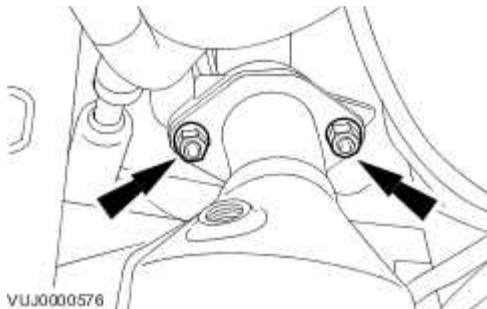
Loosen the catalytic converter retaining clamp.



10 . **NOTE:**

Right-hand shown, left-hand similar.

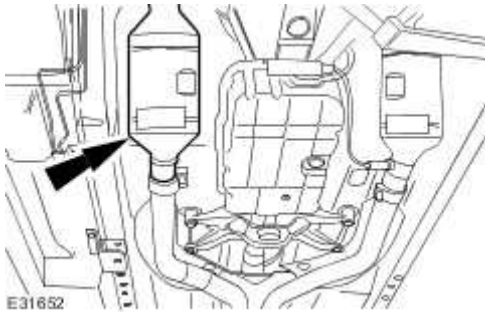
Detach the catalytic converter.



11 . **NOTE:**

Right-hand shown, left-hand similar.

Remove the catalytic converter.




Installation

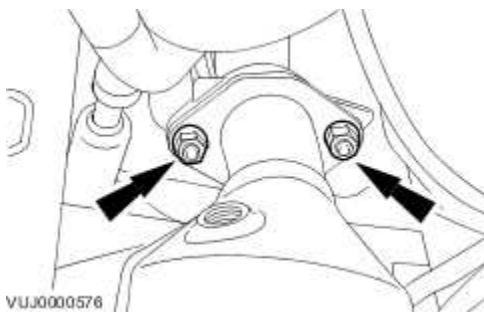
- 1 .  **CAUTION:** Never use jointing compound forward of the catalytic converter.

NOTE:

Right-hand shown, left-hand similar.

To install reverse, the removal procedure.

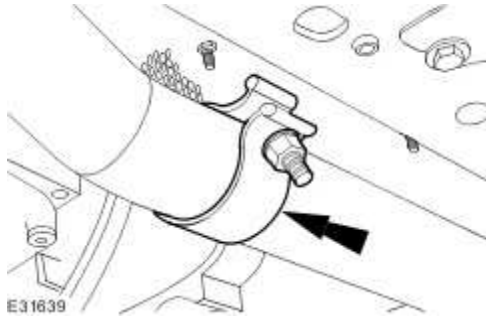
 Tighten to 40 Nm.



2 . **NOTE:**

Left-hand shown, right-hand similar.

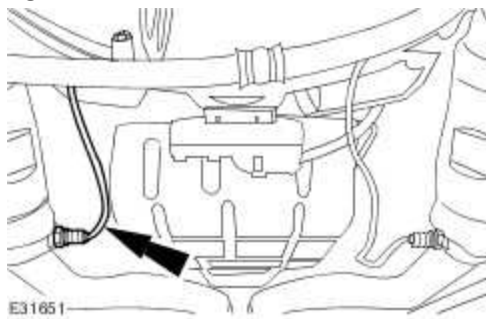
Tighten to 55 Nm.



3 . **NOTE:**

Right-hand shown, left-hand similar.

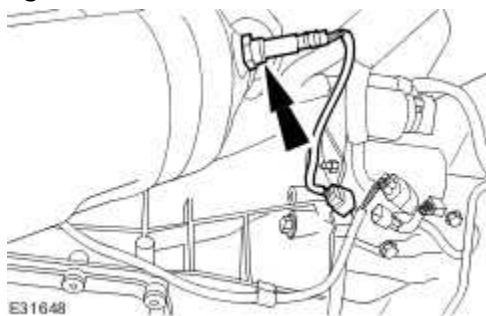
Tighten to 40 Nm.



4 . **NOTE:**

Right-hand shown, left-hand similar.

Tighten to 40 Nm.



5 NOTE:

.

For NAS vehicles only.

If required, carry out a long drive cycle.

For additional information, refer to Powertrain Control Module (PCM) Long Drive Cycle Self-Test

Catalytic Converter - 2.7L V6 - TdV6 (17.50.05)

Removal

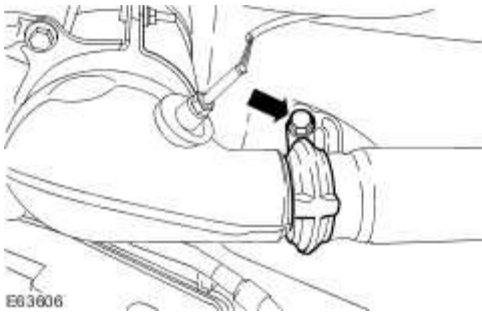
- 1 . Remove the air deflector.

For additional information, refer to Air Deflector (76.11.41)

- 2 . **NOTE:**

Right-hand shown, left-hand similar.

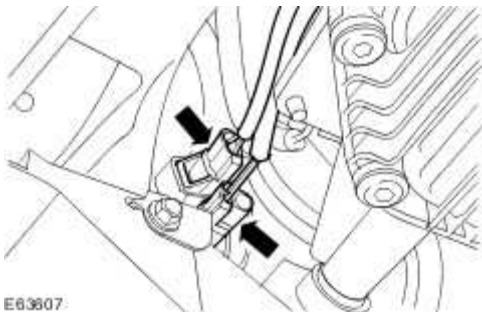
Loosen the catalytic converter to particulate filter retaining clamp.



- 3 . **NOTE:**

Right-hand shown, left-hand similar.

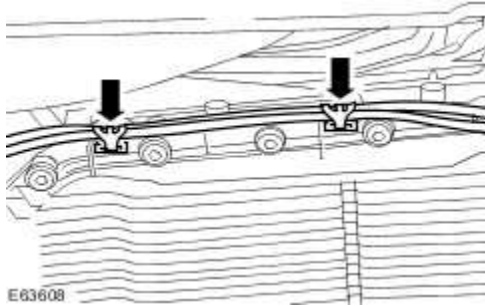
Disconnect the catalytic converter temperature sensor electrical connectors.



- 4 . **NOTE:**

Right-hand shown, left-hand similar.

Detach the catalytic converter temperature sensor wiring harness from the transmission.



5 . NOTE:

Right-hand shown, left-hand similar.

Remove and discard the catalytic converter to turbocharger retaining nuts.



6



CAUTION: Make sure the catalytic converter is fully supported during removal.
Failure to follow this instruction will result in damage to the catalytic converter decoupler joint.

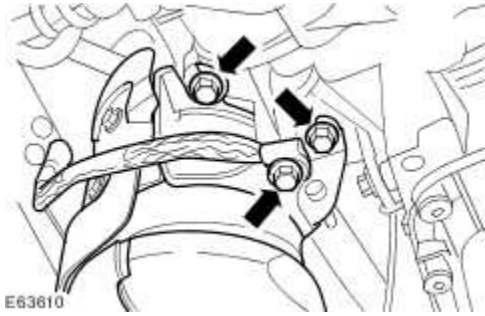
NOTE:

Right-hand shown, left-hand similar.


Remove the catalytic converter.

▶ Remove the retaining bolts.

- ▶ Remove and discard the gasket.



Installation

- 1  **CAUTION:** Make sure the catalytic converter is fully supported during installation. Failure to follow this instruction will result in damage to the catalytic converter decoupler joint.

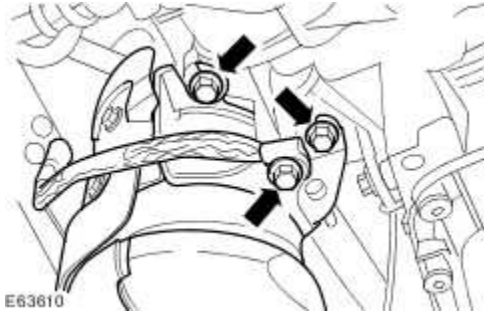
 **CAUTION:** Never use jointing compound forward of the catalytic converter.

NOTE:

Right-hand shown, left-hand similar.

Loosely install the catalytic converter.

- ▶ Install a new gasket.
- ▶ Install the retaining bolts.



2 . NOTE:

Right-hand shown, left-hand similar.

Install new retaining nuts.

▶ Tighten to 22 Nm.

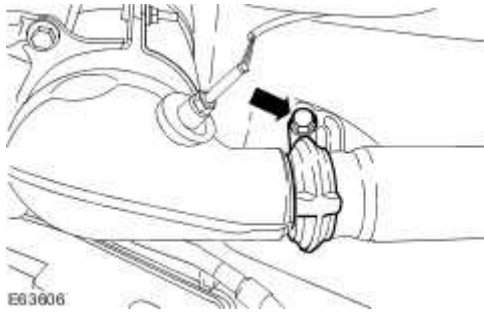


3 . NOTE:

Right-hand shown, left-hand similar.

Install the catalytic convertor to particulate filter retaining clamp.

▶ Tighten to 11 Nm.

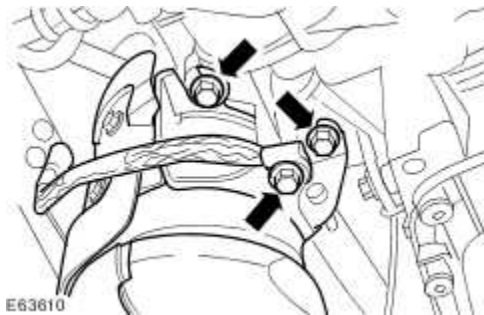


4 . NOTE:

Right-hand shown, left-hand similar.

Fully tighten the catalytic converter bracket retaining bolts.

▶ Tighten to 25 Nm.



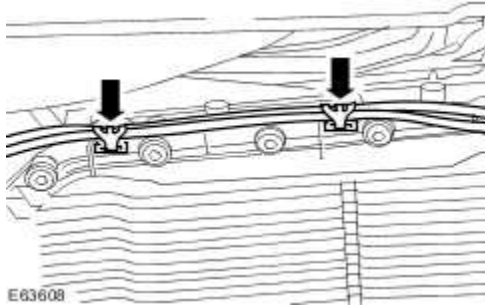
NOTE:

For vehicles prior to VIN H16767, refit old fixings and tighten to 22 Nm.

5 . NOTE:

Right-hand shown, left-hand similar.

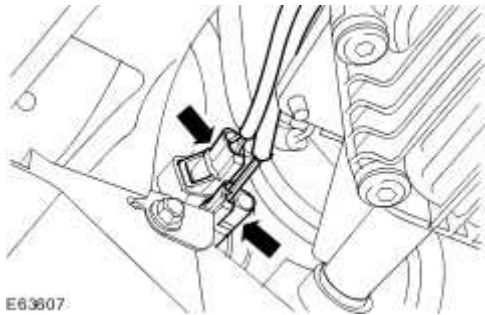
Attach the catalytic converter temperature sensor wiring harness to the transmission.



6 . NOTE:

Right-hand shown, left-hand similar.

Connect the catalytic converter temperature sensor electrical connectors.



7 . Install the air deflector.

For additional information, refer to Air Deflector (76.11.41)

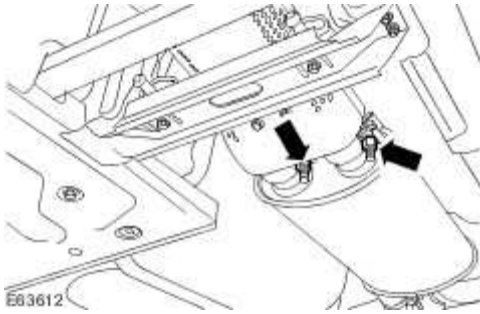
Diesel Particulate Filter (DPF)

Removal

- 1 . Raise the vehicle.

For additional information, refer to Lifting

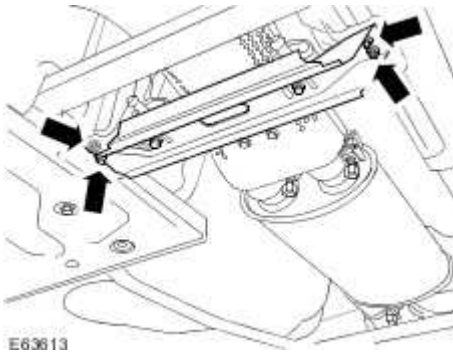
- 2 . Loosen the front muffler retaining clamps.



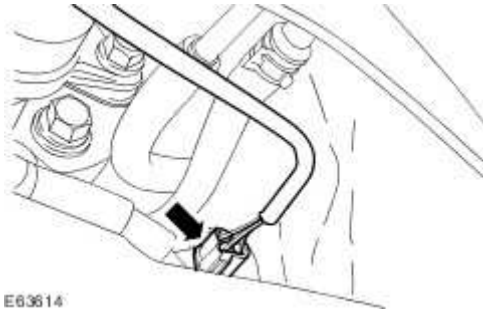
- 3 Remove the diesel particulate filter mount bracket.



Remove and discard the diesel particulate filter mount bracket retaining nuts.



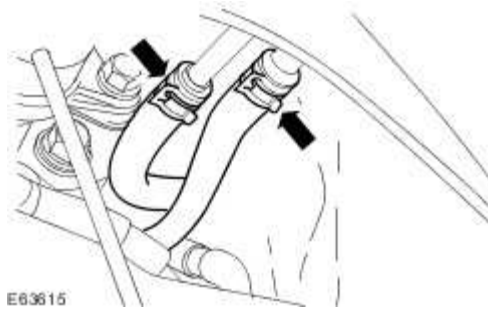
- 4 . Disconnect the diesel particulate filter temperature sensor electrical connector.



5 NOTE:

Note the orientation of the diesel particulate filter high-pressure and low-pressure hoses and make sure they are installed in the same position. There is a paint mark to identify their position.

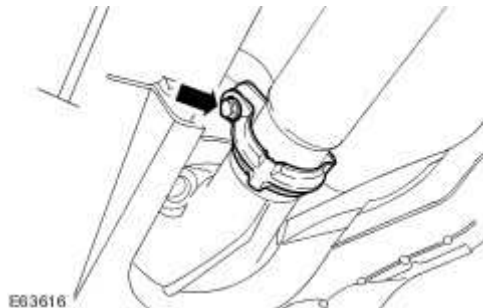
Detach the diesel particulate filter high-pressure and low-pressure hoses.



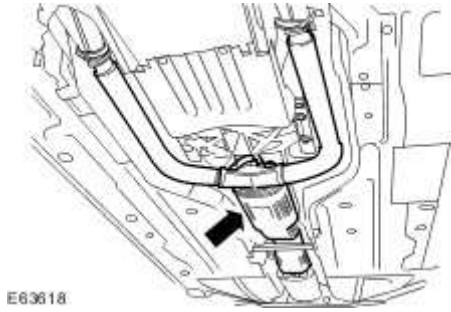
6 . NOTE:

Right-hand shown, left-hand similar.

Remove the diesel particulate filter to catalytic convertor retaining clamps.



7 . Using an assistant remove the diesel particulate filter.



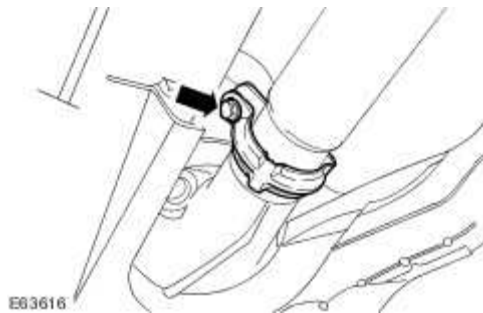
Installation

1 . NOTE:

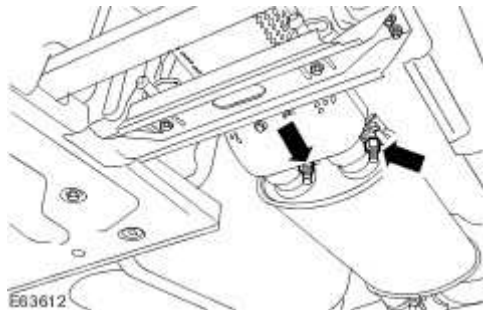
Right-hand shown, left-hand similar.

To install, reverse the removal procedure.

▶ Tighten to 11 Nm.



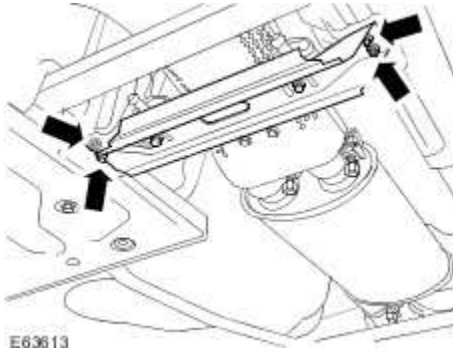
2 . Tighten to 55 Nm.



3 . NOTE:

Install new diesel particulate filter mount bracket retaining nuts.

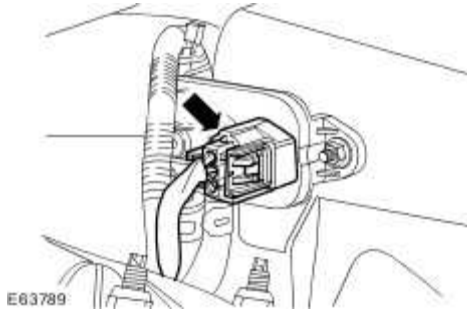
Tighten to 9 Nm.



Diesel Particulate Filter (DPF) Differential Pressure Sensor

Removal

- 1 . Disconnect the diesel particulate filter differential pressure sensor electrical connector.

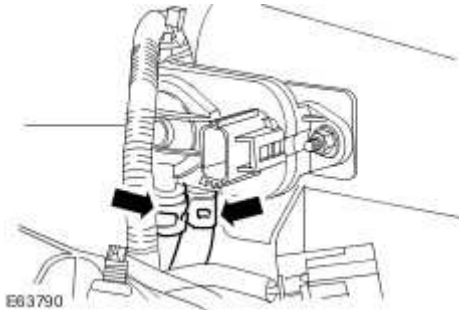


2

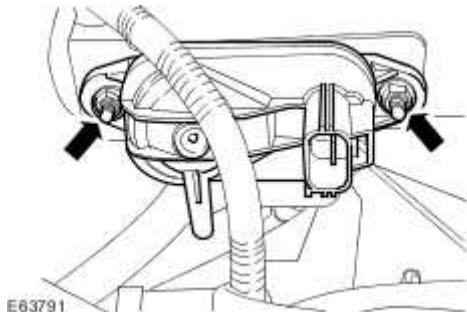


CAUTION: Make a note of the connection orientation of the high and low pressure hoses to the sensor ports. Make sure the hoses are located to the correct sensor port when installed. Failure to follow these instructions may result in damage to the vehicle.

Detach the diesel particulate filter differential pressure sensor high-pressure and low-pressure hoses.



- 3 . Remove the diesel particulate filter differential pressure sensor.



Installation

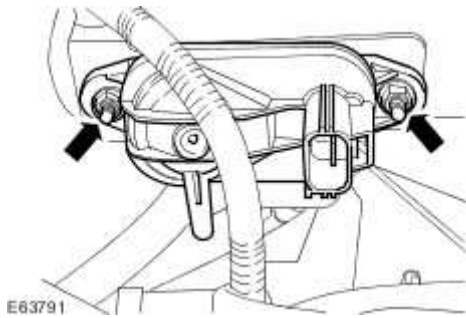
1



- **CAUTION:** Make sure the high and low pressure hoses are fully installed and the retaining clips are positioned in their original position.

To install, reverse the removal procedure.

► Tighten to 5 Nm.



Exhaust System - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8

Removal

- 1 . Remove both muffler and tailpipes.

For additional information, refer to

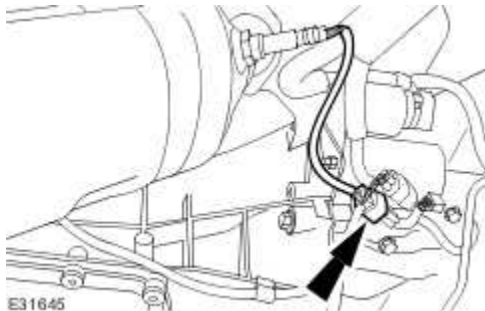
- 2 . Remove the air deflector. <<501-02>>

- 3 . Support the exhaust system with suitable stands.

- 4 . **NOTE:**

Right-hand shown, left-hand similar.

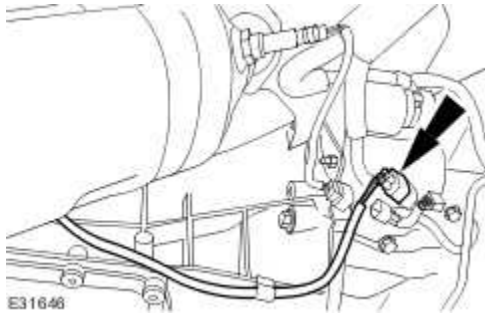
Disconnect the heated oxygen sensor (HO2S) electrical connector.



- 5 . **NOTE:**

Right-hand shown, left-hand similar.

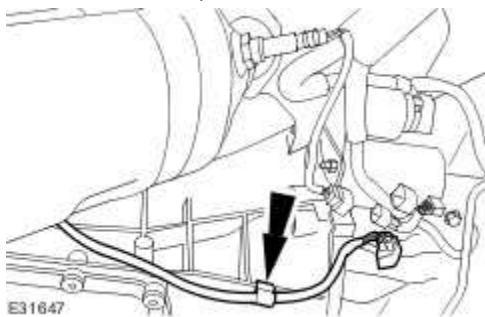
Disconnect the catalyst monitor sensor electrical connector.



6 . NOTE:

Right-hand shown, left-hand similar.

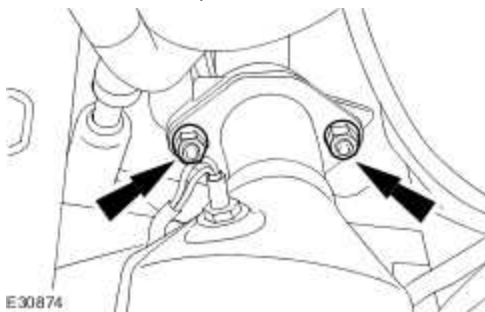
Detach the catalyst monitor sensor.



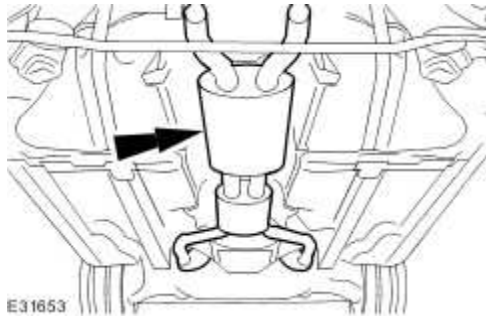
7 . NOTE:

Right-hand shown, left-hand similar.

Detach the catalytic converter.



8 . Remove the exhaust system.



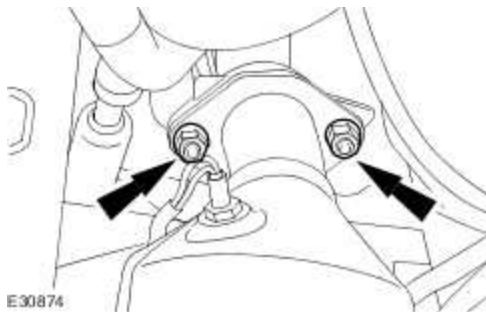
Installation

1 . NOTE:

Right-hand shown, left-hand similar.

To install, reverse the removal procedure.

▶ Tighten to 40 Nm.



Exhaust System - 2.7L V6 - TdV6

Removal

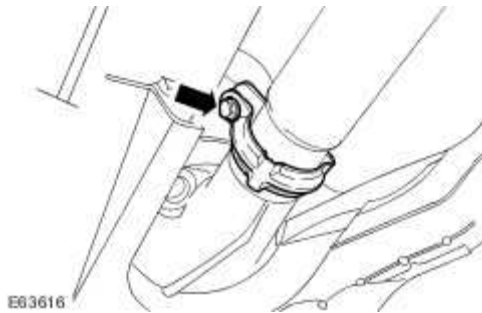
- 1 . Remove both muffler and tailpipes.

For additional information, refer to Muffler and Tailpipe (30.10.52)

- 2 . **NOTE:**

Right-hand shown, left-hand similar.

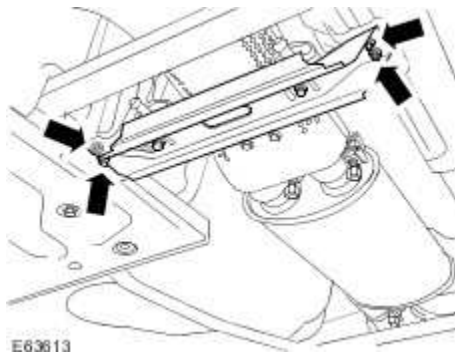
Loosen the catalytic converter to particulate filter retaining clamp.



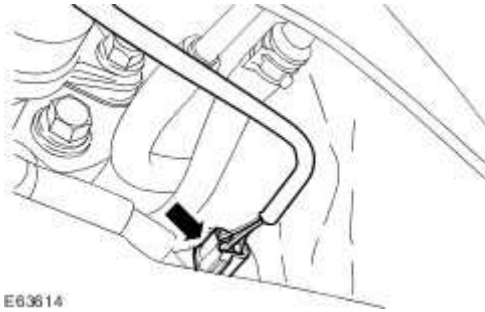
- 3 . **NOTE:**

Discard the diesel particulate filter mount bracket retaining nuts.

Remove the diesel particulate filter mount bracket.



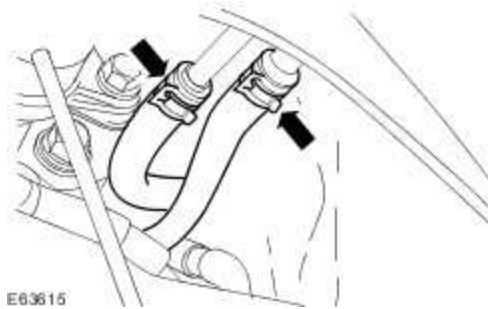
- 4 . Disconnect the diesel particulate filter temperature sensor electrical connector.



5 NOTE:

Note the orientation of the diesel particulate filter high-pressure and low-pressure hoses and make sure they are installed in the same position. There is a paint mark to identify the high-pressure hose.

Detach the diesel particulate filter high-pressure and low-pressure hoses.

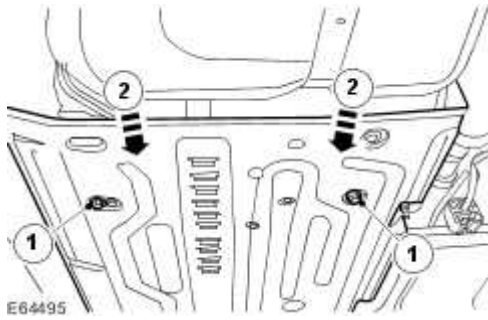


6 . NOTE:

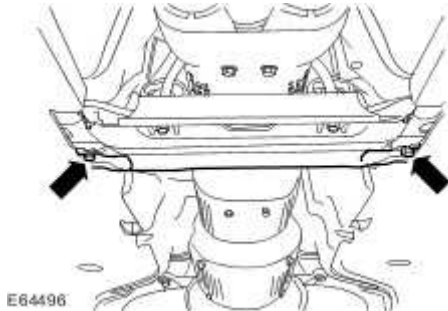
Left-hand shown, right-hand similar.

Detach the under body tray.

- 1) Remove the under body tray retaining bolts.
- 2) Reposition the under body tray.



7 . Remove the support bracket.

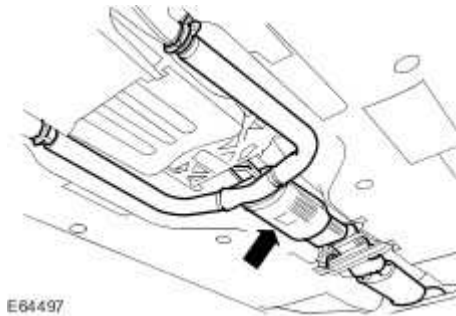


8 . Support the exhaust system with suitable stands.

9 . **NOTE:**

Discard the exhaust system to catalytic converter gaskets.

Using an assistant remove the exhaust system.



Installation

1 . NOTE:

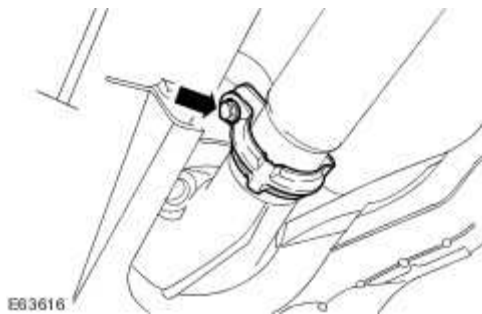
Right-hand shown, left-hand similar.

NOTE:

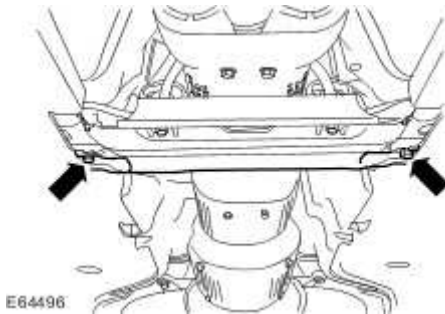
Install new exhaust system to catalytic converter gaskets.

To install, reverse the removal procedure.

▶ Tighten to 11 Nm.



2 . Tighten to 9 Nm.



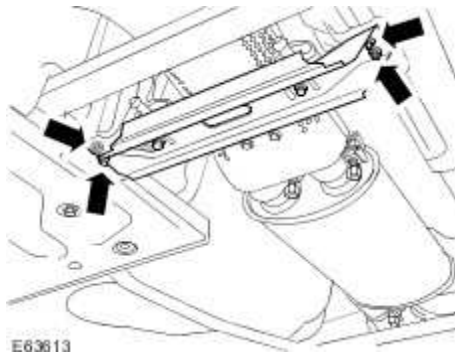
3 . Tighten to 10 Nm.



4 . NOTE:

Install new diesel particulate filter mount bracket retaining nuts.

Tighten to 9 Nm.



Front Muffler - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (30.10.18)

Removal

- 1 . Remove both muffler and tailpipes.

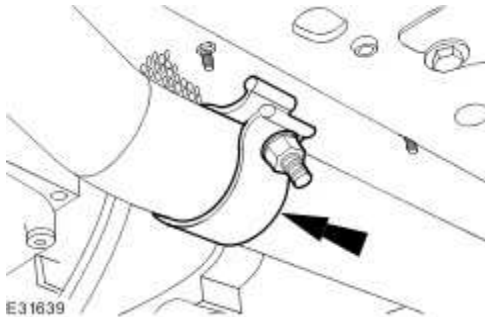
For additional information, refer to

- 2 . Support the exhaust system using suitable stands.

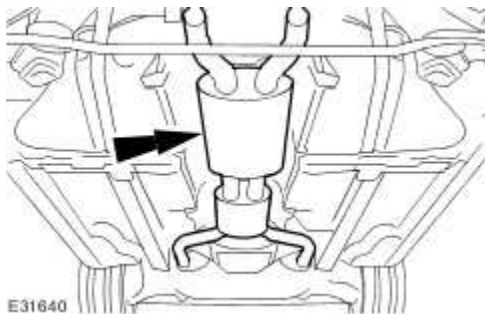
- 3 . **NOTE:**

Left-hand shown, right-hand similar.

Loosen both front muffler retaining clamps.



- 4 . Remove the front muffler.



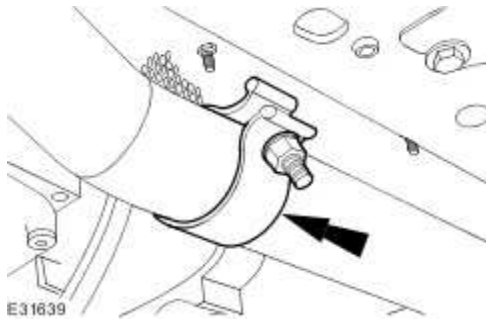
Installation

1 . NOTE:

Left-hand shown, right-hand similar.

To install, reverse the removal procedure.

▶ Tighten to 55 Nm.



Front Muffler - 2.7L V6 - TdV6 (30.10.18)

Removal

- 1 . Raise and support the vehicle.

For additional information, refer to Lifting

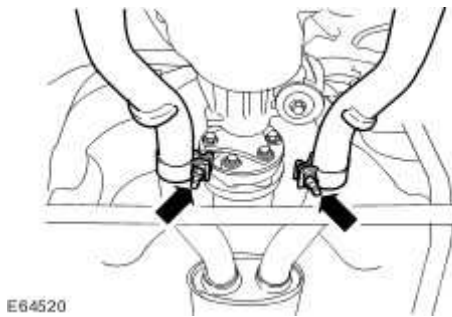
2



CAUTION: The hanger insulators are constructed of a special material. Make sure the insulators are not damaged on removal of the front muffler. Failure to follow this instruction may result in damage to the vehicle.

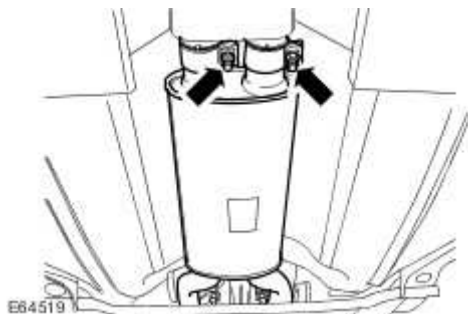
Detach the rear muffler and tailpipe assemblies.

- ▶ Loosen the rear muffler and tailpipe retaining clamps.



- 3 . Remove the front muffler.

- ▶ Loosen the front muffler to particulate filter retaining clamps.




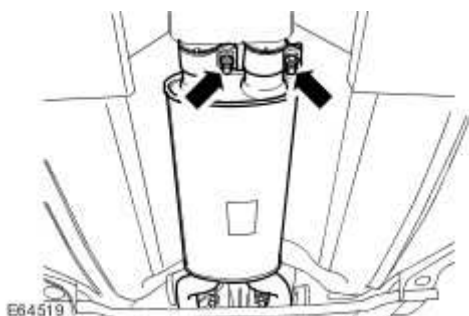
Installation

1 NOTE:

Make sure the front muffler is installed fully to the alignment pips on the diesel particulate filter outlet pipes.

Install the front muffler.

 Tighten to 55 Nm.



2



CAUTION: The hanger insulators are constructed of a special material. Make sure the insulators are not damaged on installation. Split or cracked insulators should be replaced. Failure to follow this instruction may result in damage to the vehicle.




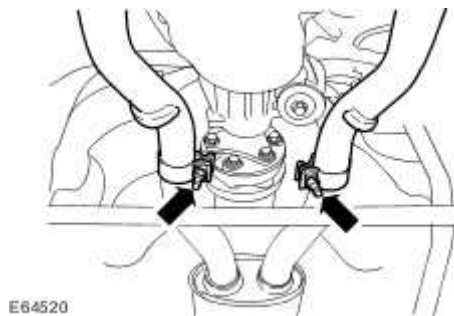
CAUTION: Alignment marks are provided for the correct alignment of the muffler and tailpipe assemblies to the front muffler. Make sure the muffler and tailpipe assemblies align between the two tolerance markers. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

Make sure the muffler and tailpipe is central in the bumper aperture.

Attach the rear muffler and tailpipe assemblies.

 Tighten to 55 Nm.



3 . Lower the vehicle.

Muffler and Tailpipe (30.10.52)

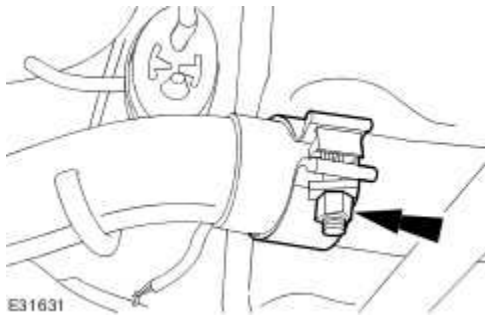
Removal

- 1 . Raise and support the vehicle.
For additional information, refer to Lifting

- 2 . **NOTE:**

Right-hand shown, left-hand similar.

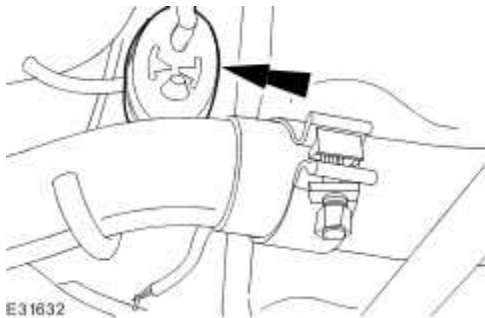
Loosen the muffler and tailpipe retaining clamp.



- 3 . **NOTE:**

Right-hand shown, left-hand similar.

Detach the muffler and tailpipe hanger insulator.



4

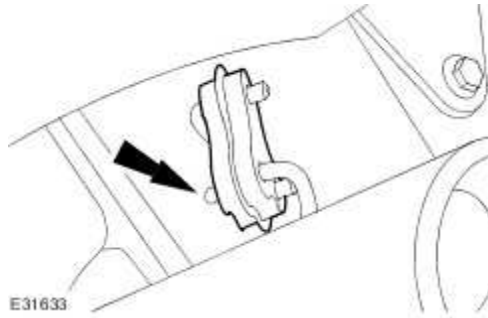


CAUTION: Do not over stretch the hanger insulator. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

Right-hand shown, left-hand similar.

Detach the muffler and tailpipe hanger insulator.



5 . NOTE:

Right-hand shown, left-hand similar.

Remove the muffler and tailpipe.



Installation

1



CAUTION: The hanger insulators are constructed of a special material. Make sure the insulators are not damaged on installation. Split or cracked insulators should be replaced. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Alignment marks are provided for the correct alignment of the muffler

and tailpipe assemblies to the front muffler. Make sure the muffler and tailpipe assemblies align between the two tolerance markers. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

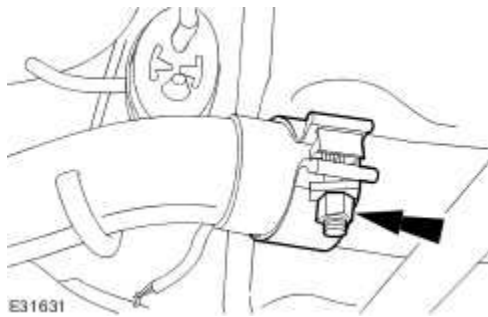
Make sure the muffler and tailpipe is central in the bumper aperture.

NOTE:

Right-hand shown, left-hand similar.

To install, reverse the removal procedure.

▶ Tighten to 55 Nm.



310 : Fuel System

310-00 : Fuel System – General Information

Specifications

Specifications

General Specifications

Item	Specification
Usable fuel tank capacity	85 liters

Fuel System Pressure Check

NOTE:

This procedure is for the installation of the adaptor into the fuel line due to the removal of the schraeder valve from the fuel line.

1.



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



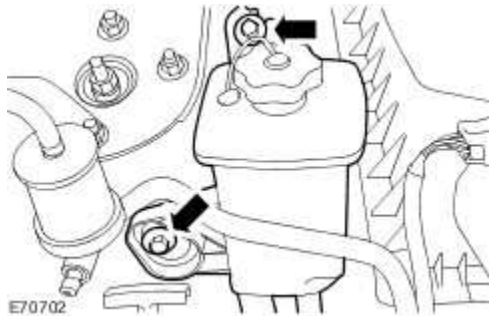
WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.

Disconnect the battery ground cable.
Battery Disconnect and Connect

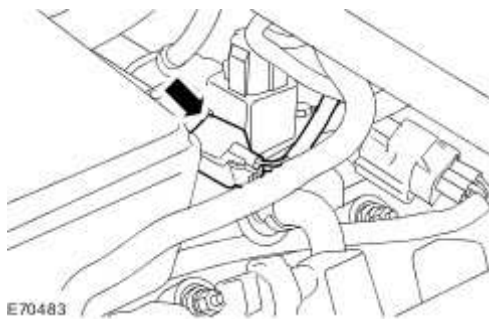
2. Remove the engine cover.

3. Remove the air cleaner outlet pipe.
Air Cleaner Outlet Pipe (19.10.31)

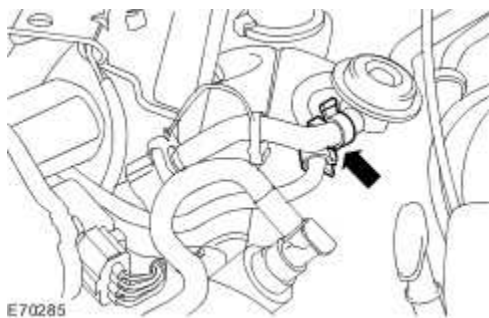
4. Detach the power steering fluid reservoir and reposition.



5. Disconnect the electrical connector.



6. Detach the fuel line retaining clip.

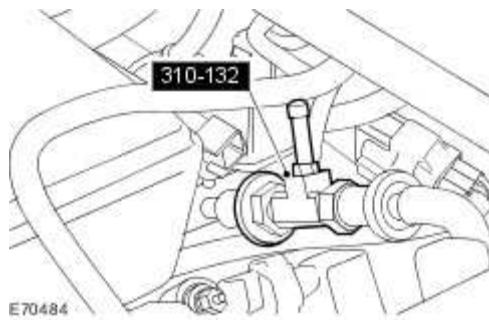


7. Disconnect the fuel rail feed pipe.
Spring Lock Couplings

8. **NOTE:**

Make sure the special tool is fully seated to the fuel pipe connections.

Install the special tool.



9. NOTE:

Make sure the special tool is fully seated to the fuel pipe connections.

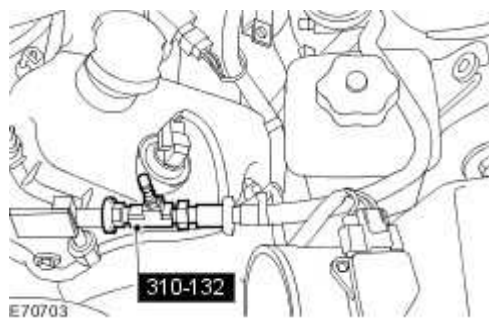
Install the special tool.



10. NOTE:

Make sure the special tool is fully seated to the fuel pipe connections.

Install the special tool.

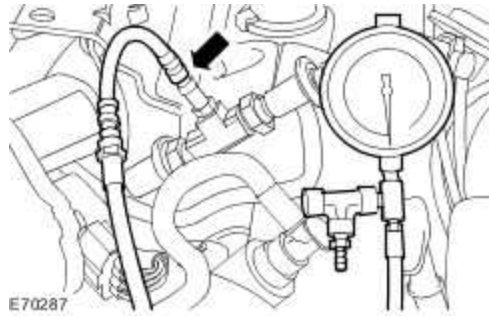


11. Install the air cleaner outlet pipe.
Air Cleaner Outlet Pipe (19.10.31)

12. NOTE:

Vehicles with 4.2L engine shown, other vehicles similar.

Install the fuel pressure gauge.



13. Connect the battery ground cable.
Battery Connect (86.15.15)

14. Carry out the fuel system pressure check.
Fuel Charging and Controls - VIN Range: G45704->G99999
Fuel Charging and Controls - VIN Range: G45704->G99999

Fuel System Pressure Release - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (19.50.02)

Special Service Tools



310012

Fuel Pressure Gauge
310-012 (JD209)

1.



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



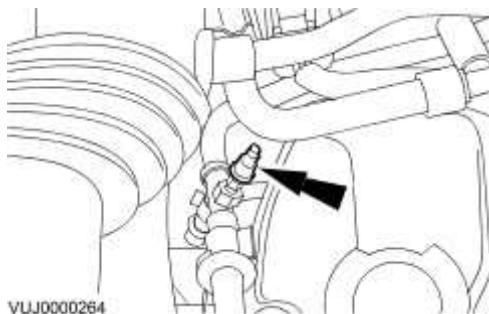
WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

Disconnect the battery ground cable.

2. Remove the fuel system pressure relief valve cap.

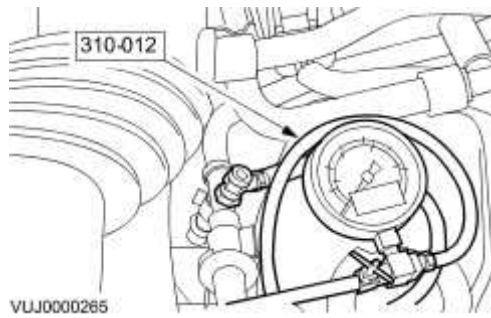


3.



WARNING: Make sure the tap of the special tool is rotated fully clockwise before installing the special tool to the fuel system pressure relief valve. Failure to follow these instructions may result in personal injury.

Install the special tool to the fuel system pressure relief valve.

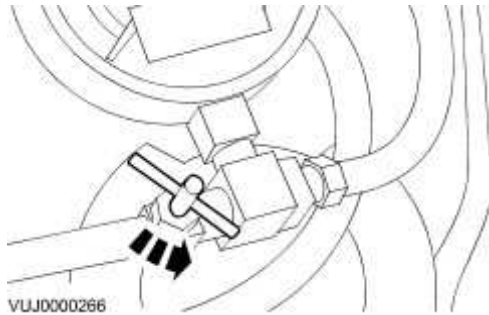


4. NOTE:

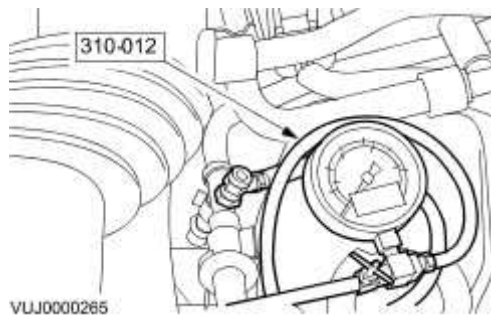
When relieving the fuel system pressure, catch any displaced fuel in a suitable container.

Relieve the fuel system pressure.

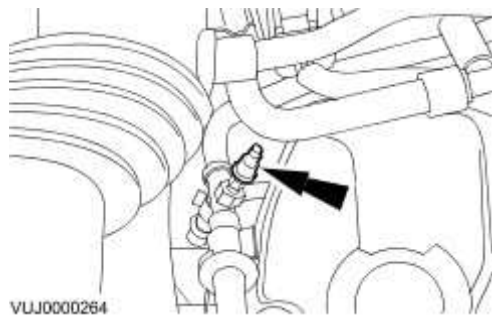
- Rotate the tap of the special tool fully counterclockwise.



5. Remove the special tool from the fuel system pressure relief valve.



6. Install the fuel system pressure relief valve cap.



7. Connect the battery ground cable.

Fuel System Pressure Release - 2.7L V6 - TdV6 (19.50.02)



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

1. Disconnect the battery ground cable.
Battery Disconnect and Connect

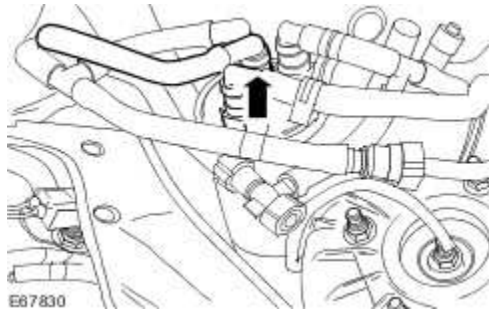
2. NOTE:

When relieving the fuel system pressure, catch any displaced fuel in a suitable container.

Relieve the fuel system pressure.

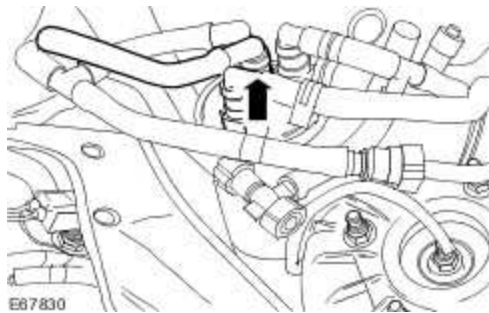
- Disconnect the fuel filter to fuel pump supply line from the fuel filter.

Quick Release Coupling - Push Connect



3. Connect the fuel filter to fuel pump supply line to the fuel filter.

Quick Release Coupling - Push Connect



4. Connect the battery ground cable.

Battery Connect (86.15.15)

Fuel Tank Draining - VIN Range: G00442- >G45703

Special Service Tools



Remover/Installer, Fuel Pump Module/Fuel Transfer Pump Locking Ring
310-072A

1.



WARNING: Place the vehicle in a well ventilated, quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



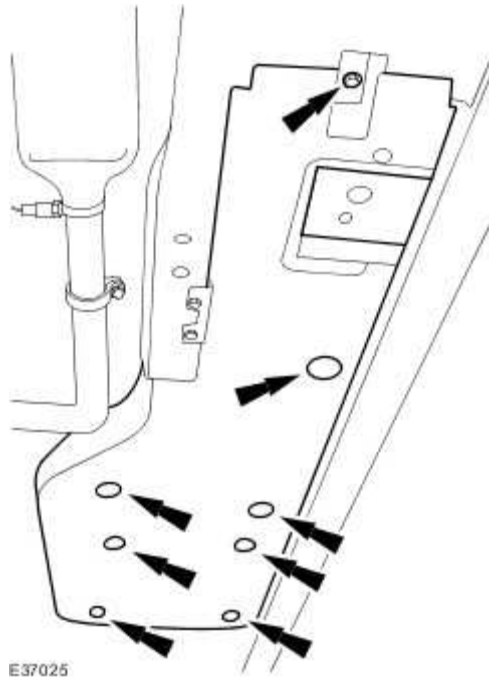
WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

Release the pressure in the fuel system.

Fuel System Pressure Release - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (19.50.02)

2. Open the fuel filler flap.
3. Disconnect the battery ground cable. <<414-01>>
4. Detach the fuel tank filler pipe cap.
5. Raise and support the vehicle. <<100-02>>

6. Remove the left-hand under body tray.

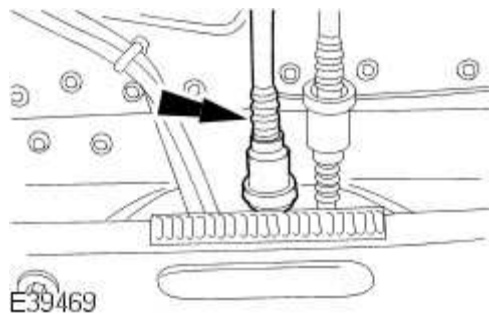


7.



CAUTION: Using a suitable container, catch any escaping fuel.

Disconnect the fuel feed pipe.

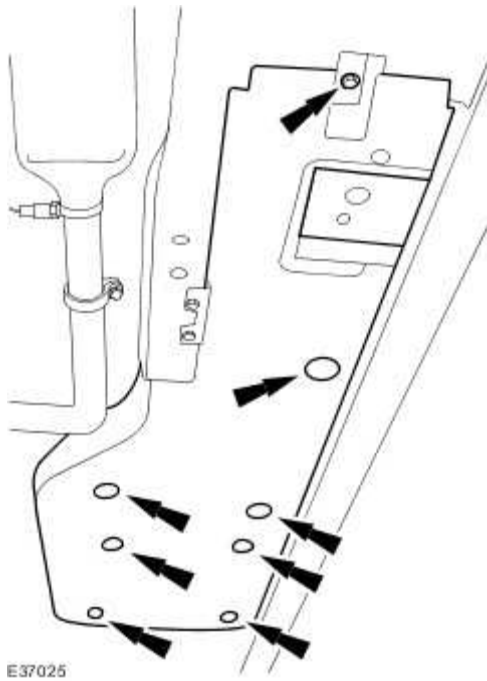


8. Using a suitable pneumatic pump, remove the fuel from the fuel tank. Follow the manufacturers operating instructions.

- Connect the pneumatic fuel draining equipment to the fuel feed pipe.

9. Connect the fuel feed pipe.

10. Fit the left-hand under body tray.



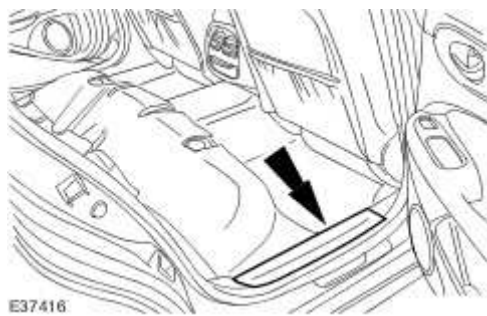
11. Lower the vehicle.

12. Remove the rear seat cushion. <<501-10>>

13. **NOTE:**

Right-hand shown, left-hand similar.

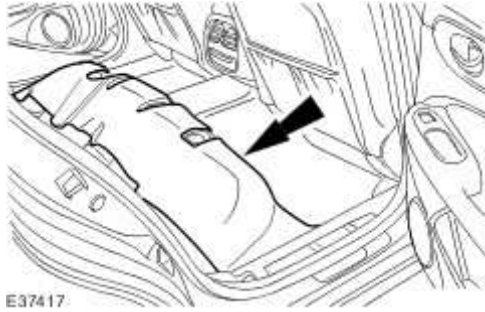
Remove the scuff plate trim panel.



14. **NOTE:**

Right-hand shown, left-hand similar.

Detach and reposition the floor covering.



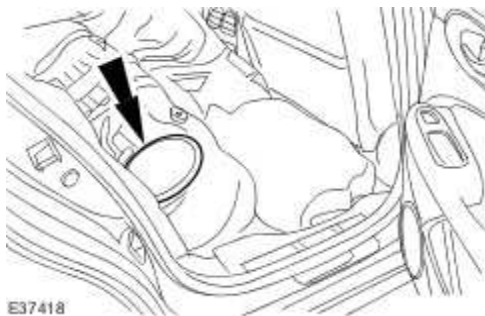
15. **NOTE:**

Right-hand shown, left-hand similar.

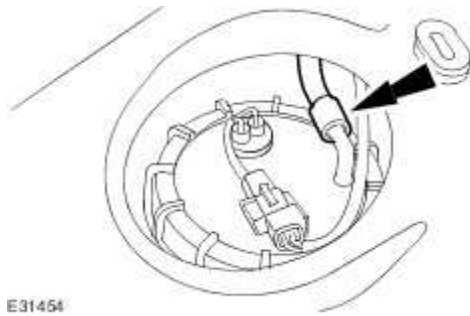
Detach and reposition the rear seat cushion insulation.



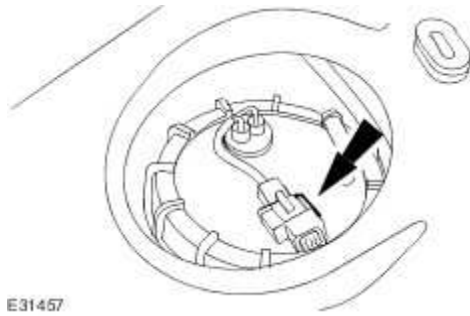
16. Remove the floor aperture cover.



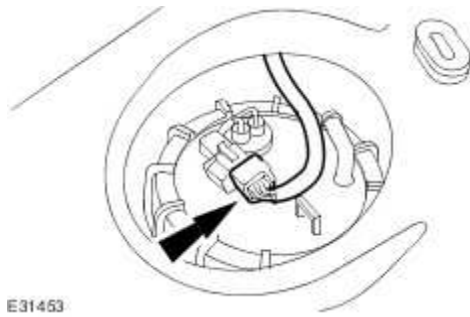
17. Disconnect the fuel pump module quick release coupling.



18. Detach the fuel pump module electrical connector from the retaining bracket.



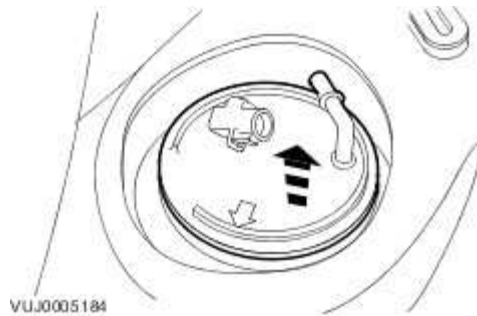
19. Disconnect the fuel pump module electrical connector.



20. Using the special tool, remove the fuel pump module locking ring.



21. Detach and reposition the upper part of the fuel pump module.



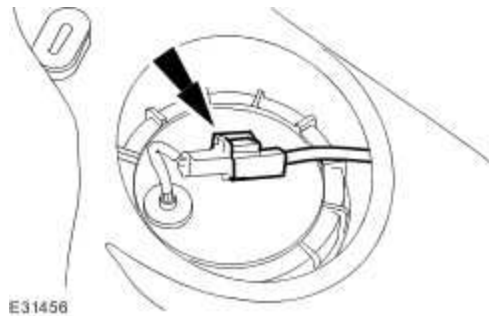
22. Remove the floor aperture cover.



23. **NOTE:**

Vehicles without supercharger shown, vehicles with supercharger similar.

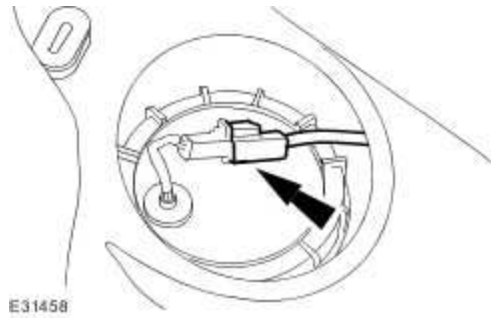
Detach the fuel transfer pump module electrical connector from the retaining bracket.



24. **NOTE:**

Vehicles without supercharger shown, vehicles with supercharger similar.

Disconnect the fuel transfer pump electrical connector.



25. **NOTE:**

Vehicles without supercharger shown, vehicles with supercharger similar.

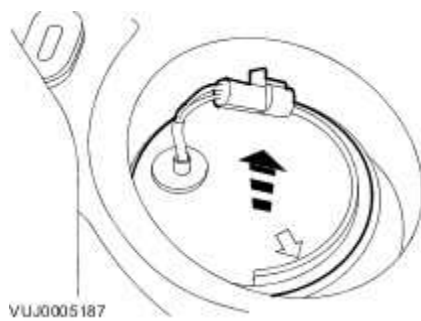
Using the special tool, remove the fuel transfer pump locking ring.



26. **NOTE:**

Vehicles without supercharger shown, vehicles with supercharger similar.

Detach and reposition the upper part of the fuel transfer pump.



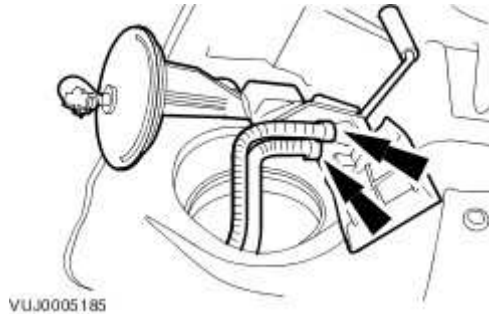
27.



CAUTION: Make sure no damage occurs to the fuel level float.

Remove the fuel transfer pump.

- Disconnect the fuel cross over lines.



28. Remove and discard the fuel transfer pump O-ring seal.

29.



CAUTION: Make sure no damage occurs to the fuel level float.

Remove the fuel pump module.

- Remove and discard the fuel pump module O-ring seal.

30. Using the fuel pump module hole in the fuel tank to gain access to the fuel, remove the fuel from the fuel tank using the fuel tank draining equipment. Follow the manufacturers operating instructions.

31. Using the fuel transfer pump hole in the fuel tank to gain access to the fuel, remove the fuel from the fuel tank using the fuel tank draining equipment. Follow the manufacturers operating instructions.

32.



CAUTION: On vehicles with supercharger make sure the arrow on the fuel pump module and the 'SC' marker on the fuel tank are aligned.



CAUTION: On vehicles without supercharger make sure the arrow on the fuel pump module and the 'NA' marker on the fuel tank are aligned.



CAUTION: On vehicles without supercharger make sure the arrow on the fuel transfer module and the 'NA' marker on the fuel tank are aligned.



CAUTION: Make sure no damage occurs to the fuel level floats.

NOTE:

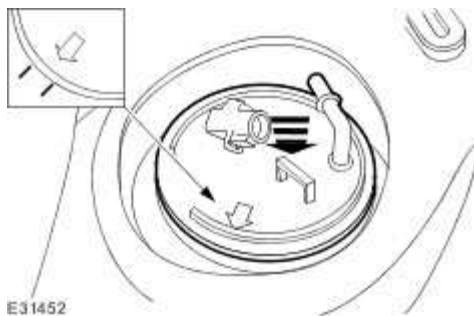
Install a new O-ring seal to the fuel pump module flange.

NOTE:

Take care not to stretch the O-ring seal.

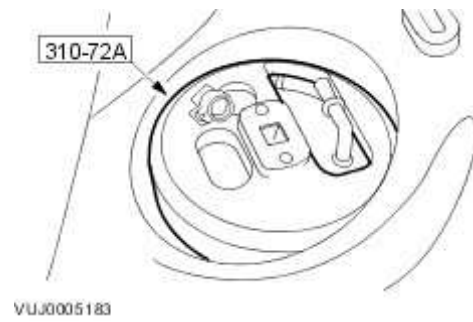
Install the fuel pump module.

- For vehicles without supercharger feed the fuel cross-over lines through the fuel pump module hole and across the front of the fuel tank saddle.

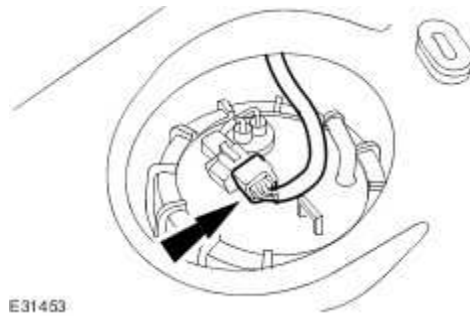


33. Using the special tool, install the fuel pump module locking ring.

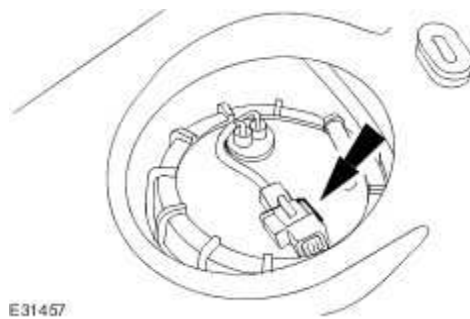
- Tighten to 70 Nm.



34. Connect the fuel pump module electrical connector.

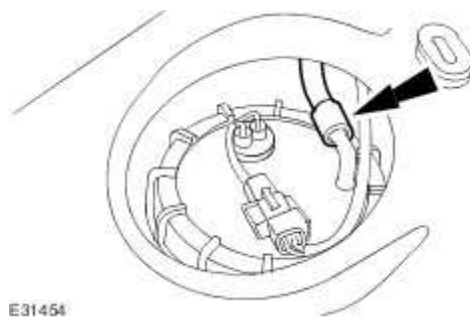


35. Attach the fuel pump module electrical connector to the retaining bracket.

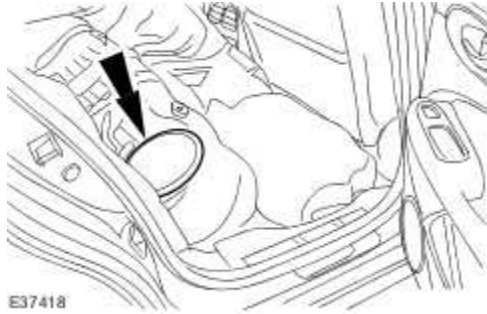


36. Connect the fuel pump module quick release coupling.

- Make sure the quick release coupling has latched onto the fuel pump module fuel pipe by pulling the pipe after the connection has been made.



37. Install the floor aperture cover.



38.



CAUTION: Vehicles with supercharger - make sure the arrow on the left-hand fuel pump module lines up with the 'SC' marker on the fuel tank.



CAUTION: Vehicles without supercharger - make sure the arrow on the fuel transfer pump lines up with the 'NA' marker on the fuel tank.



CAUTION: Make sure no damage occurs to the fuel level float.

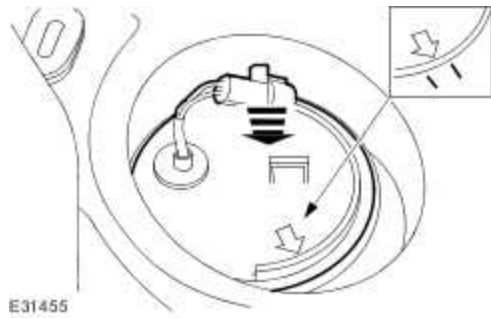
NOTE:

Install a new O-ring seal to the fuel transfer pump flange.

NOTE:

Take care not to stretch the O-ring seal.

Install the fuel transfer pump.

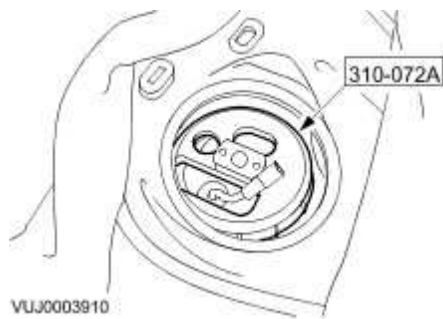


39. **NOTE:**

Vehicles without supercharger shown, vehicles with supercharger similar.

Using the special tool, install the fuel transfer pump locking ring.

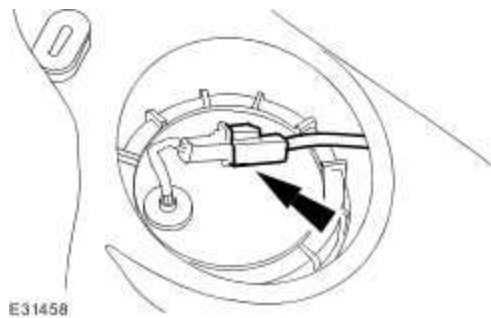
- Tighten to 70 Nm.



40. **NOTE:**

Vehicles without supercharger shown, vehicles with supercharger similar.

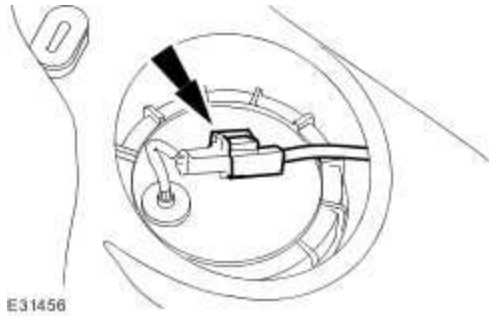
Connect the fuel transfer pump electrical connector.



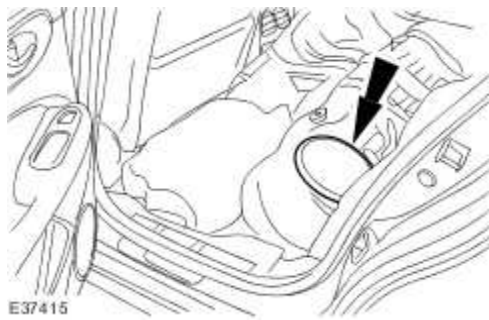
41. **NOTE:**

Vehicles without supercharger shown, vehicles with supercharger similar.

Attach the fuel transfer pump module electrical connector to the retaining bracket.



42. Install the floor aperture cover.



43. **NOTE:**

Right-hand shown, left-hand similar.

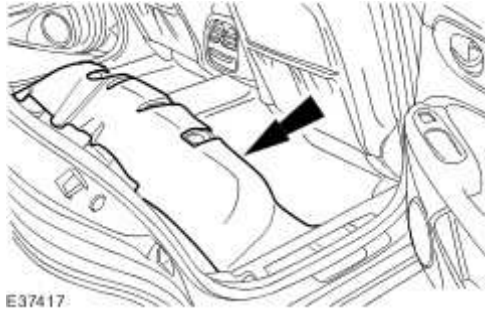
Attach the rear seat cushion insulation.



44. **NOTE:**

Right-hand shown, left-hand similar.

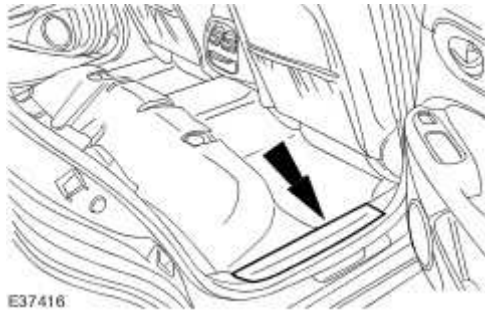
Attach the floor covering.



45. **NOTE:**

Right-hand shown, left-hand similar.

Install the scuff plate trim panels.



46. Install the rear seat cushion. <<501-10>>

47. Attach the fuel tank filler pipe cap.

48. Connect the battery ground cable. <<414-01>>

49. Close the fuel tank filler pipe flap.

Fuel Tank Draining - VIN Range: G45704- >G99999

Special Service Tools



Fuel tank drain adaptor
310-154



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.

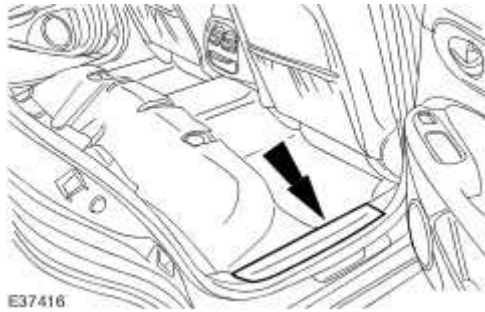


WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

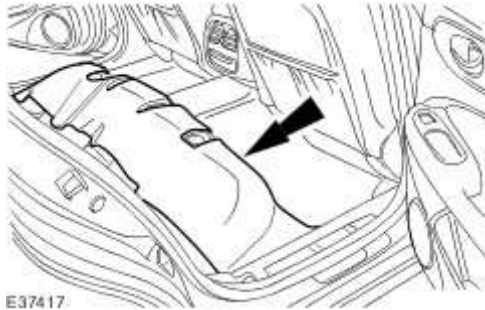
1. Release the pressure in the fuel system.
Fuel System Pressure Release - 2.7L V6 - TdV6 (19.50.02)

2. Remove the rear seat cushion.
Rear Seat Cushion (76.70.37)

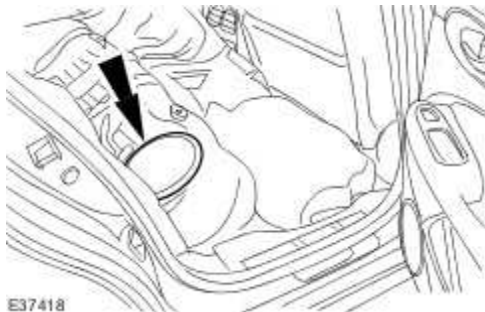
3. Remove the scuff plate trim panel.



4. Detach and reposition the floor covering.



5. Remove the floor aperture cover.



6.



CAUTION: The correct measurement must be used to remove the fuel tank drain port top. Failure to follow this instruction may result in damage to the vehicle.

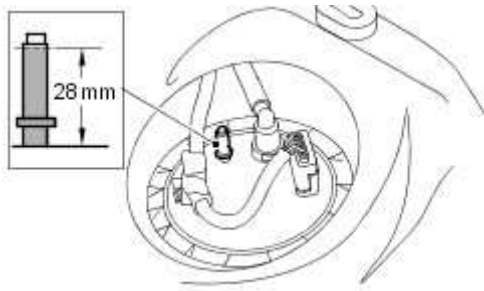
NOTE:

The fuel tank drain port is marked with DRAIN.

NOTE:

Vehicles without Diesel engine shown, vehicles with Diesel engine similar.

Using a suitable tool, remove the top of the fuel tank drain port.

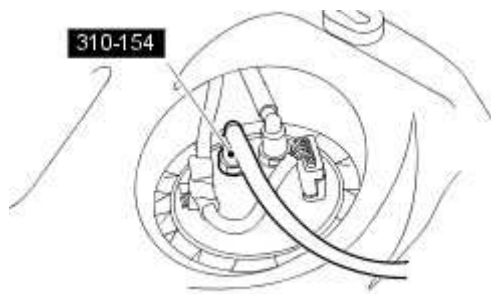


E64337

7. NOTE:

Vehicles without Diesel engine shown, vehicles with Diesel engine similar.

Install the special tool to the right-hand side of the fuel tank.



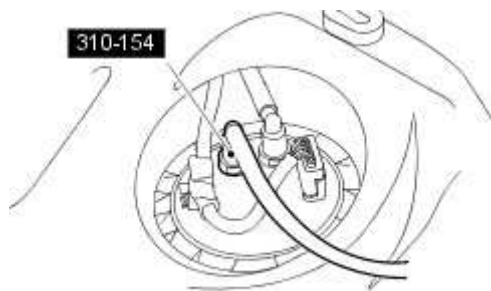
E64338

8. Using a suitable fuel vacuum drainer, remove the fuel from the right-hand side of the fuel tank.

9. NOTE:

Vehicles without Diesel engine shown, vehicles with Diesel engine similar.

Remove the special tool.



E64338

10.

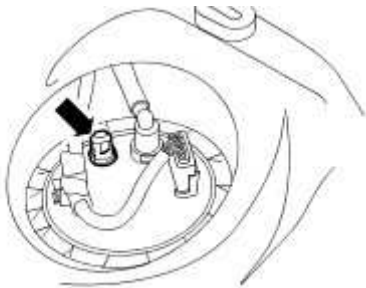


CAUTION: Make sure the new fuel tank drain port sealing cap is correctly installed. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

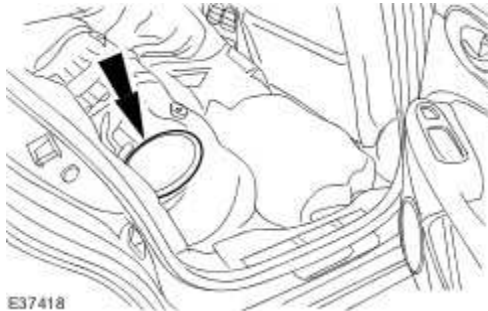
Vehicles without Diesel engine shown, vehicles with Diesel engine similar.

Install a new fuel tank drain port sealing cap.



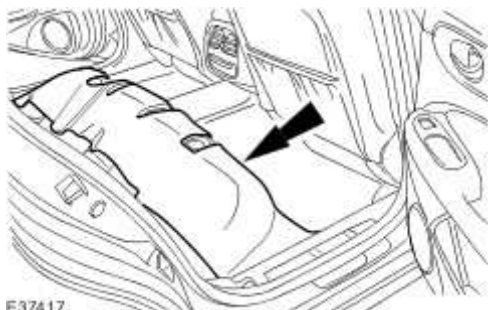
E64339

11. Install the floor aperture cover.



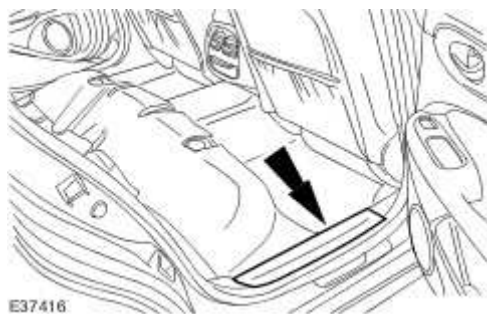
E37418

12. Attach the floor covering.

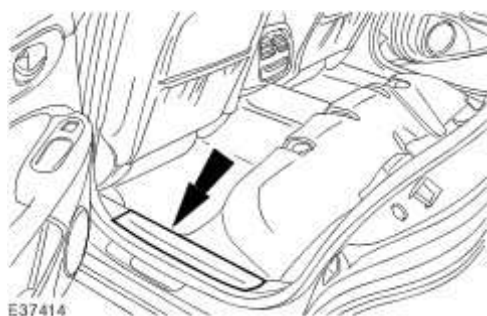


E37417

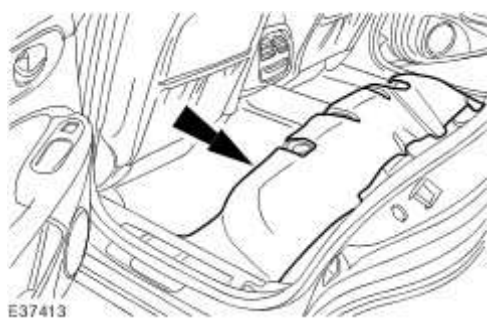
13. Install the scuff plate trim panel.



14. Remove the scuff plate trim panel.



15. Detach and reposition the floor covering.



16. Remove the floor aperture cover.



17.



CAUTION: The correct measurement must be used to remove the fuel tank drain port top. Failure to follow this instruction may result in damage to the vehicle.

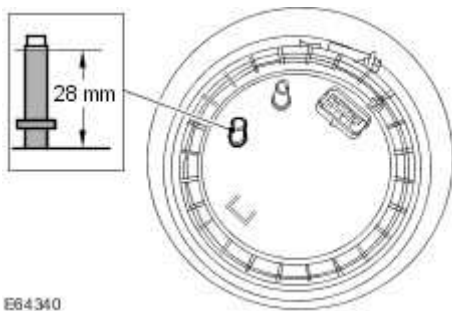
NOTE:

The fuel tank drain port is marked with DRAIN.

NOTE:

Vehicles without Diesel engine shown, vehicles with Diesel engine similar.

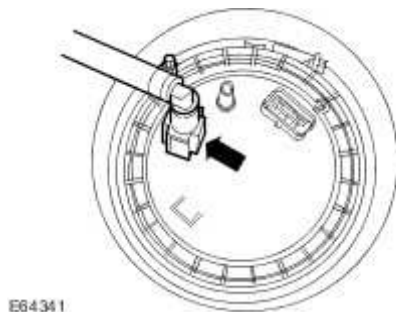
Using a suitable tool, remove the top of the fuel tank drain port.



18. NOTE:

Vehicles without Diesel engine shown, vehicles with Diesel engine similar.

Install the special tool to the left-hand side of the fuel tank.

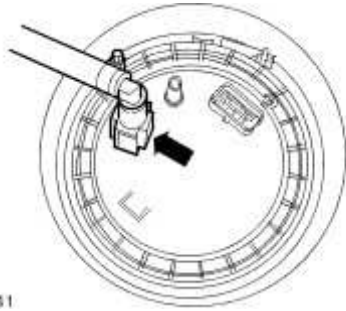


19. Using a suitable fuel vacuum drainer, remove the fuel from the left-hand side of the fuel tank.

20. NOTE:

Vehicles without Diesel engine shown, vehicles with Diesel engine similar.

Remove the special tool.



E64341

21.

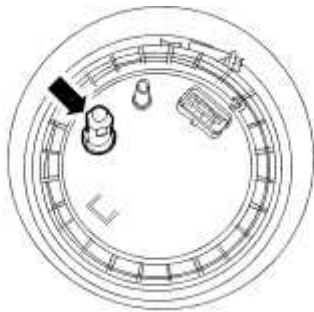


CAUTION: Make sure the new fuel tank drain port sealing cap is correctly installed. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

Vehicles without Diesel engine shown, vehicles with Diesel engine similar.

Install a new fuel tank drain port sealing cap.



E64342

22. Install the floor aperture cover.

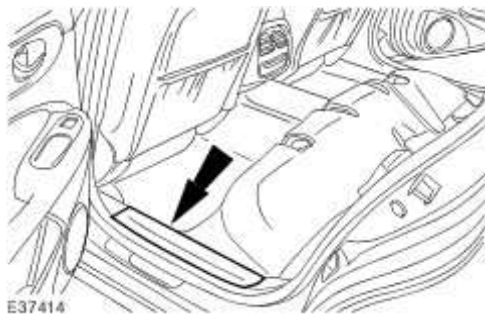


E37415

23. Attach the floor covering.



24. Install the scuff plate trim panel.



25. Install the rear seat cushion.

Rear Seat Cushion (76.70.37)

High-Pressure Fuel System Bleeding - 2.7L V6 - TdV6

Pneumatic vacuum gun



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high-pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Place the vehicle in a well ventilated, quarantined, area and arrange "No Smoking/Fuel Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not carry out any repairs to the fuel injection system with the engine running. The fuel pressure within the system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling fuel, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always fit blanking plugs to any open orifices or lines.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow these instructions may result in foreign matter ingress to the fuel injection system.



CAUTION: The low-pressure fuel system bleeding procedure must be carried out before this procedure is carried out, or the engine is attempted to be started, following removal or replacement of any low-pressure fuel system component. Failure to follow this instruction may result in damage to the fuel injection pump.



CAUTION: The engine must not be cranked using the starter motor for more than 30 seconds. The starter motor must be allowed to cool for at least 5 minutes after cranking for 30 seconds. Failure to follow these instructions will result in damage to the starter motor.

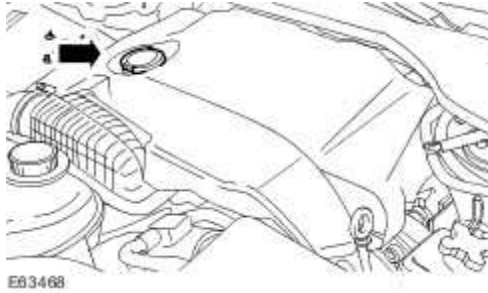
NOTE:

If a new fuel filter is to be installed, make sure the fuel filter is installed AFTER the high-pressure fuel system has been bled.

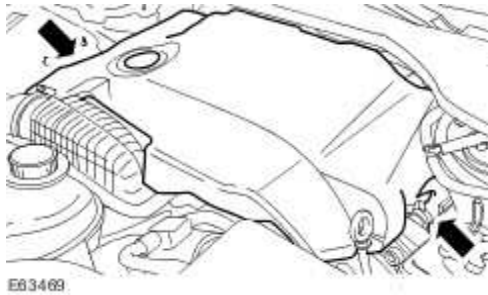
NOTE:

This procedure is necessary if the fuel injection pump, or the fuel line between the fuel filter and the fuel injection pump is removed, drained of fuel or replaced.

1. Bleed the low-pressure fuel system.
Low-Pressure Fuel System Bleeding - 2.7L V6 - TdV6
2. Remove the oil filler cap.



3. Remove the engine cover.

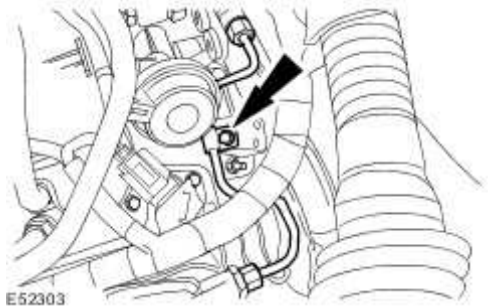


4. Install the engine oil filler cap to prevent foreign material entering the valve cover.

5. Remove the cowl vent screen.

Cowl Vent Screen (76.10.01)

6. Detach the high-pressure fuel supply line clamp.



7. Using the pneumatic vacuum gun, vacuum foreign material from the fuel injectors, high-pressure fuel supply lines and surrounding areas.

Fuel Injection Component Cleaning

- 8.

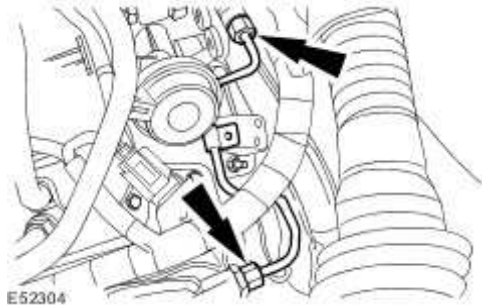


CAUTION: Make sure that the high-pressure fuel supply line remains in contact with the fuel injection supply manifold and fuel injection diverter rail until both unions have been detached and cleaned. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.



CAUTION: Make sure that the tool used to loosen the high-pressure fuel supply line unions is used at the top of the unions as this is where there is most material. Failure to follow this instruction may result in damage to the unions.

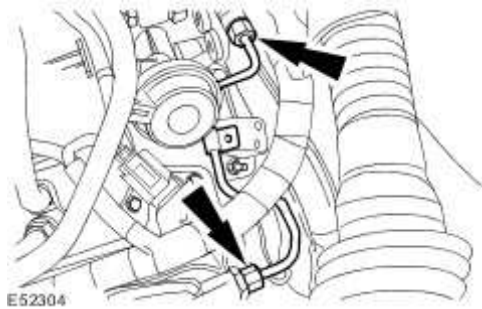
Loosen the high-pressure fuel supply lines.



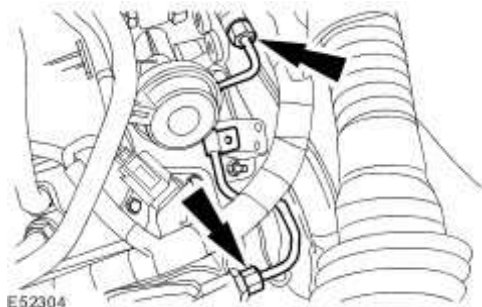
9. Using the pneumatic vacuum gun, vacuum foreign material from the fuel injectors, high-pressure fuel supply lines and surrounding areas.

Fuel Injection Component Cleaning

10. Remove and discard the high-pressure fuel supply line.



11. Install a new high-pressure fuel supply line, but do not fully tighten the unions at this stage.



12. Position suitable lint free material under the left-hand high-pressure fuel line unions to catch escaping fuel.

13. Turn the ignition switch to the RUN position for 20 seconds.

14. If fuel does not appear at the fuel line unions after 20 seconds, allow the starter motor to cool for five minutes.

15. Repeat steps 11 and 12 until fuel appears at the fuel line unions.

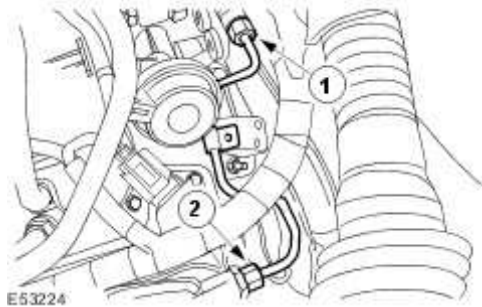
16.



CAUTION: Make sure that the tool used to tighten the high-pressure fuel supply line unions is used at the top of the unions as this is where there is most material. Failure to follow this instruction may result in damage to the unions.

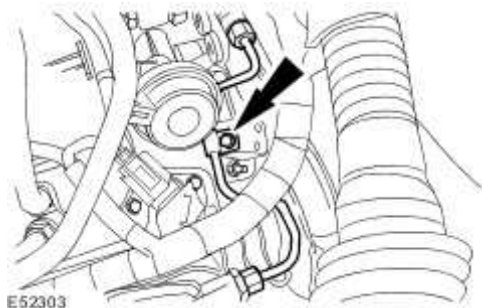
Tighten the the high-pressure fuel supply line unions.

- Tighten the high-pressure fuel supply line in the sequence shown:
- Tighten the high-pressure fuel supply line union 1 to fuel diverter rail to 15 Nm.
- Tighten the high-pressure fuel supply line union 2 to fuel rail to 15 Nm.
- Tighten the high-pressure fuel supply line union 1 to fuel diverter rail to 30 Nm.
- Tighten the high-pressure fuel supply line union 2 to fuel rail to 30 Nm.



17. Attach the high-pressure fuel supply line clamp.

- Tighten to 10 Nm.



18.



WARNING: Do not carry out any repairs to the fuel system with the engine running. The fuel pressure within the high-pressure system can be as high as 1650 bar. Failure to follow this instruction may result in personal injury.

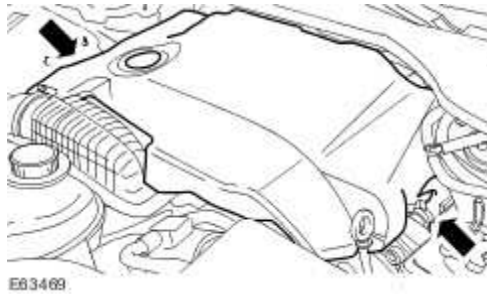
Start the engine and check visually for fuel leaks.

19. Install the cowl vent screen.

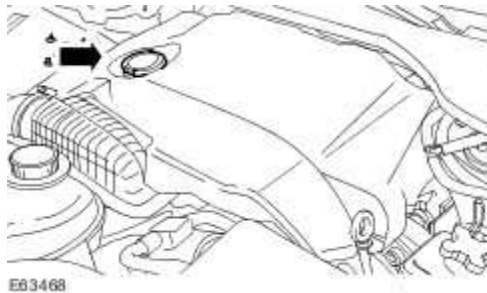
Cowl Vent Screen (76.10.01)

20. Remove the engine oil filler cap.

21. Install the engine cover.



22. Install the oil filler cap.



Low-Pressure Fuel System Bleeding - 2.7L V6 - TdV6



WARNING: Wait at least 30 seconds after the engine stops before commencing any repair to the high-pressure fuel injection system. Failure to follow this instruction may result in personal injury.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always fit blanking plugs to any exposed ports.



CAUTION: This procedure must be carried out before the engine is attempted to be started, following removal or replacement of any low pressure fuel system component. Failure to follow this instruction will result in damage to the fuel injection pump.



CAUTION: The engine must not be cranked using the starter motor for more than 30 seconds. The starter motor must be allowed to cool for at least 5 minutes after cranking for 30 seconds. Failure to follow these instructions will result in damage to the starter motor.

NOTE:

This procedure is necessary if any low-pressure fuel system components are removed or replaced. These include the fuel filter, fuel lines, fuel tank or fuel cooler.

1. Disconnect the battery ground cable.

Battery Disconnect and Connect

2. **NOTE:**

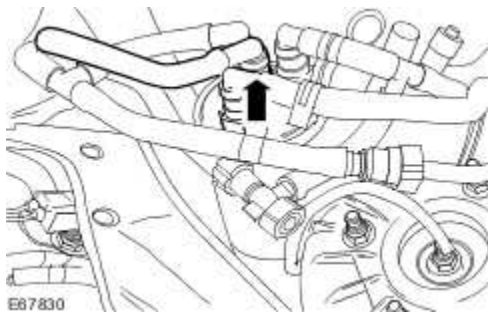
When relieving the fuel system pressure, catch any displaced fuel in a suitable container.

NOTE:

Fit a suitable blanking cap to the exposed port on the fuel filter.

Relieve the fuel system pressure.

- Disconnect the fuel filter to fuel pump supply line from the fuel filter.
Quick Release Coupling - Push Connect



- 3.

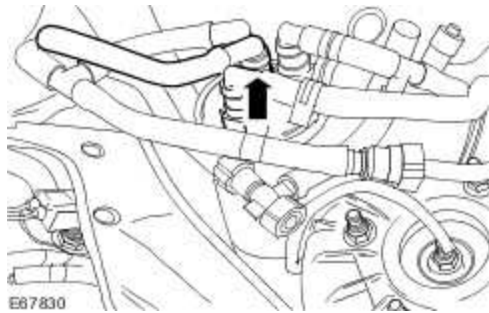


CAUTION: The tube used to bleed the low-pressure fuel system must be absolutely clean. Failure to follow this instruction may result in foreign matter ingress to the fuel injection system.

Connect a suitable clean, clear tube to the fuel pump supply outlet.

4. Place a suitable container under the tube to catch any escaping fuel.
5. Turn the ignition switch to the ON position for 10 seconds. The fuel pump in the fuel tank will be audible.
6. Turn the ignition switch to the OFF position.
7. Repeat steps 5 and 6 until air-free fuel escapes from the tube.
8. Disconnect and discard the tube from the fuel pump supply outlet.
9. **NOTE:**
Remove the blanking cap.

Connect the fuel filter to fuel pump supply line to the fuel filter.
Quick Release Coupling - Push Connect



10. Connect the battery ground cable.
Battery Connect (86.15.15)

11.



CAUTION: If any high-pressure fuel system components have been removed or replaced, the high-pressure fuel system bleeding procedure must be carried out before the engine is started. Failure to follow this instruction may result in damage to the vehicle.

If necessary, bleed the high-pressure fuel system.

12. Start the engine and allow to idle.

Quick Release Coupling

Disconnect

1.



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



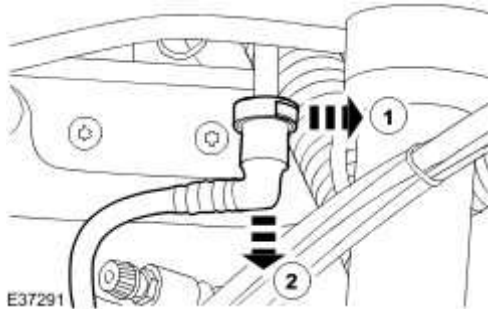
WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

Relieve the fuel system pressure.

2. Disconnect the quick release fitting.
 1. Release the retaining clip.
 2. Disconnect the quick release fitting.



Connect

1. To connect, reverse the disconnect procedure.

Quick Release Coupling - Push Connect

Disconnect

1.



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.

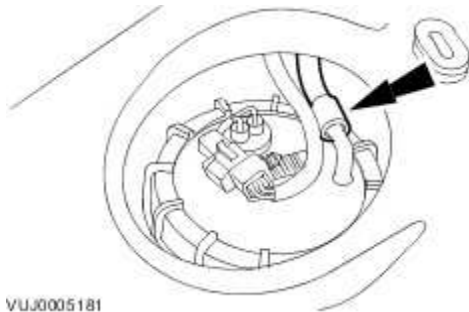


WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

Relieve the fuel system pressure.

2. Disconnect the push connect fitting.

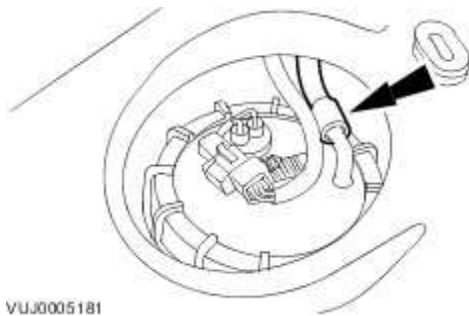
- Press the collar.
- Disconnect the push connect fitting.



Connect

1. To connect.

- Support the male stub.
- Push the connector fitting onto the stub until an audible click can be heard.
- Check the connection by a gentle tug test.



Spring Lock Couplings

Special Service Tools



Spring Lock Coupling Tool or Equivalent
310-D005 (23-040)

Disconnect

1.



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



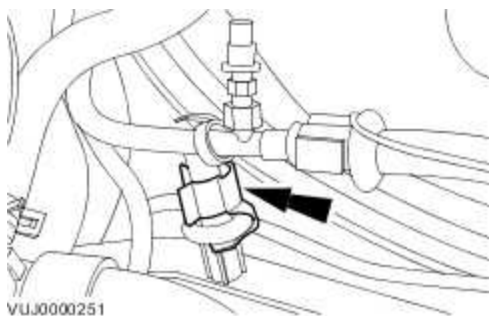
WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



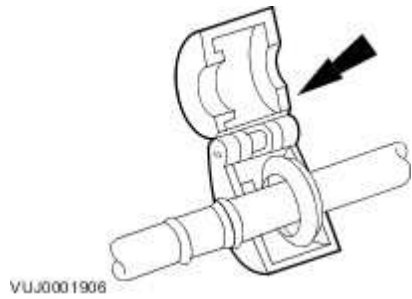
WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

Relieve the fuel system pressure. For additional information, refer to the procedure in this section: .

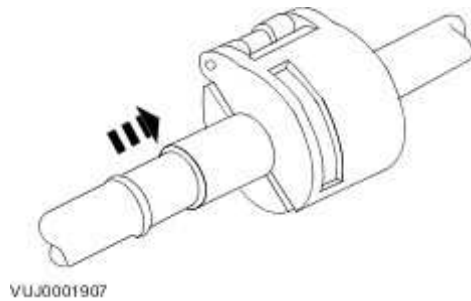
2. Remove the safety clip from the spring lock coupling.



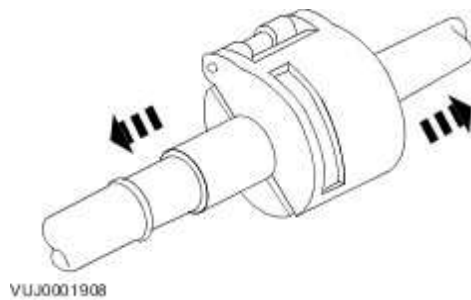
3. Install the special tool.



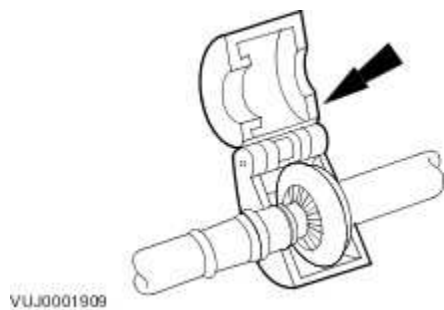
4. Close the special tool and push it into the female end of the spring lock coupling.



5. Disconnect the spring lock coupling.



6. Remove the special tool.



Connect

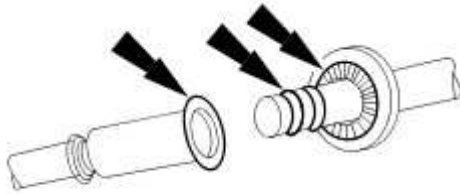
1. **NOTE:**

Install new O-ring seals.

NOTE:

Install a new garter spring.

Clean and inspect the male and female ends of the spring lock coupling.



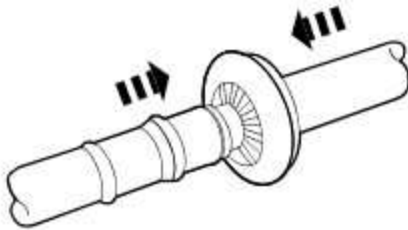
VUJ0001910

2.



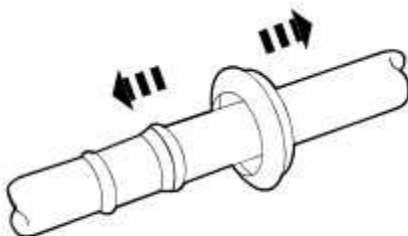
WARNING: Make sure the garter spring snaps over the male end of the spring lock coupling.

Connect the spring lock coupling.



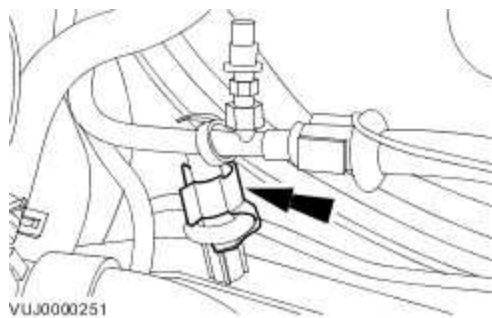
E31439

3. Check the spring lock coupling to make sure it is correctly connected.



E31440

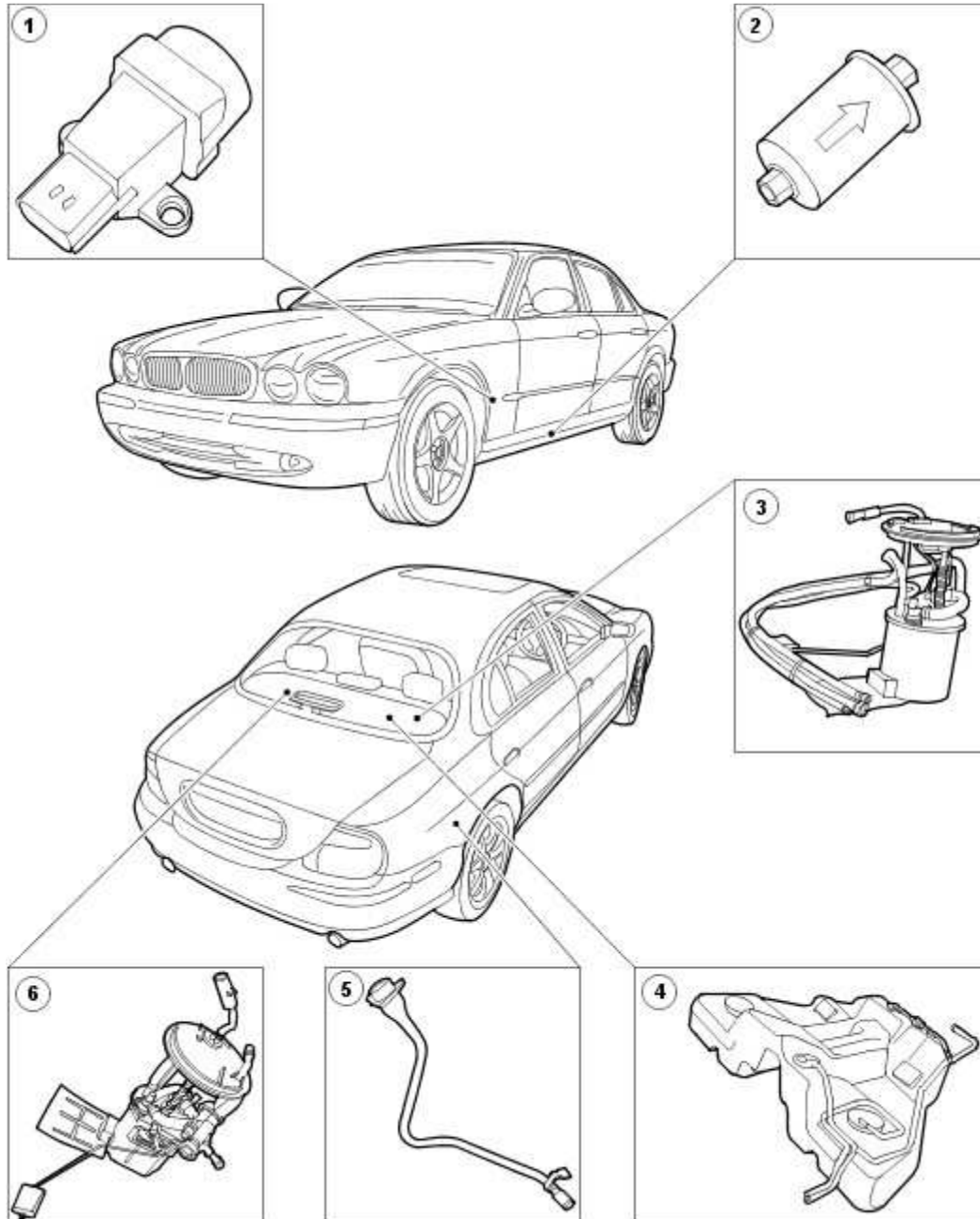
4. Install the safety clip to the spring lock coupling.



VUJ0000251

Fuel System - VIN Range: G00442- >G45703

Vehicles with supercharger

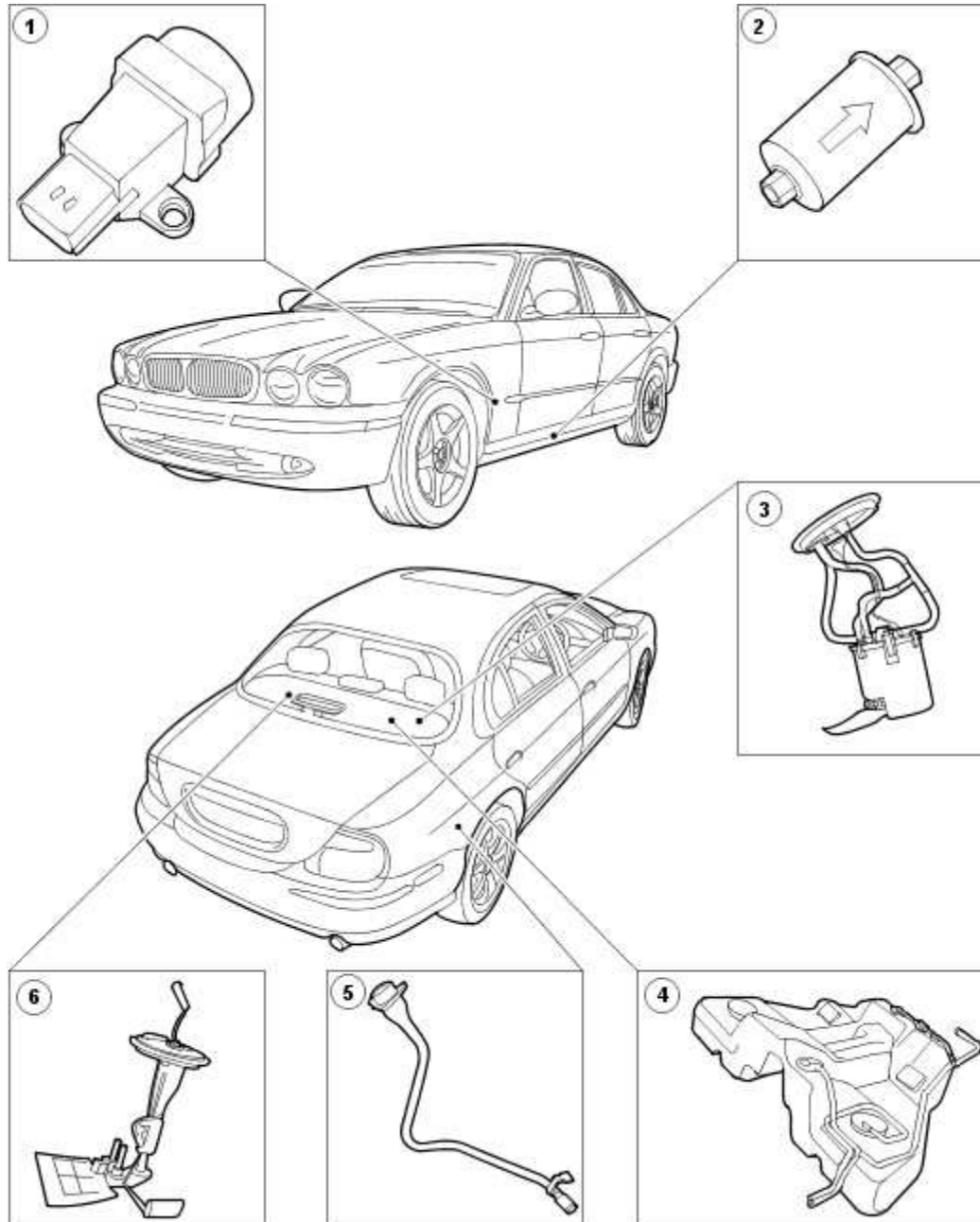


E36750

Item	Part Number	Description

1	—	Inertia fuel shutoff (IFS) switch
2	—	Fuel filter
3	—	Right-hand side fuel pump module
4	—	Fuel tank
5	—	Fuel tank filler pipe
6	—	Left-hand side fuel pump module

Vehicles without supercharger



E36751

Item	Part Number	Description
1	—	Inertia fuel shutoff (IFS) switch
2	—	Fuel filter
3	—	Fuel pump module
4	—	Fuel tank

5	—	Fuel tank filler pipe
6	—	Fuel transfer pump

The electronic returnless fuel system utilized has the following advantages:

reduced fuel tank vapor generation

requires less electrical power

does not require a fuel return line

The intelligence of this system is contained within the Engine control module (ECM).

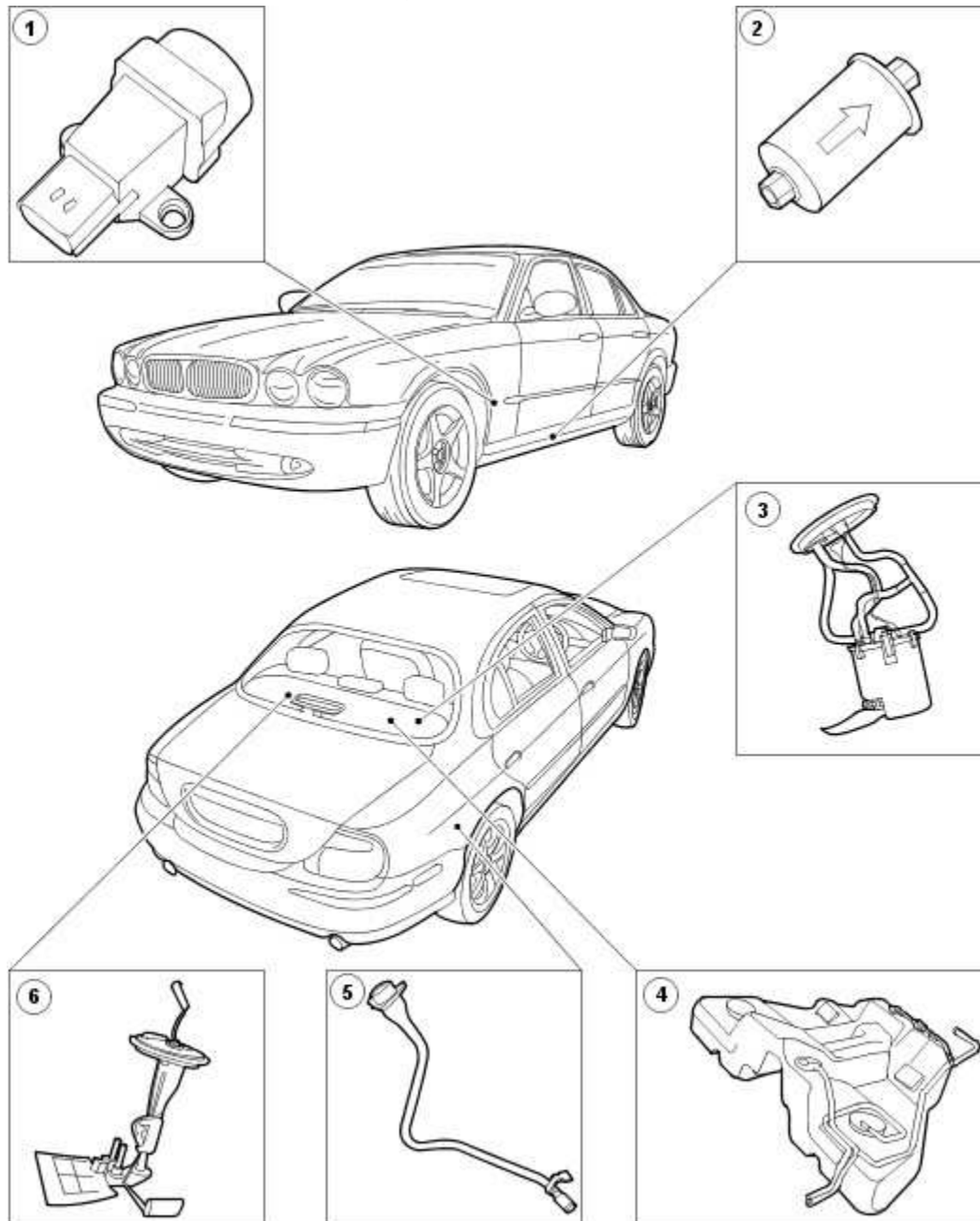
The ECM determines the required fuel flow and communicates this information to the rear electronic module (REM). The REM has the fuel pump driver functions fully integrated into the microprocessor. The fuel pump relay is activated by the ECM power relay and provides a fused power supply to the REM. The ECM and the REM calculate the frequency and determine the current required by the fuel pump to maintain the correct fuel pressure at the fuel injectors.

The fuel tank is of a saddle design which incorporates a pump/sender unit in both sides of the tank on vehicles with superchargers. On vehicles without superchargers, the right-hand side houses the fuel pump module and the left-hand side houses the fuel transfer pump. The fuel pump cross over lines are internal to the fuel tank to reduce potential leak paths.

Fuel is supplied at high pressure to the injectors via a fuel rail which incorporates a fuel pressure and a fuel temperature sensor. The ECM increases the fuel pressure to minimize fuel vapor formation to maintain fuel flow across the injectors. An inertia type fuel shutoff switch will cut power to the fuel pump in the event of an accident.

Fuel System - VIN Range: G45704- >G99999

Vehicles without Diesel engine



E36751

Item	Part Number	Description
1	—	Inertia fuel shut-off (IFS) switch
2	—	Fuel filter

3	—	Fuel pump module
4	—	Fuel tank
5	—	Fuel tank filler pipe
6	—	Fuel transfer pump

The electronic returnless fuel system utilized has the following advantages:

- reduced fuel tank vapor generation

- requires less electrical power

- does not require a fuel return line.

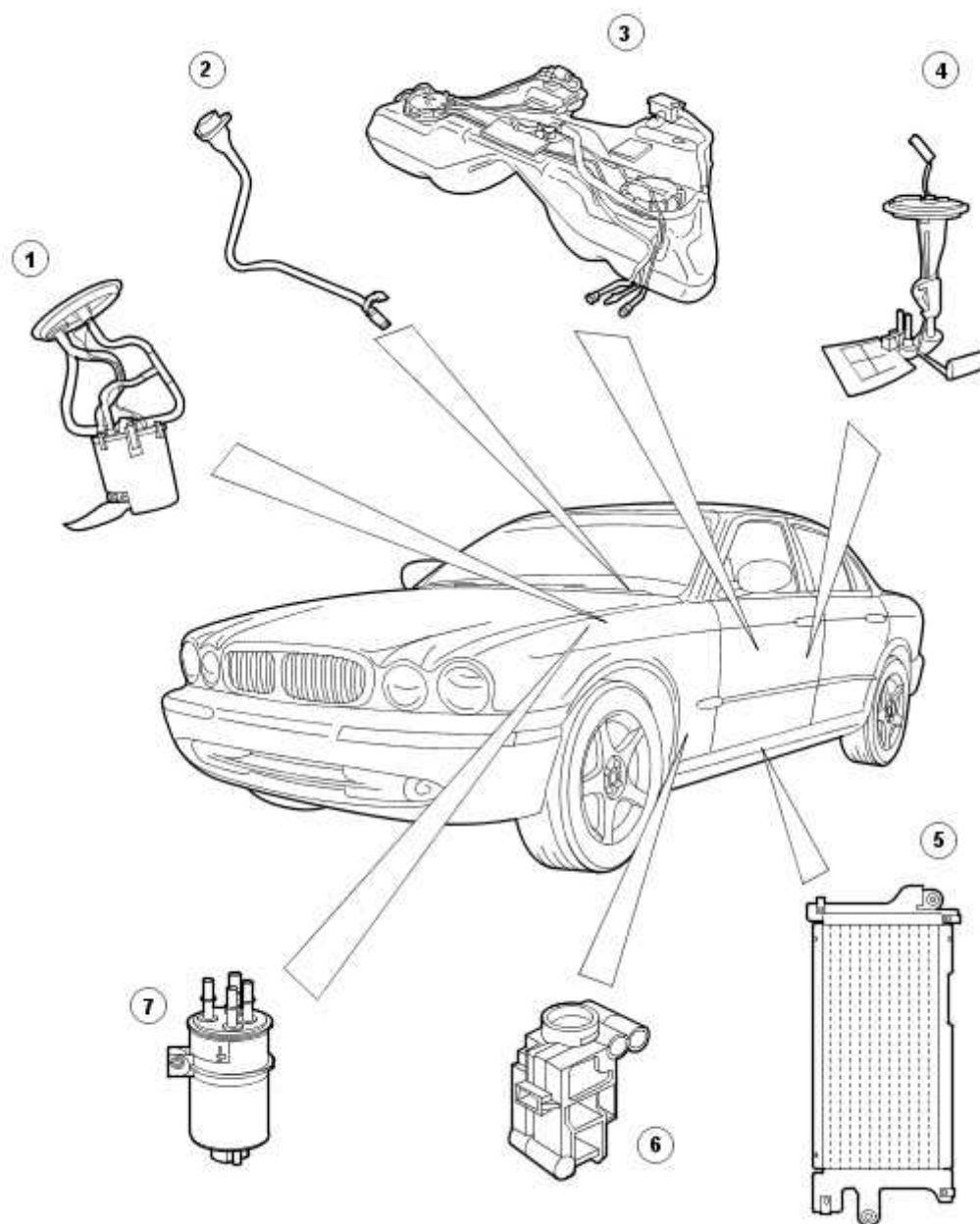
The intelligence of this system is contained within the engine control module (ECM).

The ECM determines the required fuel flow and communicates this information to the rear electronic module (REM). The REM has the fuel pump driver functions fully integrated into the microprocessor. The fuel pump relay is activated by the ECM power relay and provides a fused power supply to the REM. The ECM and the REM calculate the frequency and determine the current required by the fuel pump to maintain the correct fuel pressure at the fuel injectors.

The fuel tank is of a saddle design which incorporates a fuel pump module on the right-hand side and a fuel transfer module on the left-hand side. The fuel pump crossover lines are internal to the fuel tank to reduce potential leak paths.

Fuel is supplied at high pressure to the injectors through a fuel rail which incorporates a fuel pressure and a fuel temperature sensor. The ECM increases the fuel pressure to minimize fuel vapor formation to maintain fuel flow across the injectors. An inertia type fuel shut-off switch will cut power to the fuel pump in the event of an accident.

Vehicles with Diesel Engine



E64249

Item	Part Number	Description
1	—	Fuel pump module
2	—	Fuel tank filler pipe
3	—	Fuel level sensor
4	—	Fuel tank

5	—	Fuel filter
6	—	Inertia fuel shut-off (IFS) switch
7	—	Fuel Cooler

Fuel System - Vehicles with Diesel Engine

The diesel fuel is drawn from the fuel tank by an internal electric lift pump which is supplied with battery voltage from the fuel pump relay located in the rear power distribution box. The fuel pump relay is controlled by the ECM. The fuel pump provides a low pressure diesel fuel supply to the transfer pump incorporated in to the fuel injection pump. The fuel metering valve (FMV) governs the amount of fuel supplied to the fuel injection pump. The fuel injection pump has a fuel return circuit to the fuel filter, which is independent of the injector return pipes.

The fuel tank is of a saddle design which incorporates a fuel pump module and fuel level sensor in the right-hand side and a fuel level sensor module in the left-hand side of the tank. The fuel pump crossover lines are internal to the fuel tank to reduce potential leak paths. The signals from the fuel level sensors are used both for the fuel gauge and the run dry prevention strategy within the ECM.

The driver will always be aware of the risk of running out of fuel as the fuel gauge will show empty and the fuel warning lamp will be illuminated. In order to protect the fuel lift pump and fuel injection pump and to prevent the need for fuel priming after the vehicle has run out of fuel, the ECM will instigate the run dry prevention strategy prior to the fuel tank becoming completely empty. In order to recognize the fuel tank becoming empty, a low level switch is incorporated in to the fuel tank swirl pot. The signal from this switch, together with the signal from two fuel level sensors is relayed to the ECM, through the controller area network (CAN) bus.

Before a run dry event occurs the ECM will take a series of actions to inform the driver of the low fuel level in the fuel tank.

Fuel remaining in fuel tank	Approximate distance remaining*	Action
9.4 L	112 Km (70 Miles)	Low Fuel warning lamp illuminated in instrument cluster
5.2 L	48 Km (30 Miles)	Fuel gauge reads Empty ; RANGE display reads 0 Km (0 Miles)
3.9 L	28 Km (18 Miles)	ECM simulates engine misfire
3.7 L	25 Km (16 Miles)	Engine is stopped but restarts with misfire

2.0 L	0 Km (0 Miles)	Engine stops and will not restart
-------	----------------	-----------------------------------

* Dependant on average fuel consumption

If, when the ignition key is turned to the **ON** position, the run dry event is still detected, this would indicate that either no, or insufficient, fuel has been added to the fuel tank, or that the vehicle may be parked on a slope. In this instance the fuel pump will run to fill the swirl pot and cover the low fuel level switch. The ECM will not prevent the engine from cranking, but it will inhibit fuel injection. If, after a delay, a run dry event is still detected, the fuel pump will be inhibited for the rest of the ignition cycle. As soon as a run dry event is no longer detected normal starting can resume.

310-01 : Fuel Tank and Lines

Specifications

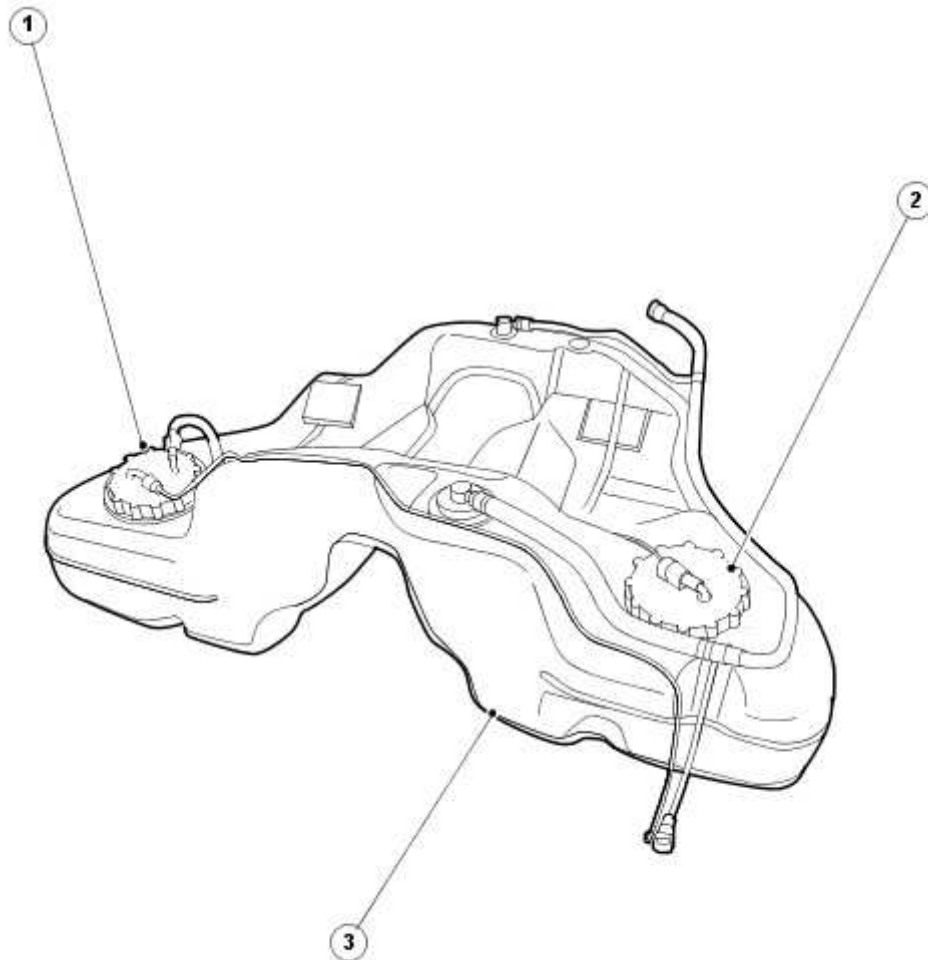
Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Engine compartment brace bar retaining bolt	25	18	-
Fuel tank support strap retaining bolts	35	26	-
Fuel pump module locking ring	60	44	-
Fuel transfer pump locking ring	60	44	-
Fuel transfer unit locking ring	60	44	-
Fuel filter support bracket retaining bolts - Vehicles without diesel engines	10	-	89
Fuel filter support bracket retaining bolt - Vehicles with diesel engines	5	-	44
Fuel filter connection to pipe	30	22	-
Fuel filler pipe retaining bolts	5	-	44
Fuel filler pipe retaining nut	4	-	35
Fuel filler hose worm drive	2	-	18

Fuel Tank and Lines - VIN Range: G00442- >G45703

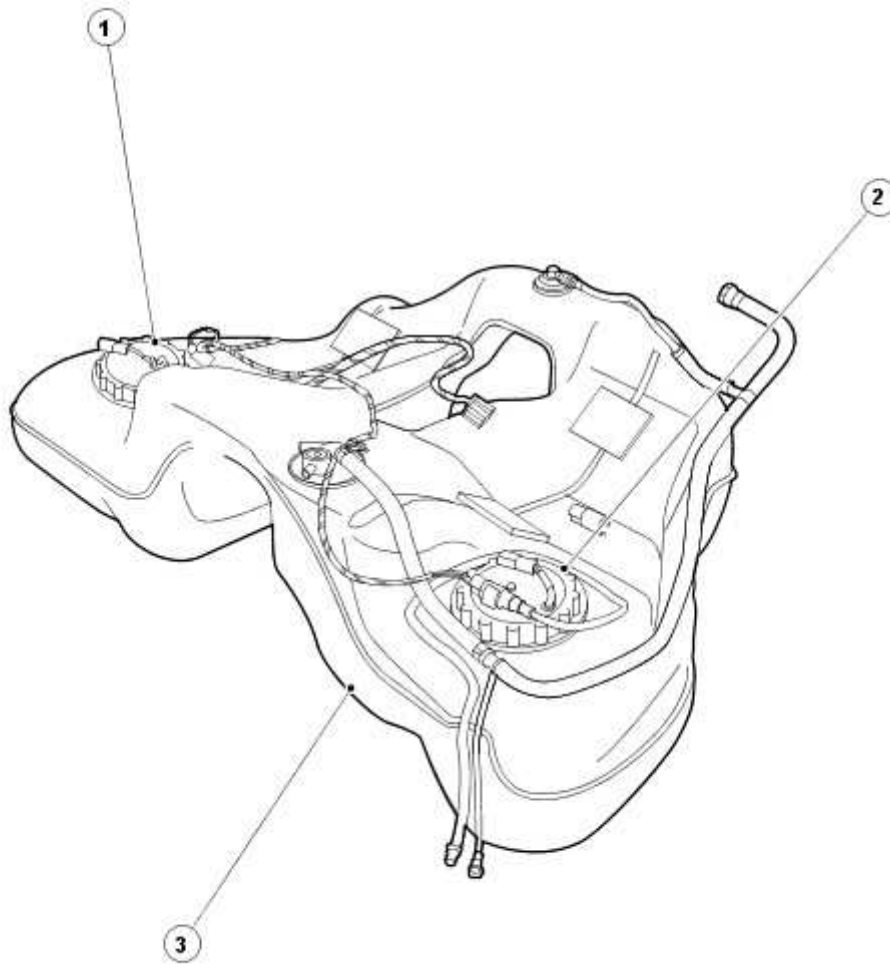
Vehicles without supercharger



E37161

Item	Part Number	Description
1		Fuel pump module
2		Fuel transfer pump
3		Fuel tank

Vehicles with supercharger



E37162

Item	Part Number	Description
1	—	Right-hand fuel pump module
2	—	Left-hand fuel pump module
3	—	Fuel tank

Fuel Tank

The fuel tank is of a plastic construction and is retained to the vehicle by means of two steel support straps. The fuel tank support straps are mounted onto the underside of the vehicle chassis towards the front of the fuel tank and bolt to the vehicle towards the rear of the fuel tank. Fuel tank ventilation is achieved through a fuel tank roll-over valve into an evaporative emission canister which absorbs fuel tank vapor. The fuel tank roll-over valve is integral to the fuel tank and will prevent fuel loss from the fuel tank if the vehicle becomes inverted.

Fuel Filter

The fuel filter is of a conventional construction being that of a paper element sealed within a steel canister. The fuel filter is located on the left-hand front longitudinal member, under the left-hand splash shield.

Fuel Tank Filler Pipe

The fuel tank filler pipe is of steel construction and is retained to the vehicle by means of two lower retaining bolts and one upper retaining nut. The fuel tank filler pipe is fitted with a twist-fit filler cap, which seals the system.

Inertia Fuel Shutoff (IFS) Switch

The inertia fuel shutoff (IFS) switch is designed to cut power to the fuel pump in the event of an accident. It is located behind the left-hand cowl side trim panel.

Fuel Pumps

The fuel pumps are electric turbine type pumps and are located inside the fuel tank, one on the left-hand side and one on the right-hand side on supercharged vehicles. They both feature an integral fuel tank sender unit and each is retained to the fuel tank by means of a locking ring.

Vehicles without supercharger

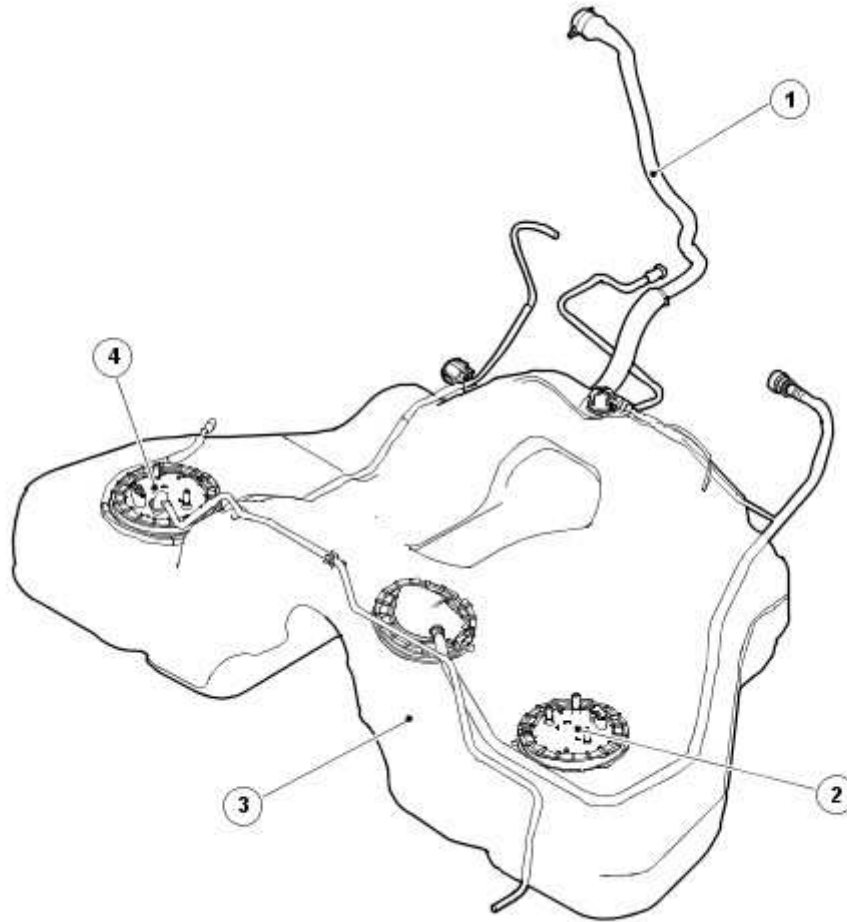
As the fuel tank is of a saddle design, a fuel pump module and a fuel transfer pump are incorporated. The fuel pump module located in the right-hand side of the fuel tank transfers fuel to the left-hand side of the fuel tank. The fuel transfer pump located in the left-hand side of the fuel tank transfers fuel to the fuel pump module and then the engine.

Vehicles with supercharger

Both pumps continually transfer fuel from one side of the tank to the other, whilst also providing a fuel supply to the engine.

Fuel Tank and Lines - VIN Range: G45704- >G99999

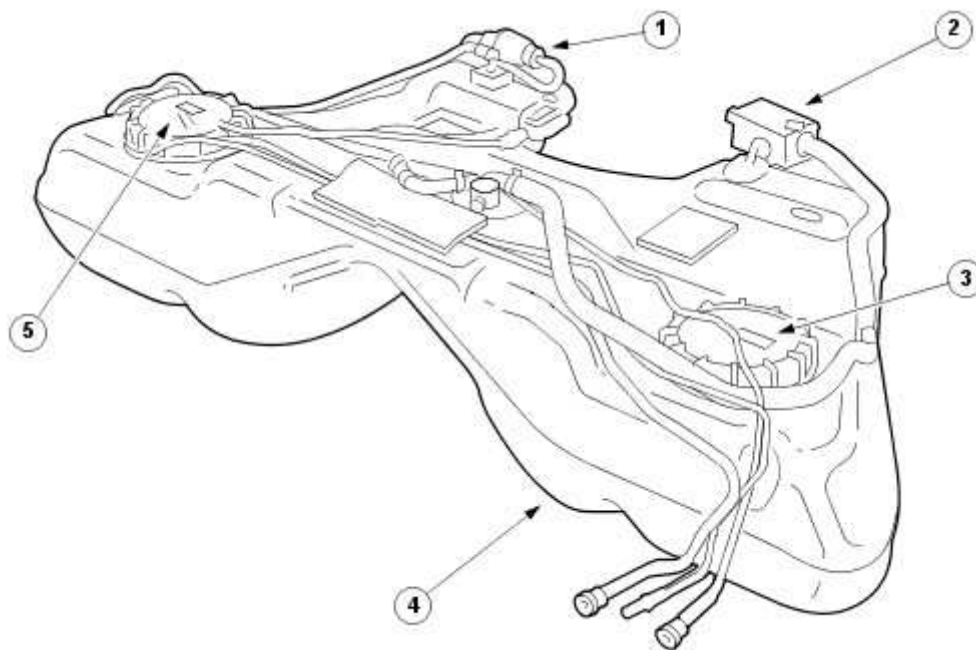
Vehicles without Diesel Engine



E64139

Item	Part Number	Description
1		Fuel tank filler pipe
2		Fuel transfer module
3		Fuel tank
4		Fuel pump module

Vehicles with Diesel Engine



E52400

Item	Part Number	Description
1		Auxiliary heater fuel supply pump
2		Fuel tank ventilation filter
3		Left-hand fuel level sensor module
4		Fuel tank
5		Right-hand fuel pump module

Fuel Tank

Vehicles without Diesel Engine

The fuel tank is of a plastic construction and is retained to the vehicle by means of two steel support straps. The fuel tank support straps are mounted onto the underside of the vehicle chassis towards the front of the fuel tank and bolt to the vehicle towards the rear of the fuel tank. Fuel tank ventilation is achieved through a fuel tank roll-over valve into an evaporative emission canister which absorbs fuel tank vapor. The fuel tank roll-over valve is integral to the fuel tank and will prevent fuel loss from the fuel tank if the vehicle becomes inverted.

Vehicles with Diesel Engine

The fuel tank is of a plastic construction and is retained to the vehicle by means of two steel support straps. The fuel tank support straps are mounted onto the underside of the vehicle chassis towards

the front of the fuel tank and bolt to the vehicle towards the rear of the fuel tank. Fuel tank ventilation is achieved through a fuel tank roll-over valve into a ventilation filter. The fuel tank roll-over valve is integral to the fuel tank and will prevent fuel loss from the fuel tank if the vehicle becomes inverted.

Fuel Filter

Vehicles without Diesel Engine

The fuel filter is of a conventional construction being that of a paper element sealed within a steel canister. The fuel filter is located behind the left-hand front fender splash shield.

Vehicles with Diesel Engine

The diesel fuel filter is located in the engine compartment. Incorporated in to the fuel filter housing is a bimetallic valve which will start to close at 30°C (86°F) and will fully close at 50°C (122°F).

When the bimetallic valve is open, fuel is only allowed to pass through the fuel cooler in the engine vee, which aids warm up of the fuel at low temperatures. When the fuel temperature increases, the bimetallic valve closes, diverting fuel through the under-floor fuel cooler which then lowers the fuel temperature before returning the fuel back to the fuel filter.

The fuel filter has an air bleed return to the fuel tank which returns excess air and fuel back to the fuel tank.

Fuel Tank Filler Pipe

The fuel tank filler pipe is of stainless steel construction and is retained to the vehicle by means of one lower retaining bolt, one lower retaining nut and one upper retaining nut. The fuel tank filler pipe is fitted with a twist-fit filler cap, which seals the system.

Inertia Fuel Shutoff (IFS) Switch

The inertia fuel shutoff (IFS) switch is designed to cut power to the fuel pump in the event of an accident. It is located behind the left-hand cowl side trim panel.

Fuel Modules

Vehicles without Diesel Engine

As the fuel tank is of a saddle design, a fuel pump module and a fuel transfer module are incorporated.

The fuel pump module is an electric turbine type pump and is located inside the fuel tank, on the right-hand side. Both the fuel pump and fuel transfer module feature an integral fuel tank sender unit and each is retained to the fuel tank by means of a locking ring.

Vehicles with Diesel Engine

The fuel pump is an electric turbine type and is located in the right-hand side of the fuel tank. The fuel pump supplies fuel to the fuel injection pump and also circulates fuel from the left-hand side of the fuel tank by means of fuel transfer pipes incorporated in the fuel pump module.

The fuel tank incorporates two fuel level sensors, one in the right-hand fuel pump module and one in the left-hand fuel tank level sensor. Both the fuel pump and fuel tank level sensor modules are retained to the fuel tank by means of a locking ring.

Fuel cooler

Vehicles with Diesel Engine

Two fuel coolers are fitted to the vehicle. One is located in the vee of the engine block, which has a coolant connection to aid heat transfer. The second cooler is located in the fuel return line and is located under the vehicle on the left-hand side. Fuel flow through the underfloor cooler is controlled by the fuel filter.

Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Damaged fuel lines	Fuses (see table)
Damaged push connect fittings	Loose or corroded electrical connectors
Fuel leaks	Fuel pump module
Damaged fuel tank filler pipe cap	Rear electronic module
Damaged fuel tank filler pipe	Fuel pump relay

- 3 . Verify the following systems are working correctly:

Air intake system

Cooling system

Charging system

Ignition system

- 4 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

- 5 . If the cause is not visually evident and the Jaguar approved diagnostic system is not available, use a fault code reader to retrieve the fault codes before proceeding to the diagnostic trouble code (DTC) index.

6 . Where the Jaguar approved diagnostic system is available, complete the S93 report before clearing any or all fault codes from the vehicle.

NOTE:

If a DTC cannot be cleared, then there is a permanent fault present that flags again as soon as it is cleared (the exception to this is P1260, which will only clear following an ignition OFF/ON cycle after rectification).

7 . Using the Jaguar approved diagnostic system where available, and a scan tool where not, check the freeze frame data for information on the conditions applicable when the fault was flagged. The format of this will vary, depending on the tool used, but can provide information useful to the technician in diagnosing the fault.

Control module Power and Ground supplies

DTCs can be set if a module's power or ground supply is interrupted.

Check the fuses listed in the table below, and check the power and ground circuit pinpoint tests before condemning components.

Fuse	Rating	Circuit	Location
33	20 Amp	Rear electronic module (from fuel pump relay)	Rear power distribution box
19	5 Amp	Rear electronic module (ignition)	Primary junction box
24	20 Amp	Fuel pump driver module	Rear power distribution box

For REM power and ground supply tests, GO to Pinpoint Test G251562p6.

.

For fuel pump driver module power and ground supply tests, GO to Pinpoint Test G251562p7.

.

For ECM power and ground supply tests, <<303-14>>

DTC index

DTC	Description	Possible Source	Action
P0460	Fuel level sensor circuit range/performance	Fuel level sensor to rear electronic module (REM) circuits; intermittent short or open circuit, high resistance	For fuel level sensor circuit tests, GO to Pinpoint Test G251562p1.

		Fuel level sensor failure REM fault (incorrect fuel level data)	.
P1233	Fuel pump 2 drive circuit fault	ECM to fuel pump 2 module control drive circuit; open circuit, short circuit, high resistance Fuel pump 2 module failure	For fuel pump 2 module tests, GO to Pinpoint Test G251562p2. .
P1234	No fuel pump commands received by ECM	ECM to rear electronic module (REM) drive circuit; open circuit, short circuit, high resistance REM failure	For ECM to REM circuit tests, GO to Pinpoint Test G251562p3. .
P1236	Fuel pump not activated when requested by ECM	ECM to rear electronic module (REM) drive circuit; open circuit, short circuit, high resistance REM failure	For ECM to REM circuit tests, GO to Pinpoint Test G251562p3. .
P1338	Fuel pump drive circuit low/high voltage	REM to fuel pump drive circuit; open circuit, short circuit, high resistance REM failure Fuel pump failure	For fuel pump drive circuit tests, GO to Pinpoint Test G251562p4. .
P1339	Fuel pump 2 drive circuit low/high voltage	Fuel pump 2 module to fuel pump drive circuit; open circuit, short circuit, high resistance Fuel pump 2 module to ECM monitor circuit; open circuit, short circuit, high resistance Fuel pump 2 module failure Fuel pump 2 failure	For fuel pump 2 module tests, GO to Pinpoint Test G251562p5. .

Power and Ground Pinpoint tests

PINPOINT TEST G251562p6 : CHECK THE POWER AND GROUND SUPPLIES TO THE REM

G251562t31 : CHECK THE IGNITION POWER SUPPLY TO THE REM

1. Disconnect the REM electrical connector, CR12. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between CR12, pin 08 (GU) and GROUND.

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the battery and the REM. This circuit includes the primary junction box (fuse 19). For additional information, refer to the wiring diagrams.

-> No

GO to Pinpoint Test G251562t32.

G251562t32 : CHECK THE POWER SUPPLY FROM THE FUEL PUMP RELAY TO THE REM

1. Reconnect the REM electrical connector, CR12. 2. Disconnect the REM electrical connector, CR73 3. Make sure the fuel pump relay is energized. 4. Measure the voltage between CR73, pin 01 (N) and GROUND.

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the battery and the REM. This circuit includes the fuel pump relay and the rear power distribution box (fuse 33). For additional information, refer to the wiring diagrams.

-> No

GO to Pinpoint Test G251562t33.

G251562t33 : CHECK THE GROUND TO THE REM

1. Measure the resistance between CR73, pins 02 and 15 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams.

-> No

CHECK for DTCs. Continue to pinpoint test indicated by the DTC.

PINPOINT TEST G251562p7 : CHECK THE POWER AND GROUND SUPPLIES TO THE FUEL PUMP DRIVER MODULE

G251562t34 : CHECK THE POWER SUPPLY FROM THE FUEL PUMP RELAY TO THE FUEL PUMP DRIVER MODULE

1. Disconnect the fuel pump driver module electrical connector, CR26. 2. Make sure the fuel pump relay is energized. 3. Measure the voltage between CR26, pin 09 (N) and GROUND.

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the battery and the fuel pump driver module. This circuit includes the fuel pump relay and the rear power distribution box (fuse 24). For additional information, refer to the wiring diagrams.

-> No

GO to Pinpoint Test G251562t35.

G251562t35 : CHECK THE GROUND TO THE FUEL PUMP DRIVER MODULE

1. Measure the resistance between CR26, pin 02 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams.

-> No

CHECK for DTCs. Continue to pinpoint test indicated by the DTC.

Pinpoint Tests

PINPOINT TEST G251562p1 : P0460; FUEL LEVEL SENSOR(S) CIRCUIT RANGE/PERFORMANCE

G251562t1 : CHECK THE SIGNAL CIRCUIT BETWEEN THE REM AND LEVEL SENSOR 1 FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR04. 2. Disconnect the left-hand fuel level sensor electrical connector, FP04. 3. Measure the resistance between CR04, pin 15 (WR) and FP04, pin 01 (WR).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t4.

G251562t4 : CHECK THE SIGNAL CIRCUIT BETWEEN THE REM AND LEVEL SENSOR 1 FOR SHORT TO GROUND

1. Measure the resistance between CR04, pin 15 (WR) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t5.

G251562t5 : CHECK THE SIGNAL CIRCUIT BETWEEN THE REM AND LEVEL SENSOR 1 FOR SHORT TO B+

1. Measure the voltage between CR04, pin 15 (WR) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t2.

G251562t2 : CHECK THE SIGNAL CIRCUIT BETWEEN THE REM AND LEVEL SENSOR 2 FOR HIGH RESISTANCE

1. Disconnect the right-hand fuel level sensor electrical connector, FP07. 2. For vehicles without supercharger, measure the resistance between CR04, pin 16 (WU) and FP07, pin 01 (WU). 3. For vehicles with supercharger, measure the resistance between CR04, pin 16 (WU) and FP03, pin 01 (WU).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t6.

G251562t6 : CHECK THE SIGNAL CIRCUIT BETWEEN THE REM AND LEVEL SENSOR 2 FOR SHORT TO GROUND

1. Measure the resistance between CR04, pin 16 (WU) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t7.

G251562t7 : CHECK THE SIGNAL CIRCUIT BETWEEN THE REM AND LEVEL SENSOR 2 FOR SHORT TO B+

1. Measure the voltage between CR04, pin 16 (WU) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t3.

G251562t3 : CHECK THE COMMON CIRCUIT BETWEEN THE REM AND LEVEL SENSORS FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR11. 2. Measure the resistance between CR11, pin 23 (BK) and FP04, pin 03 (BK). 3. Measure the resistance between CR11, pin 23 (BK) and FP07, pin 03 (BK).

Is either resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t8.

G251562t8 : CHECK THE COMMON CIRCUIT BETWEEN THE REM AND LEVEL SENSORS FOR SHORT TO GROUND

1. Measure the resistance between CR11, pin 23 (BK) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t9.

G251562t9 : CHECK THE COMMON CIRCUIT BETWEEN THE REM AND LEVEL SENSORS FOR SHORT TO B+

1. Measure the voltage between CR11, pin 23 (BK) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t10.

G251562t10 : CHECK THE SENSOR 1 RESISTANCE EMPTY

1. Remove the left-hand module. 2. Move the sensor float to it's lowest position. 3. Measure the resistance between FP04, pins 01 and 03 to the module.

Is the resistance 15 ohms?

-> Yes

GO to Pinpoint Test G251562t11.

-> No

INSTALL a new level sensor,
CLEAR the DTC. TEST the system for normal operation.

G251562t11 : CHECK THE SENSOR 1 RESISTANCE FULL

1. Move the sensor float to it's highest position. 2. Measure the resistance between FP04, pins 01 and 03 to the module.

Is the resistance 160 ohms?

-> Yes

GO to Pinpoint Test G251562t12.

-> No

INSTALL a new level sensor,
CLEAR the DTC. TEST the system for normal operation.

G251562t12 : CHECK THE SENSOR 2 RESISTANCE EMPTY

1. Remove the right-hand module. 2. Move the sensor float to it's lowest position. 3. For vehicles without supercharger, measure the resistance between FP07, pins 01 and 03 to the module. 4. For vehicles with supercharger, measure the resistance between FP03, pins 01 and 03 to the module.

Is the resistance 15 ohms?

-> Yes

GO to Pinpoint Test G251562t13.

-> No

INSTALL a new level sensor,
CLEAR the DTC. TEST the system for normal operation.

G251562t13 : CHECK THE SENSOR 2 RESISTANCE FULL

1. Move the sensor float to it's highest position. 2. For vehicles without supercharger, measure the resistance between FP07, pins 01 and 03 to the module. 3. For vehicles with supercharger, measure the resistance between FP03, pins 01 and 03 to the module.

Is the resistance 160 ohms?

-> Yes

Contact dealer technical support for advice on possible REM or instrument cluster failure.

-> No

INSTALL a new level sensor,
CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G251562p2 : P1233; FUEL PUMP 2 DRIVE CIRCUIT FAULT

G251562t14 : CHECK THE ECM TO FUEL PUMP 2 MODULE DRIVE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Disconnect the fuel pump module electrical connector, CR26. 4. Measure the resistance between PI01, pin 11 (Y) and CR26, pin 07 (Y).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t15.

G251562t15 : CHECK THE ECM TO FUEL PUMP 2 MODULE DRIVE CIRCUIT FOR SHORT TO GROUND

1. Reconnect the battery negative terminal. 2. Measure the resistance between PI01, pin 11 (Y) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G251562t16.

G251562t16 : CHECK THE ECM TO FUEL PUMP 2 MODULE DRIVE CIRCUIT FOR SHORT TO B+

1. Measure the voltage between PI01, pin 11 (Y) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new fuel pump module. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G251562p3 : P1234, P1236; NO FUEL PUMP COMMANDS RECEIVED BY THE ECM

G251562t17 : CHECK THE ECM TO REM DRIVE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Disconnect the REM electrical connector, CR11. 4. Measure the resistance between PI01, pin 27 (WR) and CR11, pin 19 (N).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G251562t18.

G251562t18 : CHECK THE ECM TO REM DRIVE CIRCUIT FOR SHORT TO GROUND

1. Reconnect the battery negative terminal. 2. Measure the resistance between PI01, pin 27 (WR) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G251562t19.

G251562t19 : CHECK THE ECM TO REM DRIVE CIRCUIT FOR SHORT TO B+

1. Measure the voltage between PI01, pin 27 (WR) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

Contact dealer technical support for advice on possible REM failure.

PINPOINT TEST G251562p4 : P1338; FUEL PUMP DRIVE CIRCUIT LOW/HIGH VOLTAGE

G251562t20 : CHECK THE REM TO FUEL PUMP DRIVE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR73. 2. Disconnect the fuel pump electrical connector, FP04. 3. Measure the resistance between CR73, pin 03 (R) and FP04, pin 04 (R).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G251562t21.

G251562t21 : CHECK THE REM TO FUEL PUMP DRIVE CIRCUIT FOR SHORT TO GROUND

1. Measure the resistance between CR73, pin 03 (R) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t22.

G251562t22 : CHECK THE REM TO FUEL PUMP DRIVE CIRCUIT FOR SHORT TO B+

1. Measure the voltage between CR73, pin 03 (R) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t23.

G251562t23 : CHECK THE POWER OUTPUT TO THE FUEL PUMP

1. Reconnect the REM electrical connector, CR73. 2. Turn the ignition switch to the ON position. 3. Measure the voltage between FP04, pin 02 (Y) and GROUND.

Is the voltage greater than 5 volts?

-> Yes

INSTALL a new fuel pump module,
CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t24.

G251562t24 : CHECK THE POWER CIRCUIT TO THE FUEL PUMP FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR73. 2. Measure the resistance between CR73, pin 04 (Y) and FP04, pin 02 (Y).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

Contact dealer technical support for advice on possible REM failure.

PINPOINT TEST G251562p5 : P1339; FUEL PUMP 2 DRIVE CIRCUIT LOW/HIGH VOLTAGE

G251562t25 : CHECK THE FUEL PUMP 2 MODULE TO FUEL PUMP DRIVE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the fuel pump module electrical connector, CR26. 2. Disconnect the fuel pump 2 electrical connector, FP03. 3. Measure the resistance between CR26, pin 10 (R) and FP03, pin 02 (R).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G251562t26.

G251562t26 : CHECK THE FUEL PUMP 2 MODULE TO FUEL PUMP DRIVE CIRCUIT FOR SHORT TO GROUND

1. Measure the resistance between CR26, pin 10 (R) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G251562t27.

G251562t27 : CHECK THE FUEL PUMP 2 MODULE TO FUEL PUMP DRIVE CIRCUIT FOR SHORT TO B+

1. Measure the voltage between CR26, pin 10 (R) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t28.

G251562t28 : CHECK THE FUEL PUMP MODULE TO ECM MONITOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal. 2. Disconnect the ECM electrical connector, PI01. 3. Measure the resistance between CR26, pin 01 (WU) and PI01, pin 53 (WU).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t29.

G251562t29 : CHECK THE FUEL PUMP MODULE TO ECM MONITOR CIRCUIT FOR SHORT TO GROUND

1. Measure the resistance between CR26, pin 01 (WU) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> No

GO to Pinpoint Test G251562t30.

G251562t30 : CHECK THE FUEL PUMP MODULE TO ECM MONITOR CIRCUIT FOR SHORT TO B+

1. Measure the voltage between CR26, pin 01 (WU) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
TEST the system for normal operation.

-> **No**

Contact dealer technical support for advice on possible fuel pump driver module failure.

Fuel Tank and Lines - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit, and the change from two fuel pumps for vehicles with supercharger to a single pump.

For additional information on the description and operation of the fuel system.

Fuel Tank and Lines - 2.7L V6 - TdV6

Inspection and Verification

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Fuel leaks	Fuses
Damaged fuel lines	Inertia switch
Damaged push connect fittings	Loose or corroded electrical connectors
Fuel level	Harnesses
Fuel contamination/grade/quality	Fuel pump driver module (FPDM)
Damaged fuel tank filler pipe cap	Rear electronic module (REM)
Damaged fuel tank filler pipe	Fuel pump relay
	Engine control module (ECM)

3 . If an obvious cause for an observed or reported symptom is found, correct the cause (if possible) before proceeding to the next step.

4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the diagnostic trouble code (DTC) Index.

Symptom Chart

Symptom	Possible source	Action
Engine cranks, but does not fire	<p>Engine breather system disconnected/restricted</p> <p>Ignition system</p> <p>Fuel system</p> <p>Harness</p> <p>Crankshaft position (CKP) sensor</p> <p>ECM fault</p>	<p>Check the engine breather system, Engine Emission Control - VIN Range: G45704->G99999 For ignition system,</p> <p>Engine Ignition - VIN Range: G45704->G99999 or</p> <p>Engine Ignition - VIN Range: G45704->G99999 For fuel pressure test, GO to Pinpoint Test G532449p8.</p> <p>For CKP tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 or</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
Engine cranks and fires, but will not start	<p>Evaporative emissions purge valve</p> <p>Fuel pump</p> <p>Spark plugs</p> <p>HT short to ground (tracking) check rubber boots for cracks/damage</p> <p>Ignition coil failure(s)</p> <p>Harness</p>	<p>For purge valve tests,</p> <p>Evaporative Emissions - VIN Range: G45704->G99999 For fuel pressure test, GO to Pinpoint Test G532449p8.</p> <p>For ignition system,</p> <p>Engine Ignition - VIN Range: G45704->G99999 or</p> <p>Engine Ignition - VIN Range: G45704->G99999</p>
Difficult to start cold	<p>Check coolant anti-freeze content</p> <p>Battery</p> <p>CKP sensor</p> <p>Exhaust gas recirculation (EGR) valve stuck open</p> <p>Fuel pump</p> <p>Evaporative emissions purge</p>	<p>Check engine coolant level and condition. For battery information, Battery For CKP sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 or</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 For EGR system information,</p> <p>Engine Emission Control - VIN Range: G45704->G99999 For fuel pressure test, GO to Pinpoint Test G532449p8.</p>

	valve	For purge valve tests, Evaporative Emissions - VIN Range: G45704->G99999
Difficult to start hot	<p>Injector leak</p> <p>Engine fuel temperature (EFT) sensor</p> <p>Intake air temperature (IAT) sensor</p> <p>Mass air flow (MAF) sensor</p> <p>Evaporative emissions purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>EGR valve stuck open</p>	<p>For fuel injector information, Fuel Injectors (18.10.02) or Fuel Injectors (18.10.02) For EFT, IAT and MAF sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999 For purge valve tests,</p> <p>Evaporative Emissions - VIN Range: G45704->G99999 For fuel pressure test, GO to Pinpoint Test G532449p8.</p> <p>For ignition system, Engine Ignition - VIN Range: G45704->G99999 or Engine Ignition - VIN Range: G45704->G99999 For EGR tests, Engine Emission Control - VIN Range: G45704->G99999</p>
Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)	<p>Injector leak</p> <p>EFT sensor</p> <p>IAT sensor</p> <p>MAF sensor</p> <p>Evaporative emissions purge valve</p> <p>Fuel pump</p> <p>Ignition system</p> <p>EGR valve stuck open</p>	<p>For fuel injector tests, Fuel Charging and Controls - VIN Range: G45704->G99999</p> <p>Fuel Charging and Controls - VIN Range: G45704->G99999 For EFT sensor, IAT sensor and MAF sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999 For purge valve tests,</p> <p>Evaporative Emissions - VIN Range: G45704->G99999 For fuel pressure test, GO to Pinpoint Test G532449p8.</p> <p>For ignition system, Engine Ignition - VIN Range: G45704->G99999 or Engine Ignition - VIN Range: G45704->G99999</p>

		>G99999 For EGR tests, Engine Emission Control - VIN Range: G45704->G99999
Engine stalls soon after start	<p>Breather system disconnected/restricted</p> <p>ECM relay</p> <p>Harness</p> <p>MAF sensor</p> <p>Ignition system</p> <p>Air filter restricted</p> <p>Fuel lines</p> <p>Fuel rail pressure (FRP) sensor</p> <p>Air leakage</p>	<p>For breather system information, Engine Emission Control - VIN Range: G45704->G99999 For ECM relay and MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999 For ignition system, Engine Ignition - VIN Range: G45704->G99999 or Engine Ignition - VIN Range: G45704->G99999 For air filter information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 or Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For fuel line tests, GO to Pinpoint Test G532449p2.</p> <p>For FRP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999 For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 or Intake Air Distribution and Filtering - VIN Range: G45704->G99999</p>
Engine hesitates/poor acceleration	<p>Fuel pump</p> <p>Injector leak</p> <p>Fuel pressure</p> <p>Fuel lines</p> <p>Air leakage</p> <p>Throttle position (TP) sensors</p>	<p>For fuel pressure test, GO to Pinpoint Test G532449p8.</p> <p>For FRP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999 For fuel line tests, GO to Pinpoint Test G532449p2.</p> <p>For intake system, Intake Air Distribution and Filtering -</p>

	<p>Throttle motor</p> <p>Ignition system</p> <p>EGR system</p> <p>HO2 sensors</p> <p>Transmission malfunction</p> <p>Restricted pedal travel (carpet, etc)</p> <p>Accelerator pedal position (APP) sensor</p>	<p>VIN Range: G45704->G99999 or Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For TP sensor and throttle motor tests, Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999 For ignition system, Engine Ignition - VIN Range: G45704->G99999 or Engine Ignition - VIN Range: G45704->G99999 For EGR, Engine Emission Control - VIN Range: G45704->G99999 Check for DTCs indicating a faulty HO2 sensor. Refer to the DTC index. For transmission information, Check accelerator pedal travel. For APP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999</p>
Engine backfires	<p>Fuel pump</p> <p>Fuel lines</p> <p>Air leakage</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Ignition system</p> <p>Sticking variable camshaft timing (VCT) hub</p> <p>APP sensor</p>	<p>For fuel pressure test, GO to Pinpoint Test G532449p8.</p> <p>For fuel line tests, GO to Pinpoint Test G532449p2.</p> <p>For intake system, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 or Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For MAF sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999 Check for DTCs indicating a faulty HO2 sensor. Refer to the DTC index. For ignition system, Engine Ignition - VIN Range: G45704->G99999 or Engine Ignition - VIN Range: G45704->G99999</p>

		<p>>G99999 Check DTCs for VCT range/performance fault. For VCT information,</p> <p>Engine For APP sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999</p>
Engine surges	<p>Fuel pump</p> <p>Fuel lines</p> <p>MAF sensor</p> <p>Harness</p> <p>TP sensors</p> <p>Throttle motor</p> <p>Ignition system</p>	<p>For fuel pressure test, GO to Pinpoint Test G532449p8.</p> <p>For fuel line tests, GO to Pinpoint Test G532449p2.</p> <p>For MAF sensor, TP sensor, and throttle motor relay tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999 For ignition system,</p> <p>Engine Ignition - VIN Range: G45704->G99999 or</p> <p>Engine Ignition - VIN Range: G45704->G99999</p>
Engine detonates/knocks	<p>Knock sensor (KS)/circuit malfunction</p> <p>Fuel pump</p> <p>Fuel lines</p> <p>FRP sensor</p> <p>MAF sensor</p> <p>HO2 sensors</p> <p>Air leakage</p> <p>Sticking VCT hub</p> <p>BARO sensor malfunction (internal ECM fault)</p>	<p>For KS circuit tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 For fuel pressure test, GO to Pinpoint Test G532449p8.</p> <p>For fuel line tests, GO to Pinpoint Test G532449p2.</p> <p>For MAF, FRP sensor and HO2 sensor tests,</p> <p>Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999 For intake system,</p> <p>Intake Air Distribution and Filtering - VIN Range: G45704->G99999 or Intake Air Distribution and Filtering - VIN Range: G45704->G99999 Check DTCs for VCT range/performance fault. For VCT information,</p>

		Engine Refer to the warranty policy and procedures manual if an ECM is suspect.
--	--	---

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of DTCs,
 Electronic Engine Controls - VIN Range: G45704->G99999 or
 Electronic Engine Controls - VIN Range: G45704->G99999

DTC	Description	Possible source	Action
P008700	Fuel rail/system pressure - too low	Fuel rail pressure (FRP) sensor disconnected FRP sensor to ECM sensing circuit: short circuit to ground FRP sensor supply circuit: high resistance FRP sensor failure Fuel pump failure Fuel line leak Restricted fuel line	For FRP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999 For fuel line tests, GO to Pinpoint Test G532449p2. For fuel pressure tests, GO to Pinpoint Test G532449p8.
P008800	Fuel rail/system pressure - too high	FRP sensor to ECM wiring (supply/sense): short circuit to each other FRP sensor to ECM sense circuit: short circuit to power	For FRP sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range:

		FRP sensor ground circuit: high resistance FRP sensor failure Restricted fuel line Fuel pump short circuit to battery	G45704->G99999 For fuel line tests, GO to Pinpoint Test G532449p2.
P017100	System too lean (right hand bank)	Air intake leak between MAF sensor and cylinder head Fuel filter/system restriction Fuel injector restriction MAF sensor fault (low intake air flow) Exhaust leak (before catalyst)	For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 or Intake Air Distribution and Filtering - VIN Range: G45704->G99999 For fuel line tests, GO to Pinpoint Test G532449p2. For fuel pressure tests, GO to Pinpoint Test G532449p8. For fuel injector information, Fuel Injectors (18.10.02) For MAF sensor circuit tests, Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999 Check the exhaust system (before catalyst) for condition and security, Exhaust System
P017400	System too lean (left hand bank)	Air intake leak between MAF sensor and cylinder head Fuel filter/system restriction Fuel injector restriction	For intake system information, Intake Air Distribution and Filtering - VIN Range: G45704->G99999 or Intake Air Distribution

		<p>MAF sensor fault (low intake air flow)</p> <p>Exhaust leak (before catalyst)</p>	<p>and Filtering - VIN Range: G45704->G99999 For fuel line tests, GO to Pinpoint Test G532449p2.</p> <p>For fuel pressure tests, GO to Pinpoint Test G532449p8.</p> <p>For fuel injector information, Fuel Injectors (18.10.02)</p> <p>For MAF sensor circuit tests, Electronic Engine Controls - VIN Range: G45704->G99999 or Electronic Engine Controls - VIN Range: G45704->G99999 Check the exhaust system (before catalyst) for condition and security, Exhaust System</p>
P030000	Random/multiple cylinder misfire detected	<p>ECM to ignition coil primary circuit faults (cylinder misfire detected DTCs also logged)</p> <p>Ignition coil failure</p> <p>Spark plug failure/fouled/incorrect gap</p> <p>Fuel delivery pressure (low/high)</p> <p>Fuel injector circuit fault(s) (injector DTCs also logged)</p> <p>Fuel injectors restricted/leaking</p> <p>Fuel injectors continuously open</p> <p>Fuel contamination</p>	<p>For ignition coil and spark plug tests, Engine Ignition - VIN Range: G45704->G99999 or Engine Ignition - VIN Range: G45704->G99999 For fuel pressure test, GO to Pinpoint Test G532449p8.</p> <p>For fuel injector circuit tests, Fuel Charging and Controls - VIN Range: G45704->G99999 or Fuel Charging and Controls - VIN Range: G45704->G99999 Check compressions, valve gear, etc,</p>

		<p>Cylinder compression low</p> <p>Worn camshaft/broken valve springs</p> <p>Valve clearance adjustment</p>	Engine - 2.7L V6 - TdV6
P046129	Fuel level sensor A circuit range/performance - signal invalid	<p>Fuel level sensor to rear electronic module (REM) circuits; intermittent short circuit, high resistance</p> <p>Fuel level sensor failure</p> <p>REM fault (incorrect fuel level data)</p>	For fuel level sensor tests, GO to Pinpoint Test G532449p3.
P04612F	Fuel level sensor A circuit range/performance - signal erratic	<p>Fuel level sensor to rear electronic module (REM) circuits; intermittent short circuit, high resistance</p> <p>Fuel level sensor failure</p> <p>REM fault (incorrect fuel level data)</p>	For fuel level sensor tests, GO to Pinpoint Test G532449p3.
P046200	Fuel level sensor A circuit low input	<p>Fuel level sensor to rear electronic module (REM) circuits; intermittent short circuit to ground or high resistance</p> <p>Fuel level sensor failure</p> <p>REM fault (incorrect fuel level data)</p>	For fuel level sensor tests, GO to Pinpoint Test G532449p3.
P046300	Fuel level sensor A circuit high input	<p>Fuel level sensor to rear electronic module (REM) circuits; intermittent short circuit to power</p> <p>Fuel level sensor failure</p> <p>REM fault (incorrect fuel level data)</p>	For fuel level sensor tests, GO to Pinpoint Test G532449p3.
P062700	Fuel pump A control circuit/open	Invalid fuel pump duty requested by ECM	Refer to the warranty policy and procedures manual if an ECM is suspect.

P062A00	Fuel pump driver module (FPDM) control circuit range/performance (vehicles with supercharger only)	ECM to FPDM control drive circuits; intermittent short circuit, high resistance FPDM failure Rear electronic module (REM) failure	For REM power and ground tests, GO to Pinpoint Test G532449p1. For FPDM power and ground tests, GO to Pinpoint Test G532449p9. For ECM to FPDM circuit tests, GO to Pinpoint Test G532449p7.
P263500	Fuel pump A low flow/performance (fuel pump not activated when requested by ECM)	ECM to rear electronic module (REM) drive circuit: short circuit, high resistance Fuel pump failure REM failure	For REM power and ground tests, GO to Pinpoint Test G532449p1. For ECM to REM circuit tests, Check the fuel pressure. GO to Pinpoint Test G532449p8.

Pinpoint tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

NOTE:

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

PINPOINT TEST G532449p1 : REM POWER AND GROUND CIRCUITS

G532449t1 : CHECK THE IGNITION POWER SUPPLY TO THE REM

1. Disconnect the REM electrical connector, CR12. 2. Key on, engine off. 3. Measure the voltage between:

REM connector CR12, harness side	Battery
Pin 08	Negative terminal

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the battery and the REM. This circuit includes fuse 19 of the primary junction box and the inertia switch. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t2.

G532449t2 : CHECK THE POWER SUPPLY VOLTAGE TO THE REM

1. Key off. 2. Disconnect the REM electrical connector, CR73. 3. Key on, engine off. 4. Make sure the fuel pump relay is energized. 5. Measure the voltage between:

REM connector CR73, harness side	Battery
Pin 01	Negative terminal

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the battery and the REM. This circuit includes fuse 33 of the rear power distribution box and the fuel pump relay. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t3.

G532449t3 : CHECK THE REM GROUNDS FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the REM electrical connector, CR71. 3. Measure the resistance between:

REM connector CR73, harness side	Battery
Pin 02	Negative terminal

4. Measure the resistance between:

REM connector CR71, harness side	Battery
Pin 15	Negative terminal

Is either resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

CHECK for DTCs indicating a REM or ECM fault. REFER to the DTC index.

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.0L engines and

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.5L and 4.2L engines.

PINPOINT TEST G532449p9 : FUEL PUMP DRIVER MODULE (FPDM) POWER AND GROUND CIRCUITS (V8 VEHICLES WITH SUPERCHARGER)

G532449t43 : CHECK THE POWER SUPPLY VOLTAGE TO THE FPDM

1. Disconnect the FPDM electrical connector, FP26. 2. Key on, engine off. 3. Make sure the fuel pump relay is energized. 4. Measure the voltage between:

FPDM connector FP26, harness side	Battery
Pin 05	Negative terminal

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the battery and the FPDM. This circuit includes fuse 24 of the rear power

distribution box, the fuel pump relay and the mega fuses. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532449t44.

G532449t44 : CHECK THE FPDM GROUND FOR HIGH RESISTANCE

1. Measure the resistance between:

FPDM connector FP26, harness side	Battery
Pin 06	Negative terminal

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

CHECK for DTCs indicating a FPDM or ECM fault.

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.0L engines and

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.5L and 4.2L engines.

PINPOINT TEST G532449p3 : FUEL LEVEL SENSOR(S) CIRCUIT RANGE/PERFORMANCE

G532449t7 : CHECK THE SIGNAL CIRCUIT BETWEEN THE REM AND LEVEL SENSOR A FOR SHORT CIRCUIT TO GROUND

1. Disconnect the fuel pump module electrical connector, FP06. 2. Measure the resistance between:

Fuel module connector FP06, harness side	Battery
Pin 12	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532449t8.

G532449t8 : CHECK THE SIGNAL CIRCUIT BETWEEN THE REM AND LEVEL SENSOR A FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Fuel module connector FP06, harness side	Battery
Pin 12	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532449t10.

G532449t10 : CHECK THE SIGNAL CIRCUIT BETWEEN THE REM AND LEVEL SENSOR B FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Fuel module connector FP06, harness side	Battery
Pin 14	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532449t11.

G532449t11 : CHECK THE SIGNAL CIRCUIT BETWEEN THE REM AND LEVEL SENSOR B FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Fuel module connector FP06, harness side	Battery
Pin 14	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t13.

G532449t13 : CHECK THE SIGNAL RETURN CIRCUIT BETWEEN THE REM AND LEVEL SENSORS FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Fuel module connector FP06, harness side	Battery
Pin 13	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t14.

G532449t14 : CHECK THE SIGNAL RETURN CIRCUIT BETWEEN THE REM AND LEVEL SENSORS FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Fuel module connector FP06, harness side	Battery
Pin 13	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t15.

G532449t15 : CHECK THE SENSOR A RESISTANCE EMPTY

1. Remove the right-hand fuel pump module.

Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08) 2. Move the sensor float to it's lowest position. 3.

Measure the resistance between:

Fuel module connector FP06, component side	Fuel module connector FP06, component side
Pin 12	Pin 13

Is the resistance 15 ohms?

-> Yes

GO to Pinpoint Test G532449t16.

-> No

INSTALL a new level sensor,

Fuel Level Sender RH - 2.7L V6 - TdV6 CLEAR the DTC, test the system for normal operation.

G532449t16 : CHECK THE SENSOR A RESISTANCE FULL

1. Move the sensor float to it's highest position. 2. Measure the resistance between:

Fuel module connector FP06, component side	Fuel module connector FP06, component side
Pin 12	Pin 13

Is the resistance 160 ohms?

-> Yes

GO to Pinpoint Test G532449t17.

-> No

INSTALL a new level sensor,

Fuel Level Sender RH - 2.7L V6 - TdV6 CLEAR the DTC, test the system for normal operation.

G532449t17 : CHECK THE SENSOR B RESISTANCE EMPTY

1. Remove the left-hand fuel pump module.

Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08) 2. Move the sensor float to it's lowest position. 3.

Measure the resistance between:

Fuel module connector FP06, component side	Fuel module connector FP06, component side
Pin 13	Pin 14

Is the resistance 15 ohms?

-> Yes

GO to Pinpoint Test G532449t18.

-> No

INSTALL a new level sensor,

Fuel Level Sender LH - 2.7L V6 - TdV6 CLEAR the DTC, test the system for normal operation.

G532449t18 : CHECK THE SENSOR B RESISTANCE FULL

1. Move the sensor float to it's highest position. 2. Measure the resistance between:

Fuel module connector FP06, component side	Fuel module connector FP06, component side
Pin 13	Pin 14

Is the resistance 160 ohms?

-> Yes

GO to Pinpoint Test G532449t6.

-> No

INSTALL a new level sensor,

Fuel Level Sender LH - 2.7L V6 - TdV6 CLEAR the DTC, test the system for normal operation.

G532449t6 : CHECK THE SIGNAL CIRCUIT BETWEEN THE REM AND LEVEL SENSOR A FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR04. 2. Measure the resistance between CR04, pin 15 (WR) and FP06, pin 12 (WR).

REM connector CR04, harness side	Fuel module connector FP06, harness side
Pin 15	Pin 12

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t9.

G532449t9 : CHECK THE SIGNAL CIRCUIT BETWEEN THE REM AND LEVEL SENSOR B FOR HIGH RESISTANCE

1. Measure the resistance between:

REM connector CR04, harness side	Fuel module connector FP06, harness side
Pin 16	Pin 14

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t12.

G532449t12 : CHECK THE SIGNAL RETURN CIRCUIT BETWEEN THE REM AND LEVEL SENSORS FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR11. 2. Measure the resistance between:

REM connector CR11, harness side	Fuel module connector FP06, harness side
Pin 23	Pin 13

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

CHECK for DTCs indicating another cause of the complaint.

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.0L engines and

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.5L and 4.2L engines.

PINPOINT TEST G532449p5 : ECM TO REM DRIVE CIRCUIT (V6 AND V8 VEHICLES WITHOUT SUPERCHARGER)

G532449t23 : CHECK THE ECM TO REM DRIVE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the REM electrical connector, CR11. 2. Measure the resistance between:

REM connector CR11, harness side	Battery
Pin 19	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t24.

G532449t24 : CHECK THE ECM TO REM DRIVE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

REM connector CR11, harness side	Battery
Pin 19	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t22.

G532449t22 : CHECK THE ECM TO REM DRIVE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

REM connector CR11, harness side	ECM connector EC300, harness side
Pin 19	Pin 20

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

CHECK for DTCs indicating a REM or ECM fault.

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.0L engines and

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.5L and 4.2L engines.

PINPOINT TEST G532449p7 : ECM TO FPDM MONITOR AND CONTROL CIRCUITS (V8 VEHICLES WITH SUPERCHARGER)

G532449t21 : CHECK THE ECM TO FPDM MONITOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Disconnect the FPDM electrical connector, FP26. 3. Measure the resistance between:

FPDM connector FP26, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t28.

G532449t28 : CHECK THE ECM TO FPDM MONITOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

FPDM connector FP26, harness side	Battery
Pin 04	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t30.

G532449t30 : CHECK THE ECM TO FPDM CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

FPDM connector FP26, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532449t31.

G532449t31 : CHECK THE ECM TO FPDM CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

FPDM connector FP26, harness side	Battery
Pin 03	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532449t32.

G532449t32 : CHECK THE ECM TO FPDM MONITOR CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM electrical connector, EC300. 2. Measure the resistance between:

FPDM connector FP26, harness side	ECM connector EC300, harness side
Pin 04	Pin 21

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t33.

G532449t33 : CHECK THE ECM TO FPDM CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

FPDM connector FP26, harness side	ECM connector EC300, harness side
Pin 03	Pin 20

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

CHECK for DTCs indicating a module fault.

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.0L engines and

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.5L and 4.2L engines.

PINPOINT TEST G532449p6 : FUEL PUMP POWER AND GROUND CIRCUITS (V6 AND V8 VEHICLES WITHOUT SUPERCHARGER)

G532449t26 : CHECK THE REM TO FUEL PUMP NEGATIVE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Disconnect the fuel pump module electrical connector, FP02. 3. Measure the resistance between:

Fuel pump module connector FP02, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t27.

G532449t27 : CHECK THE REM TO FUEL PUMP NEGATIVE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Fuel pump module connector FP02, harness side	Battery
Pin 04	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t39.

G532449t39 : CHECK THE REM TO FUEL PUMP POSITIVE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Fuel pump module connector FP02, harness side	Battery
Pin 01	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t40.

G532449t40 : CHECK THE REM TO FUEL PUMP POSITIVE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Fuel pump module connector FP02, harness side	Battery
Pin 01	Positive terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t25.

G532449t25 : CHECK THE REM TO FUEL PUMP NEGATIVE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR73. 2. Measure the resistance between:

REM connector CR73, harness side	Fuel module connector FP02, harness side
Pin 03	Pin 04

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t29.

G532449t29 : CHECK THE REM TO FUEL PUMP POSITIVE CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

REM connector CR73, harness side	Fuel module connector FP02, harness side
Pin 04	Pin 01

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

FOR REM power and ground tests, GO to Pinpoint Test G532449p1.

PINPOINT TEST G532449p4 : FUEL PUMP POWER AND GROUND CIRCUITS (V8 VEHICLES WITH SUPERCHARGER)

G532449t20 : CHECK THE FPDM TO FUEL PUMP NEGATIVE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Remove the fuel pump module

Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08) 2. Disconnect the fuel pump module electrical connector, FP08. 3. Measure the resistance between:

Fuel pump module connector FP08, harness side	Battery
--	----------------

Pin 03	Positive terminal
--------	-------------------

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t34.

G532449t34 : CHECK THE FPDM TO FUEL PUMP POSITIVE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Fuel pump module connector FP08, harness side	Battery
Pin 04	Negative terminal

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> No

GO to Pinpoint Test G532449t35.

G532449t35 : CHECK THE FPDM TO FUEL PUMP POSITIVE CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Fuel pump module connector FP08, harness side	Battery
Pin 04	Positive terminal

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532449t41.

G532449t41 : CHECK THE FPDM TO FUEL PUMP NEGATIVE CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the FPDM electrical connector, FP26. 2. Measure the resistance between:

Fuel pump module connector FP08, harness side	FPDM connector FP26, harness side
Pin 03	Pin 02

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

GO to Pinpoint Test G532449t42.

G532449t42 : CHECK THE FPDM TO FUEL PUMP POSITIVE CIRCUIT FOR HIGH RESISTANCE

1. Measure the resistance between:

Fuel pump module connector FP08, harness side	FPDM connector FP26, harness side
Pin 04	Pin 01

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.

-> **No**

FOR FPDM power and ground tests, GO to Pinpoint Test G532449p9.

PINPOINT TEST G532449p8 : CHECK THE FUEL SYSTEM PRESSURE

G532449t19 : CHECK THE PUMP ACTIVITY

1. Remove the rear seat cushion.

Rear Seat Cushion (76.70.37) 2. Key on, engine off. 3. Listen for pump noise.

Can the fuel pump be heard running?

-> **Yes**

GO to Pinpoint Test G532449t36.

-> **No**

CHECK for DTCs.

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.0L engines and

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.5L and 4.2L engines.

G532449t36 : CHECK THE FUEL SYSTEM PRESSURE

1.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

NOTE:

The fuel pressure can be tested using the Jaguar approved diagnostic system datalogger facility, or by the use of a suitable gauge from the schraeder connector on the special tool fitted to the fuel rail.

Fuel System Pressure Check

Apply the parking brake. 2. Make sure the gear selector is in the **NEUTRAL** position for vehicles fitted with manual transmission, **PARK** position for vehicles fitted with automatic transmission. 3. Connect a suitable gauge to the fuel Schraeder valve. 4. Disconnect and plug the vacuum hose from the pressure regulator. 5. Key on, engine off.

Make sure there are no leaks from the gauge connections 6. Record the fuel pressure reading.

Is the fuel pressure between 4 and 5 bar (58.01 and 72.51 lb/in²)?

-> Yes

GO to Pinpoint Test G532449t37.

-> No

CHECK for DTCs.

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.0L engines and

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.5L and 4.2L engines.

G532449t37 : CHECK THE FUEL SYSTEM PRESSURE WITH THE ENGINE CRANKING

1. Key in start position. 2. Record the fuel pressure reading.

Is the fuel pressure 4.5 bar (65.25 lb/in²)?

-> Yes

GO to Pinpoint Test G532449t38.

-> No

CHECK for DTCs.

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.0L engines and

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.5L and 4.2L engines.

G532449t38 : CHECK THE FUEL SYSTEM PRESSURE WITH THE ENGINE IDLING (WHERE POSSIBLE)

1. Key on, engine running.

Is the fuel pressure 4.5 bar (65.25 lb/in²)?

-> Yes

CHECK for DTCs and symptoms indicating another cause of the problem.

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.0L engines and

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.5L and 4.2L engines.

-> No

CHECK the fuel pump power and ground circuits, GO to Pinpoint Test G532449p6.

For V6 and V8 vehicles without supercharger and GO to Pinpoint Test G532449p4.

For V8 vehicles with supercharger.

PINPOINT TEST G532449p2 : CHECK THE FUEL LINES

G532449t4 : CHECK THE FUEL LINES FOR RESTRICTIONS

1.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

Detach the fuel line from the fuel rail and from the fuel pump module. 2. Using an air line gently blow through the line checking for blockages or restrictions.

Is a blockage or restriction evident?

-> **Yes**

CLEAR/REPAIR the blocked or restricted fuel line and test the system for normal operation.

-> **No**

GO to Pinpoint Test G532449t5.

G532449t5 : CHECK THE FUEL TANK LINES FOR RESTRICTIONS

1. Remove the fuel and transfer pump module locking rings.

Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08) 2. Detach the fuel lines from the transfer and fuel pump modules. 3. Using an air line gently blow through the line checking for blockages or restrictions.

Is a blockage or restriction evident?

-> **Yes**

CLEAR/REPAIR the blocked or restricted fuel line and test the system for normal operation.

-> **No**

CHECK for DTCs and symptoms indicating another cause of the problem.

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.0L engines and

Electronic Engine Controls - VIN Range: G45704->G99999 For vehicles with 3.5L and 4.2L engines.

Fuel Tank and Lines - 2.7L V6 - TdV6

Principles of Operation

The fuel tank shares many features of the petrol variant, being of the same shape to facilitate the driveshaft, using a fuel pump module in the right hand side and a fuel transfer pump in the left hand side to transfer fuel across the tank. The 2.7L diesel also uses a critical fuel level switch which activates an anti air suction strategy, preventing air from entering the system during a low fuel level condition by preventing the pump from running.

For additional information,

Fuel Tank and Lines - VIN Range: G45704->G99999

Overview

There are changes to the engine management system (EMS) for 2006 my, the most obvious of which will be the change to 7-digit diagnostic trouble codes (DTCs) from the familiar 5-digit.

Refer to the DTC index in this section for guidance on how to use these codes with the Jaguar approved diagnostic system or a scan tool.

Inspection and Verification



WARNING: Do NOT carry out any work on the fuel system with the engine running. The fuel pressure within the system can be as high as 1600 bar (23,206 lb/in²). Failure to follow this instruction may result in personal injury.



WARNING: Eye protection must be worn at all times when working on or near any fuel related components. Failure to follow this instruction may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow this instruction may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. This should be done after the engine has been run, but with the engine switched OFF. Failure to follow this instruction may result in personal injury.



WARNING: If taken internally, DO NOT induce vomiting. Seek immediate medical attention. Failure to follow this instruction may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention. Failure to follow this instruction may result in personal injury.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention. Failure to follow this instruction may result in personal injury.



CAUTION: Before disconnecting any part of the system, it is imperative that all dust, dirt and debris is removed from around components to prevent ingress of foreign matter into the fuel system. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: The fuel pipes between the injectors and the rail must be discarded after each use, and new pipes installed. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: It is essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or lines. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure that the workshop area in which the vehicle is being worked on is as clean and dust-free as possible. Areas in which work on clutches, brakes or where welding or machining are carried out are not suitable in view of the risk of contamination to the fuel system. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure that any protective clothing worn is clean and made from lint-free non-flocking material. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure that any protective gloves worn are new and are of the non-powdered latex type. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure that clean, non-plated tools are used. Clean tools using a new brush that will not lose its bristles and fresh cleaning fluid prior to starting work on the vehicle. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Use a steel-topped work bench and cover it with clean, lint-free, non-flocking material. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

This section contains references to Parameter Identifiers (PIDs). Where the Jaguar approved diagnostic system is not available, a scantool may be used to access these PIDs, all of which give information, and some of which can be used to both read information and to activate components. The format of the information may vary, depending on the tool used.

- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Fuel level	Battery charge and condition
Contaminated fuel	Fuse(s)
Fuel supply line(s)	Inertia fuel shutoff (IFS) switch
Fuel return line(s)	Fuel pump module relay

High-pressure fuel supply line(s)	Fuel pump module
Fuel tank filler pipe	Electrical connector(s)
Fuel leak(s)	Damaged or corroded wiring harness
Fuel tank	Fuel volume control valve (FVCV)
Fuel filler cap	Fuel pressure control valve (FPCV)
Fuel filter	Rear electronic module (REM)
Push connect fittings	Engine control module (ECM)
Fuel rail	
Fuel injection pump	
Exhaust gas recirculation (EGR) system	

3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC index, or the symptom chart if no DTCs are set.



The fuel system interacts with a number of modules, therefore a complete vehicle DTC read will be necessary.

Symptom Chart

Symptom	Possible source	Action
Engine cranks, but does not start	Inertia fuel shutoff (IFS) switch Low/contaminated fuel Anti air suction initiated Fuel pump module fault Low pressure fuel system fault Blocked fuel filter Fuel volume control valve	Check that the inertia switch has not tripped. Check the fuel level/condition, Fuel Charging and Controls. If there is sufficient fuel check the critical fuel level switch, GO to Pinpoint Test G552807p2. Check the fuel pump module operation, GO to Pinpoint Test G552807p8. Check the low pressure fuel system for leaks/damage, GO to Pinpoint Test G552807p9. Check the fuel filter, check the FVCV and FPCV,

	<p>(FVCV) blocked/contaminated</p> <p>Fuel pressure control valve (FPCV) blocked/contaminated</p> <p>Fuel injection pump failure</p> <p>Air leakage</p> <p>Crankshaft position (CKP) sensor</p> <p>ECM fault</p>	<p>Fuel Charging and Controls Check the fuel injection pump, Fuel Injection Pump For air intake system, Intake Air Distribution and Filtering Check the CKP sensor, Electronic Engine Controls Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
Difficult to start	<p>Glow plug system fault (very cold conditions)</p> <p>Low/contaminated fuel</p> <p>Fuel pump module fault</p> <p>Low pressure fuel system fault</p> <p>Blocked fuel filter</p> <p>Fuel volume control valve (FVCV) blocked/contaminated</p> <p>Fuel pressure control valve (FPCV) blocked/contaminated</p> <p>Air leakage</p> <p>Exhaust gas recirculation (EGR) valve(s) fault</p>	<p>Check the glow plug circuits, Glow Plug System Check the fuel level/condition, Fuel Charging and Controls Check the fuel pump module operation, GO to Pinpoint Test G552807p8. Check the low pressure fuel system for leaks/damage, GO to Pinpoint Test G552807p9. Check the fuel filter, check the FVCV and FPCV, Fuel Charging and Controls For air intake system, Intake Air Distribution and Filtering For EGR tests, Engine Emission Control</p>
Rough idle	<p>Low/contaminated fuel</p> <p>Air ingress</p> <p>Low pressure fuel system fault</p> <p>Blocked fuel filter</p> <p>Fuel volume control valve (FVCV) blocked/contaminated</p>	<p>Check the fuel level/condition, Fuel Charging and Controls Check the low pressure fuel system for leaks/damage, GO to Pinpoint Test G552807p9. Check the fuel filter, check the FVCV and FPCV, Fuel Charging and Controls For EGR tests, Engine Emission Control</p>

	<p>Fuel pressure control valve (FPCV) blocked/contaminated</p> <p>Exhaust gas recirculation (EGR) valve(s) fault</p>	
Lack of power when accelerating	<p>Air intake system fault</p> <p>Catalytic converter blocked</p> <p>Diesel particulate filter (DPF) blocked</p> <p>Low fuel pressure</p> <p>Exhaust gas recirculation (EGR) valve(s) fault</p> <p>Turbocharger(s) fault</p>	<p>Check the air intake system, Intake Air Distribution and Filtering Check for a blocked catalytic converter or DPF, Exhaust System Check the fuel pump module operation, GO to Pinpoint Test G552807p8.</p> <p>For EGR tests, Engine Emission Control For turbocharger tests, Turbocharger</p>
Engine stops/stalls	<p>Low/contaminated fuel</p> <p>Anti air suction initiated</p> <p>Fuel pump module fault</p> <p>Air ingress</p> <p>Low pressure fuel system fault</p> <p>Fuel volume control valve (FVCV) blocked/contaminated</p> <p>Fuel pressure control valve (FPCV) blocked/contaminated</p> <p>High pressure fuel leak</p> <p>Exhaust gas recirculation (EGR) valve(s) fault</p>	<p>Check the fuel level/condition, Fuel Charging and Controls If there is sufficient fuel check the critical fuel level switch, GO to Pinpoint Test G552807p2.</p> <p>Check the fuel pump module operation, GO to Pinpoint Test G552807p8.</p> <p>Check the low pressure fuel system for leaks/damage, GO to Pinpoint Test G552807p9.</p> <p>Check for fuel system leaks, check the FVCV and FPCV, Fuel Charging and Controls For EGR tests, Engine Emission Control</p>
Engine judders	<p>Low/contaminated fuel</p> <p>Air ingress</p> <p>Low pressure fuel system fault</p> <p>Fuel volume control valve (FVCV)</p>	<p>Check the fuel level/condition, Fuel Charging and Controls Check the low pressure fuel system for leaks/damage, GO to Pinpoint Test G552807p9.</p> <p>Check for fuel system leaks, check the FVCV and FPCV, Fuel Charging and Controls Check the fuel</p>

	blocked/contaminated Fuel pressure control valve (FPCV) blocked/contaminated High pressure fuel leak Fuel injection pump fault	injection pump, Fuel Injection Pump
Excessive fuel consumption	Low pressure fuel system fault Fuel volume control valve (FVCV) blocked/contaminated Fuel pressure control valve (FPCV) blocked/contaminated Fuel temperature sensor leak High pressure fuel leak Injector(s) failure Exhaust gas recirculation (EGR) valve(s) fault	Check the low pressure fuel system for leaks/damage, GO to Pinpoint Test G552807p9. Check the FVCV and FPCV, Fuel Charging and Controls Check the fuel temperature sensor, fuel injection pump, etc for leaks, Fuel Charging and Controls Check for injector DTCs. For EGR tests, Engine Emission Control

DTC index

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra information read by the manufacturer-approved diagnostic system).

NOTE:

For a full list of powertrain DTCs,
 Electronic Engine Controls

DTC	Description	Possible source	Action
B120200	Fuel pump module, level sender above threshold	Fuel level float stuck/sticking	For fuel pump module level sender tests, GO to Pinpoint

		<p>Fuel level sender circuit: high resistance</p> <p>Fuel level sender failure</p>	Test G552807p3.
B120400	Fuel pump module, level sender below threshold	<p>Fuel level float stuck/sticking</p> <p>Fuel level sender circuit: short circuit to ground</p> <p>Fuel level sender failure</p>	For fuel pump module level sender tests, GO to Pinpoint Test G552807p3.
B262700	Fuel transfer pump, level sender above threshold	<p>Fuel level float stuck/sticking</p> <p>Fuel level sender circuit: high resistance</p> <p>Fuel level sender failure</p>	For fuel transfer pump level sender tests, GO to Pinpoint Test G552807p11.
B262800	Fuel transfer pump, level sender below threshold	<p>Fuel level float stuck/sticking</p> <p>Fuel level sender circuit: short circuit to ground</p> <p>Fuel level sender failure</p>	For fuel transfer pump level sender tests, GO to Pinpoint Test G552807p11.
B287900	Fuel transfer pump fault	<p>Low pressure fuel bleed tap open</p> <p>Low pressure fuel system leak</p> <p>Fuel transfer pump failure</p>	<p>Check the status of the low pressure fuel bleed tap, GO to Pinpoint Test G552807p8.</p> <p>Check the low pressure fuel system for leaks, GO to Pinpoint Test G552807p9.</p> <p>Check the function of the fuel transfer pump, GO to Pinpoint Test G552807p5.</p>
P008700	Fuel rail/system pressure too low	<p>Fuel rail pressure (FRP) sensor disconnected</p> <p>FRP sensor to ECM sensing circuit: short circuit to ground</p> <p>FRP sensor supply circuit: high resistance</p> <p>FRP sensor failure</p>	<p>For FRP sensor circuit tests, Fuel Charging and Controls</p> <p>Check the fuel lines, GO to Pinpoint Test G552807p9.</p> <p>Check the fuel pressure, GO to Pinpoint Test G552807p8.</p> <p>For fuel pump module circuit tests, GO to Pinpoint Test G552807p4.</p> <p>and GO to Pinpoint Test G552807p6.</p>

		<p>Fuel line leak</p> <p>Restricted fuel line</p> <p>Fuel pump module circuit: high resistance</p> <p>Fuel pump module circuit: short circuit to ground</p> <p>Fuel pump module failure</p>	
P008800	Fuel rail/system pressure too high	<p>Fuel rail pressure (FRP) sensor to ECM wiring (supply/sense): short circuit to each other</p> <p>FRP sensor to ECM sense circuit: short circuit to power</p> <p>FRP sensor failure</p> <p>Fuel pressure control valve (FPCV) fault</p> <p>Fuel pump module circuit: short circuit to power</p> <p>Fuel pump module failure</p>	<p>For FRP sensor circuit tests and FPCV tests, Fuel Charging and Controls For fuel pump module circuit tests, GO to Pinpoint Test G552807p4. and GO to Pinpoint Test G552807p6.</p>
P046000	Fuel level sender, signal range high	<p>Fuel level sender signal circuit: high resistance</p> <p>Fuel level sender signal circuit: short circuit to power</p> <p>Fuel level sender failure</p> <p>ECM failure</p>	<p>For fuel level sender and circuit tests, GO to Pinpoint Test G552807p3. and GO to Pinpoint Test G552807p11. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P046100	Fuel level sender, signal range low	<p>Fuel level sender signal circuit: high resistance</p> <p>Fuel level sender signal circuit: short circuit to ground</p> <p>Fuel level sender failure</p> <p>ECM failure</p>	<p>For fuel level sender and circuit tests, GO to Pinpoint Test G552807p3. and GO to Pinpoint Test G552807p11. Refer to the warranty policy and procedures manual if an ECM is suspect.</p>

P062700	Fuel pump module relay control circuit high	Fuel pump module relay control circuit: short circuit to power Fuel pump module relay failure	For fuel pump module relay and circuit tests, GO to Pinpoint Test G552807p4.
P062800	Fuel pump module relay control circuit low	Fuel pump module relay control circuit: high resistance Fuel pump module relay control circuit: short circuit to ground Fuel pump module relay failure	For fuel pump module relay and circuit tests, GO to Pinpoint Test G552807p4.
P062900	Fuel pump module relay control circuit/open	Fuel pump module relay control circuit: high resistance Fuel pump module relay failure	For fuel pump module relay and circuit tests, GO to Pinpoint Test G552807p4.
P115A00	Low fuel level - forced limited power	Fuel reserve signal range Low fuel level condition Critical fuel level switch signal circuit: high resistance Critical fuel level switch signal circuit: short circuit to ground Critical fuel level switch failure Fuel level sender signal circuit: high resistance Fuel level sender signal circuit: short circuit to ground Fuel level sender signal circuit: short circuit to power Fuel level sender failure	Check the fuel level. If there is sufficient fuel check the critical fuel level switch circuits, GO to Pinpoint Test G552807p2. Check the fuel level sender circuits, GO to Pinpoint Test G552807p3. and GO to Pinpoint Test G552807p11. Refer to the warranty policy and procedures manual if an ECM is suspect.

		ECM failure	
P115B00	Low fuel level - forced engine shutdown	Anti air suction intervention Low fuel level condition Critical fuel level switch signal circuit: high resistance Critical fuel level switch signal circuit: short circuit to ground Critical fuel level switch failure Fuel level sender signal circuit: high resistance Fuel level sender signal circuit: short circuit to ground Fuel level sender signal circuit: short circuit to power Fuel level sender failure ECM failure	Check the fuel level. If there is sufficient fuel check the critical fuel level switch circuits, GO to Pinpoint Test G552807p2. Check the fuel level sender circuits, GO to Pinpoint Test G552807p3. and GO to Pinpoint Test G552807p11. Refer to the warranty policy and procedures manual if an ECM is suspect.
P120F00	Fuel rail pressure (FRP) regulator - fuel pressure low at start	FRP sensor circuit: high resistance FRP sensor circuit: short circuit to ground FRP sensor circuit: short circuit to power FRP sensor failure Restricted fuel line Fuel pump module failure ECM failure	For FRP sensor tests, Fuel Charging and Controls For fuel pump module circuit tests, GO to Pinpoint Test G552807p4. and GO to Pinpoint Test G552807p6. For fuel line tests, GO to Pinpoint Test G552807p9. Refer to the warranty policy and procedure manual if an ECM is suspect.
P193300	Fuel level sender CAN signal	Fuel level sender signal circuit: high resistance Fuel level sender signal	For fuel level sender and circuit tests, GO to Pinpoint Test G552807p3.

		<p>circuit: short circuit to ground</p> <p>Fuel level sender signal circuit: short circuit to power</p> <p>Fuel level sender signal circuit: short circuit to other resistive sensors</p> <p>Fuel level sender failure</p> <p>ECM failure</p>	<p>and GO to Pinpoint Test G552807p11.</p> <p>Refer to the warranty policy and procedures manual if an ECM is suspect.</p>
P228800	Injector control pressure too high - fuel pressure control valve (FPCV) minimum limit reached	<p>Fuel injector control pressure: too high</p> <p>FPCV circuit fault</p> <p>FPCV failure</p> <p>Fuel pump module circuit: short circuit to power</p> <p>Fuel pump module failure</p> <p>Fuel injection pump failure</p>	<p>For fuel pressure, GO to Pinpoint Test G552807p8.</p> <p>For fuel pump module circuit tests, GO to Pinpoint Test G552807p4.</p> <p>and GO to Pinpoint Test G552807p6.</p> <p>For FPCV and circuit tests, Fuel Charging and Controls For fuel injection pump, Fuel Injection Pump</p>
P229000	Injector control pressure too low - fuel pressure control valve (FPCV) maximum limit reached	<p>Fuel injector control pressure: too low</p> <p>Fuel line leak</p> <p>Fuel filter/system restriction</p> <p>FPCV circuit fault</p> <p>FPCV failure</p> <p>Fuel pump module circuit: short circuit to ground</p> <p>Fuel pump module failure</p> <p>Fuel injection pump failure</p>	<p>Check the fuel lines, GO to Pinpoint Test G552807p9.</p> <p>Check the fuel pressure, GO to Pinpoint Test G552807p8.</p> <p>For fuel pump module circuit tests, GO to Pinpoint Test G552807p4.</p> <p>and GO to Pinpoint Test G552807p6.</p> <p>For FPCV and circuit tests, Fuel Charging and Controls For fuel injection pump, Fuel Injection Pump</p>
P229200	Injector control pressure erratic - fuel pressure control valve (FPCV)	<p>Fuel injector control pressure: erratic</p>	<p>Check the fuel lines, GO to Pinpoint Test G552807p9.</p> <p>Check the fuel pressure, GO to Pinpoint Test G552807p8.</p>

	dynamic	FPCV circuit fault FPCV failure Fuel pump module circuit(s): high resistance, short circuit to ground, short circuit to power Fuel pump module failure Fuel injection pump failure	For fuel pump module circuit tests, GO to Pinpoint Test G552807p4. and GO to Pinpoint Test G552807p6. For FPCV and circuit tests, Fuel Charging and Controls For fuel injection pump, Fuel Injection Pump
--	---------	--	--

Pinpoint tests



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

NOTE:

If DTCs are recorded and a fault is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

PINPOINT TEST G552807p1 : REM POWER SUPPLY AND GROUND CIRCUITS

G552807t2 : CHECK FOR POWER TO THE REM

1. Rear electronic control module (REM) connector, CR04

Circuit	Pin
REM - power	03

2. Rear electronic control module (REM) connector, CR12

Circuit	Pin
REM - ignition supply	08

3. Rear electronic control module (REM) connector, CR71

Circuit	Pin
REM - ground	15

4. Rear electronic control module (REM) connector, CR73

Circuit	Pin
REM - ground	02

5. Key off. 6. Disconnect the REM electrical connector, CR04. 7. Key on, engine off. 8. Measure the voltage between:

CR04, harness side	Battery
Pin 03	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G552807t46.

-> No

REPAIR the battery power supply circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t46 : CHECK FOR POWER TO THE REM

1. Key off. 2. Disconnect the REM electrical connector, CR12. 3. Key on, engine off. 4. Measure the voltage between:

CR12, harness side	Battery
Pin 08	Negative terminal

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G552807t3.

-> No

REPAIR the ignition supply circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t3 : CHECK THE REM GROUNDS FOR HIGH RESISTANCE

1. Key off. 2. Disconnect the REM electrical connector, CR71. 3. Measure the resistance between:

CR71, harness side	Battery
Pin 15	Negative terminal

4. Disconnect the REM electrical connector, CR73. 5. Measure the resistance between:

CR73, harness side	Battery
Pin 02	Negative terminal

Are the resistances less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - REM connector(s). - REM.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552807p2 : CRITICAL FUEL LEVEL SWITCH

G552807t26 : CHECK FOR FUEL IN THE FUEL PUMP MODULE SWIRL POT

1. Remove the fuel pump module locking ring

Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08) 2. Detach and reposition the upper part of the fuel pump module sufficiently to gain visual access to the swirl pot.

Is there fuel in the swirl pot?

-> **Yes**

GO to Pinpoint Test G552807t48.

-> **No**

GO to Pinpoint Test G552807t27.

G552807t27 : CHECK THE FUEL PUMP MODULE SWIRL POT FOR FUEL LEAKAGE

1. Using a suitable clean container, add fuel to the swirl pot. 2. Check that the swirl pot holds the fuel for over one minute.

Does the swirl pot hold the fuel?

-> **Yes**

GO to Pinpoint Test G552807t48.

-> **No**

INSTALL a new fuel pump module.

Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08) Report the findings in an electronic product quality report (EPQR).

G552807t48 : CHECK THE CRITICAL FUEL LEVEL SWITCH RESISTANCE (FULL)

1. Fuel pump module connector, FP13

Circuit	Pin
Critical fuel level switch - signal	06
Critical fuel level switch - signal return	05

2. Rear electronic control module (REM) connector, CR04

Circuit	Pin
Critical fuel level switch - signal	13

3. Rear electronic control module (REM) connector, CR11

Circuit	Pin
Critical fuel level switch - signal return	23

4. Key off. 5. Disconnect the fuel pump module connector, FP13. 6. Measure the resistance between:

FP13, component side	FP13, component side
Pin 05	Pin 06

Is the resistance between 425 and 440 ohms?

-> Yes

GO to Pinpoint Test G552807t25.

-> No

INSTALL a new fuel pump module.

Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08) Report the findings in an electronic product quality report (EPQR).

G552807t25 : CHECK THE CRITICAL FUEL LEVEL SWITCH RESISTANCE (EMPTY)

1. Remove and drain the fuel pump module. 2. Measure the resistance between:

FP13, component side	FP13, component side
Pin 05	Pin 06

Is the resistance between 100 and 105 ohms?

-> **Yes**

GO to Pinpoint Test G552807t4.

-> **No**

INSTALL a new fuel pump module.

Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08) Report the findings in an electronic product quality report (EPQR).

G552807t4 : CHECK THE CRITICAL FUEL LEVEL SWITCH SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

FP13, harness side	Battery
Pin 06	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552807t5.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t5 : CHECK THE CRITICAL FUEL LEVEL SWITCH SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

FP13, harness side	Battery
Pin 06	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552807t45.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t45 : CHECK THE CRITICAL FUEL LEVEL SWITCH SIGNAL RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

FP13, harness side	Battery
Pin 05	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552807t1.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t1 : CHECK THE CRITICAL FUEL LEVEL SWITCH SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR04. 2. Measure the resistance between:

FP13, harness side	CR04, harness side
Pin 06	Pin 13

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552807t47.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t47 : CHECK THE CRITICAL FUEL LEVEL SWITCH SIGNAL RETURN CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR11. 2. Measure the resistance between:

FP13, harness side	CR11, harness side
Pin 05	Pin 23

Is the resistance less than 10 ohms?

-> Yes

Check the fuel pump module relay, GO to Pinpoint Test G552807p4.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552807p3 : RIGHT HAND FUEL LEVEL SENDER

G552807t6 : CHECK THE RIGHT HAND FUEL LEVEL SENDER SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Fuel pump module connector, FP13

Circuit	Pin
Fuel level sender - signal	02
Fuel level sender - signal return	01

2. Rear electronic control module (REM) connector, CR04

Circuit	Pin
Fuel level sender - signal	15

3. Rear electronic control module (REM) connector, CR11

Circuit	Pin
Fuel level sender - signal return	23

4. Key off. 5. Disconnect the fuel pump module connector, FP13. 6. Measure the resistance between:

FP13, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552807t49.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t49 : CHECK THE RIGHT HAND FUEL LEVEL SENDER SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

FP13, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552807t51.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t51 : CHECK THE RIGHT HAND FUEL LEVEL SENDER SIGNAL RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

FP13, harness side	Battery

Pin 01	Positive terminal
--------	-------------------

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552807t52.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t52 : CHECK THE RIGHT HAND FUEL LEVEL SENDER SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR04. 2. Measure the resistance between:

FP13, harness side	CR04, harness side
Pin 02	Pin 15

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552807t53.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t53 : CHECK THE RIGHT HAND FUEL LEVEL SENDER SIGNAL RETURN CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR11. 2. Measure the resistance between:

FP13, harness side	CR11, harness side
Pin 01	Pin 23

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G552807t54.

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t54 : CHECK THE RIGHT HAND FUEL LEVEL SENDER RESISTANCE EMPTY

1. Remove the fuel pump module.

Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08) 2. Move the sensor float to it's lowest position. 3.

Measure the resistance between:

FP13, component side	FP13, component side
Pin 01	Pin 02

Is the resistance between 50 and 52 ohms?

-> **Yes**

GO to Pinpoint Test G552807t55.

-> **No**

INSTALL a new fuel level sender,

Fuel Level Sender RH - 2.7L V6 - TdV6 Clear any DTCs, test the system for normal operation.

G552807t55 : CHECK THE RIGHT HAND FUEL LEVEL SENDER RESISTANCE FULL

1. Move the sensor float to it's highest position. 2. Measure the resistance between:

FP13, component side	FP13, component side
Pin 01	Pin 02

Is the resistance greater than 591 ohms?

-> **Yes**

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel pump module connector. - Fuel level sender. - REM connector. - REM.

-> **No**

INSTALL a new fuel level sender,

Fuel Level Sender RH - 2.7L V6 - TdV6 Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552807p11 : LEFT HAND FUEL LEVEL SENDER

G552807t56 : CHECK THE LEFT HAND FUEL LEVEL SENDER SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Fuel transfer pump connector, FP14

Circuit	Pin
Fuel level sender - signal	02
Fuel level sender - signal return	01

2. Rear electronic control module (REM) connector, CR04

Circuit	Pin
Fuel level sender - signal	16

3. Rear electronic control module (REM) connector, CR11

Circuit	Pin
Fuel level sender - signal return	23

4. Key off. 5. Disconnect the fuel transfer pump connector, FP14. 6. Measure the resistance between:

FP14, harness side	Battery
Pin 02	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552807t7.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t7 : CHECK THE LEFT HAND FUEL LEVEL SENDER SIGNAL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

FP14, harness side	Battery
Pin 02	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552807t9.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t9 : CHECK THE LEFT HAND FUEL LEVEL SENDER SIGNAL RETURN CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

FP14, harness side	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552807t10.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t10 : CHECK THE LEFT HAND FUEL LEVEL SENDER SIGNAL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR04. 2. Measure the resistance between:

FP14, harness side	CR04, harness side
Pin 02	Pin 16

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552807t11.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t11 : CHECK THE LEFT HAND FUEL LEVEL SENDER SIGNAL RETURN CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the REM electrical connector, CR11. 2. Measure the resistance between:

FP14, harness side	CR04, harness side
Pin 01	Pin 23

Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G552807t12.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t12 : CHECK THE LEFT HAND FUEL LEVEL SENDER RESISTANCE EMPTY

1. Remove the fuel transfer pump.

Fuel Transfer Pump - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 (19.45.21) 2. Move the sensor float to it's lowest position. 3. Measure the resistance between:

FP14, component side	FP14, component side
Pin 01	Pin 02

Is the resistance between 50 and 52 ohms?

-> Yes

GO to Pinpoint Test G552807t13.

-> No

INSTALL a new fuel level sender,

Fuel Level Sender LH - 2.7L V6 - TdV6 Clear any DTCs, test the system for normal operation.

G552807t13 : CHECK THE LEFT HAND FUEL LEVEL SENDER RESISTANCE FULL

1. Move the sensor float to it's highest position. 2. Measure the resistance between:

FP14, component side	FP14, component side
Pin 01	Pin 02

Is the resistance greater than 591 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel transfer pump connector. - Fuel level sender. - REM connector. - REM.

-> No

INSTALL a new fuel level sender,

Fuel Level Sender LH - 2.7L V6 - TdV6 Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552807p4 : FUEL PUMP MODULE RELAY

G552807t14 : CHECK FOR POWER TO THE FUEL PUMP MODULE RELAY BASE

1. Engine control module (ECM) connector, EC66

Circuit	Pin
Fuel pump module relay - control	J4

2. Remove the fuel pump module relay. 3. Measure the voltage between:

Fuel pump module relay base	Battery
Pin 04	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G552807t15.

-> **No**

REPAIR the power supply circuit as necessary. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t15 : CHECK THE SWITCHED SUPPLY TO THE FUEL PUMP MODULE RELAY BASE

1. Key on, engine off. 2. Measure the voltage between:

Fuel pump module relay base	Battery
Pin 02	Negative terminal

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G552807t16.

-> **No**

REPAIR the switched supply circuit as necessary, this circuit includes the slave ignition relay. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t16 : CHECK THE FUEL PUMP MODULE RELAY CONTROL CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Measure the resistance between:

Fuel pump module relay base	Battery
Pin 01	Negative terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552807t17.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t17 : CHECK THE FUEL PUMP MODULE RELAY CONTROL CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Fuel pump module relay base	Battery
Pin 01	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552807t18.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t18 : CHECK THE FUEL PUMP MODULE RELAY CONTROL CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the ECM connector, EC66. 2. Measure the resistance between:

Fuel pump module relay base	EC66, harness side
-----------------------------	--------------------

Pin 01	Pin J4
--------	--------

Is the resistance less than 10 ohms?

-> Yes

Check the fuel pump module circuits, GO to Pinpoint Test G552807p6.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552807p6 : FUEL PUMP MODULE

G552807t28 : CHECK THE FUEL PUMP MODULE GROUND CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Fuel pump module connector, FP13

Circuit	Pin
Fuel pump module - supply	04
Fuel pump module - ground	03

2. Key off. 3. Disconnect the fuel pump module electrical connector, FP13. 4. Key on, engine off. 5. Measure the resistance between:

FP13, harness side	Battery
Pin 03	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552807t21.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t21 : CHECK THE FUEL PUMP MODULE GROUND CIRCUIT FOR HIGH RESISTANCE

1. Key off. 2. Measure the resistance between:

FP13, harness side	Battery
Pin 03	Negative terminal

Is the resistance less than 10 ohms?

-> **Yes**

GO to Pinpoint Test G552807t22.

-> **No**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t22 : CHECK THE FUEL PUMP MODULE SUPPLY CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

FP13, harness side	Battery
Pin 04	Negative terminal

Is the resistance greater than 100 Kohms?

-> **Yes**

GO to Pinpoint Test G552807t19.

-> **No**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t19 : CHECK THE FUEL PUMP MODULE SUPPLY CIRCUIT FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

FP13, harness side	Battery
Pin 04	Positive terminal

Is the resistance greater than 100 Kohms?

-> Yes

GO to Pinpoint Test G552807t20.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

G552807t20 : CHECK THE FUEL PUMP MODULE SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Remove the fuel pump module relay. 2. Measure the resistance between:

FP13, harness side	Fuel pump module relay base
Pin 04	Pin 05

Is the resistance less than 10 ohms?

-> Yes

An intermittent fault may be present in the wiring harness. Visually check for chaffed wires or other physical damage to the harness. If no fault is found in the circuit, suspect the following component(s): - Fuel pump module connector. - Fuel pump module relay. - Fuel pump module.

-> No

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Clear any DTCs, test the system for normal operation.

PINPOINT TEST G552807p8 : CHECK THE LOW PRESSURE FUEL SYSTEM

G552807t8 : CHECK THE LOW PRESSURE FUEL SYSTEM BLEED TAP STATUS

1. Make sure that the low pressure fuel bleed tap is in the **CLOSED** position.

Is the low pressure fuel bleed tap in the CLOSED position?

-> **Yes**

GO to Pinpoint Test G552807t39.

-> **No**

Turn the low pressure fuel bleed tap to the **CLOSED** position and test for normal operation.

G552807t39 : CHECK THE PUMP ACTIVITY

1. Remove the rear seat cushion.

Rear Seat Cushion (76.70.37) 2. Key on, engine off. 3. Listen for pump noise.

Can the fuel pump be heard running?

-> **Yes**

GO to Pinpoint Test G552807t23.

-> **No**

GO to Pinpoint Test G552807p2.

G552807t23 : CHECK THE FUEL PUMP MODULE FUNCTION

1.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

After thoroughly cleaning around the connections, disconnect the inlet pipe from the fuel filter. 2. Position a suitable container beneath the fuel filter inlet pipe to collect fuel. 3. Key on, engine off (the pump should run for a short period, depending on temperature, etc). 4. Check that fuel is pumped from the fuel filter inlet pipe.

Is fuel pumped from the fuel filter inlet pipe?

-> **Yes**

CHECK the drive belt to the fuel injection pump.

Fuel Injection Pump Belt Check for DTCs. Test the system for normal operation.

-> **No**

CHECK the fuel lines for a blockage/restriction, GO to Pinpoint Test G552807p9.

PINPOINT TEST G552807p9 : CHECK THE FUEL LINES

G552807t24 : CHECK FOR FUEL SYSTEM LEAKS

1. Start and run the engine for five minutes. 2. Key off. 3. Inspect the fuel lines, pump, etc, in the engine bay for cracks/damage. 4. Raise and support the vehicle.

Lifting 5. Inspect the fuel lines for cracks/damage. 6. Check the integrity of the joints in the supply and return lines between the fuel tank and the fuel pump. 7. Carefully check around the fuel pipes, injectors and pump for evidence of leakage. 8. If there is evidence of a significant leak, clean the engine and repeat the test.

Is there any evidence of leakage?

-> **Yes**

RECTIFY the leak as necessary. Test the system for normal operation.

-> **No**

GO to Pinpoint Test G552807t43.

G552807t43 : CHECK THE FUEL LINES FOR RESTRICTIONS

1.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

Detach the fuel line from the fuel rail and from the fuel pump module. 2. Using an air line gently blow through the line checking for blockages or restrictions.

Is a blockage or restriction evident?

-> **Yes**

CLEAR/REPAIR the blocked or restricted fuel line and test the system for normal operation.

-> **No**

GO to Pinpoint Test G552807t44.

G552807t44 : CHECK THE IN TANK FUEL LINES

1. Remove the fuel and transfer pump module locking rings.

Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08) 2. Detach the fuel lines from the transfer and fuel

pump modules. 3. Using an air line gently blow through the line checking for blockages, restrictions or leaks.

Is a blockage, restriction or leak evident?

-> Yes

CLEAR/REPAIR the blocked, restricted or leaking fuel line as necessary and test the system for normal operation.

-> No

CHECK for DTCs and symptoms indicating another cause of the problem.

PINPOINT TEST G552807p5 : CHECK THE IN TANK FUEL LEVEL

G552807t29 : CHECK THE FUEL LEVEL IN EACH SIDE OF THE FUEL TANK

1. Remove the fuel transfer pump and fuel pump module locking rings.

Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08) 2. Reposition the fuel pump modules such that you can see the fuel levels in the tank.

Is there fuel in both sides of the tank?

-> Yes

The fuel transfer pump is functioning.

-> No

If fuel is evident in the fuel transfer pump side and the fuel pump module side is empty then suspect the following: - Low pressure fuel bleed tap is open. GO to Pinpoint Test G552807p8.


- Fuel transfer pump failure.

Fuel Transfer Pump - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN

Range: G00442->G45703 (19.45.21)

Fuel Filter - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (19.25.02)

Removal

- 1  **WARNING:** Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for

leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



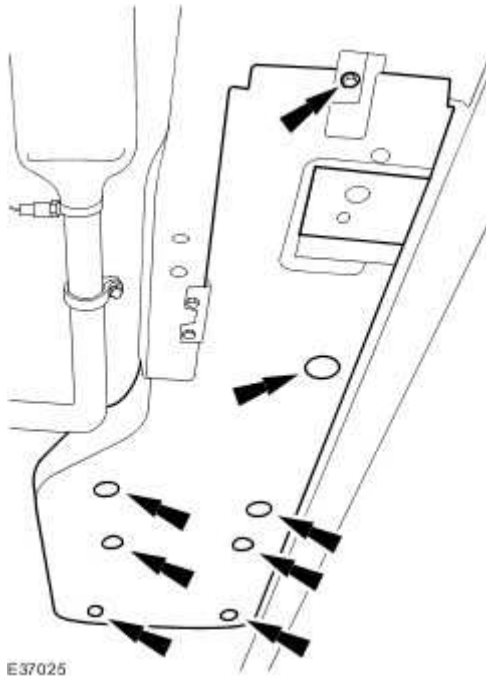
WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



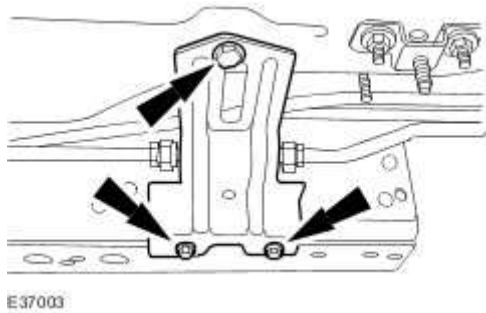
WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

Disconnect the battery ground cable. <<414-01>>

- 2 . De-pressurize the fuel system. <<310-00>>
- 3 . Raise and support the vehicle. <<100-02>>
- 4 . Remove the under engine air deflector tray. <<501-02>>
- 5 . Detach the left-hand splash shield.

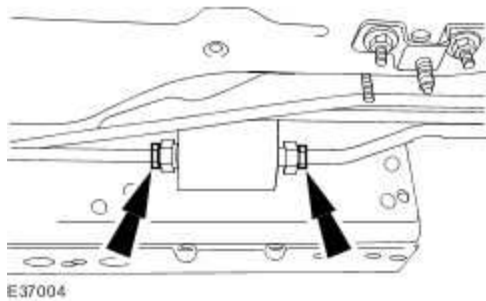


6 . Detach the fuel filter retaining bracket.



7 . Remove the fuel filter.

► Remove and discard the O-ring seals.

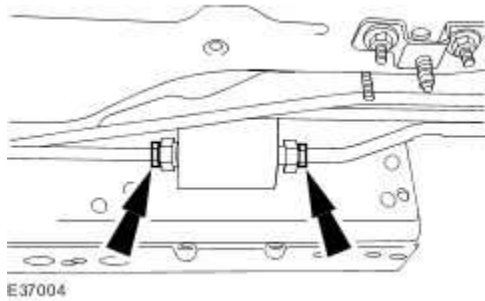


Installation

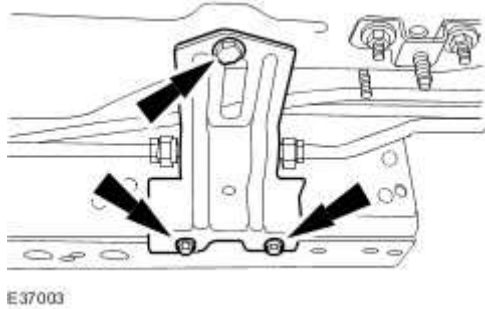
1 . To install, reverse the removal procedure.

▶ Install new O-ring seals.

▶ Tighten to 30 Nm.



2 . Tighten to 5 Nm.



Fuel Filter - 2.7L V6 - TdV6 (19.25.02)

Removal



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always fit blanking plugs to open orifices or lines. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Make sure the fuel lines are connected to the correct fuel line connector on the fuel filter. Note the orientation of the fuel filter alignment mark before removing it from the fuel filter retaining bracket. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in damage to the vehicle.

1 . NOTE:

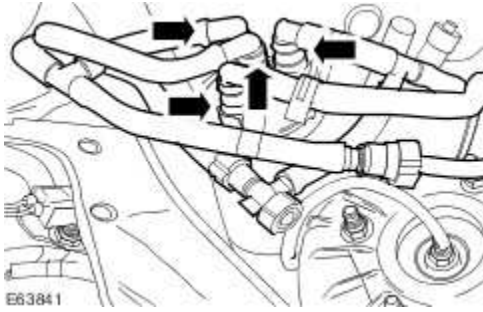
Make sure the position of the fuel lines are noted before removal from the fuel filter.

NOTE:

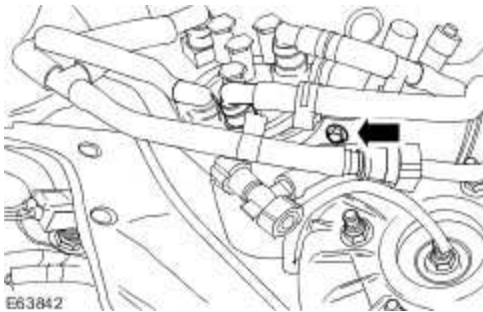
Fit suitable blanking caps to the fuel filter unions, fuel supply lines and fuel return lines.

Detach the fuel filter supply and return lines.

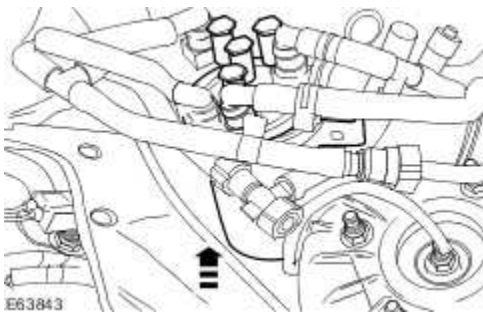
For additional information, refer to Quick Release Coupling - Push Connect



2 . Loosen the fuel filter securing bolt.



3 . Remove the fuel filter from the retaining bracket.



Installation



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.



CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and

fine clearances. It is therefore essential that absolute cleanliness is observed when working with these components. Always fit blanking plugs to open orifices or lines. Failure to follow this instruction may result in damage to the vehicle.



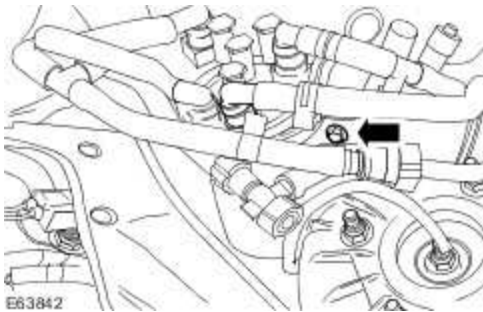
CAUTION: Make sure the fuel lines are connected to the correct fuel line connector on the fuel filter. Note the orientation of the fuel filter alignment mark before removing it from the fuel filter retaining bracket. Failure to follow this instruction may result in damage to the vehicle.



CAUTION: Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow this instruction may result in damage to the vehicle.

1 . To install, reverse the removal procedure.

 Tighten to 7 Nm.



2 . Bleed the low-pressure fuel system.
For additional information, refer to

Fuel Level Sender LH - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703

Removal



WARNING: Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

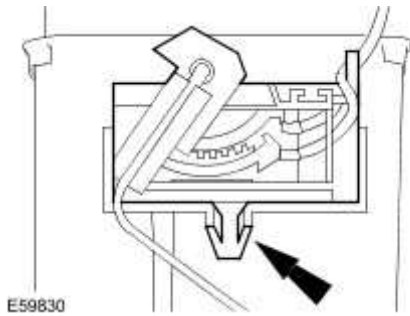
- 1 Remove the transfer pump.
 - . For additional information, refer to Fuel Transfer Pump - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 (19.45.21)

- 2 . Disconnect the fuel level sender electrical connector.



E61882

3 . Remove the fuel level sender and harness.



Installation



WARNING: Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

1 . To install, reverse the removal procedure.

Fuel Level Sender LH - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999

Removal



WARNING: Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



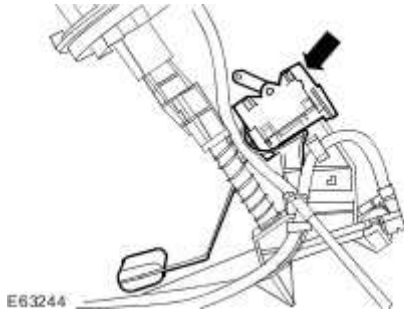
WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

- 1 Remove the fuel transfer unit.
 - . For additional information, refer to Fuel Transfer Unit - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999

- 2 . Remove the fuel level sender and harness.



Cut the fuel level sender harness tie straps.



Installation



WARNING: Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

- 1 . To install, reverse the removal procedure.

Fuel Level Sender LH - 2.7L V6 - TdV6

Special Service Tools



Remover/Installer, Fuel Pump Module/Fuel Transfer Pump Locking Ring
310-146

Removal



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



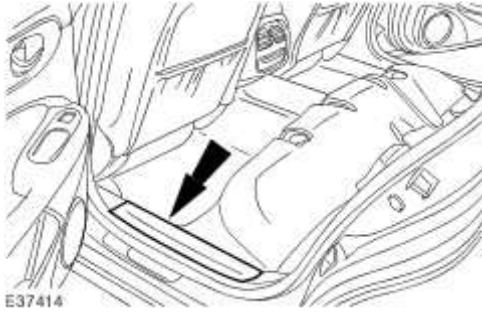
WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



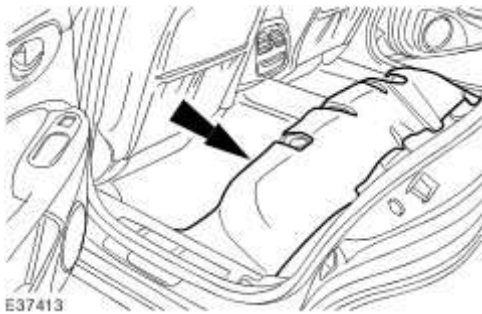
WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Detach the fuel tank filler pipe cap.
- 3 Release the pressure in the fuel system.
 - . For additional information, refer to Fuel System Pressure Release - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (19.50.02)
- 4 . Drain the fuel system.
For additional information, refer to Fuel Tank Draining - VIN Range: G45704->G99999
- 5 . Remove the rear seat cushion.
For additional information, refer to Rear Seat Cushion (76.70.37)

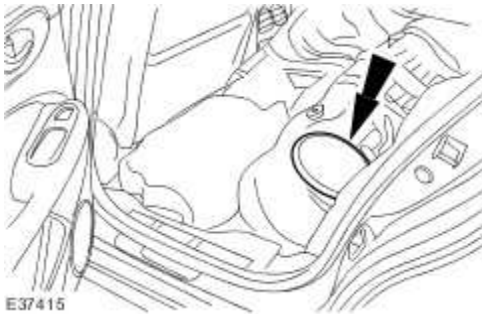
6 . Remove the scuff plate trim panel.



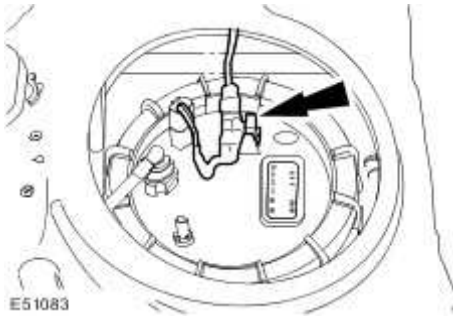
7 . Detach and reposition the floor covering.



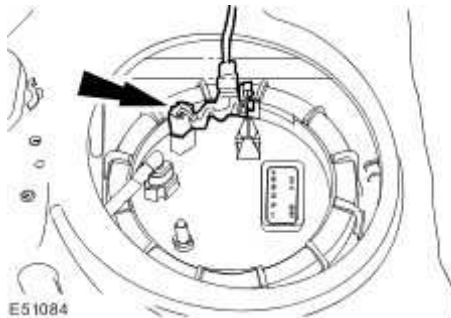
8 . Remove the floor aperture cover.



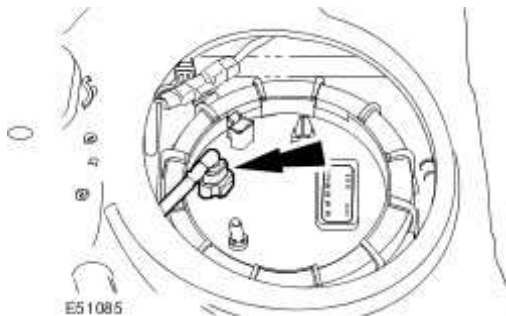
9 . Detach the fuel transfer unit electrical connector from the retaining bracket.



10 . Disconnect the fuel transfer unit electrical connector.



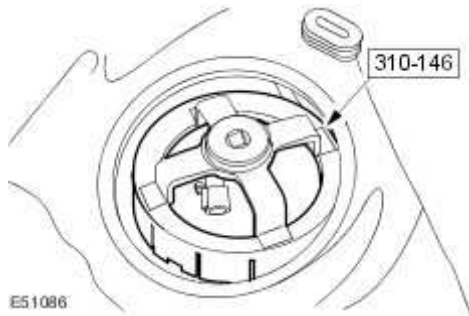
11 . Disconnect the fuel return line from the fuel transfer unit.



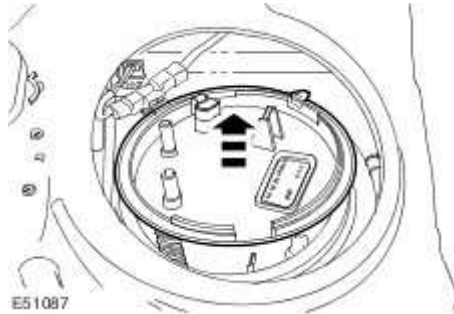
- 12  **CAUTION:** Make sure no damage occurs to the fuel transfer unit when removing the locking ring.

Using the special tool, remove the fuel transfer unit locking ring.

 Remove and discard the O-ring seal.

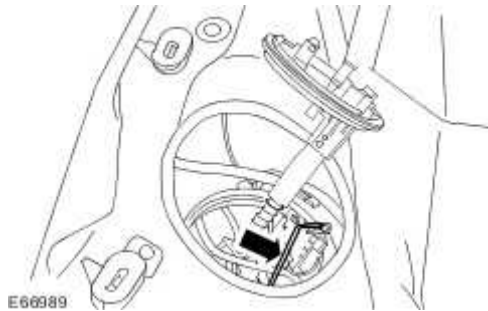


13 . Detach and reposition the upper part of the fuel transfer unit.

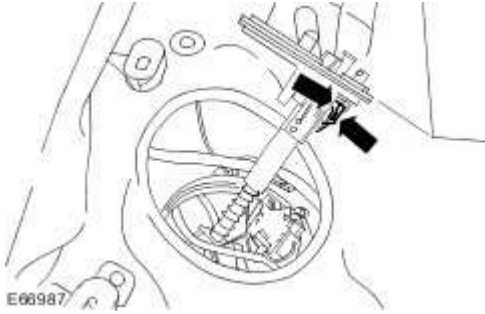


14 .  **CAUTION:** Make sure no damage occurs to the fuel level float.

Remove the fuel level float.



15 . Disconnect the fuel level sender electrical connector.



16 . Remove the fuel level sender and harness.



Installation



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these

instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

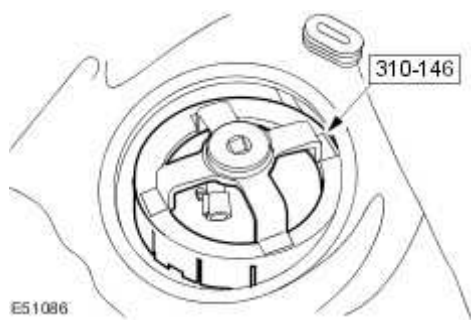
1 . To install, reverse the removal procedure.



Install a new O-ring seal.



Tighten to 60 Nm.



E51086

Fuel Level Sender RH - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703

Removal



WARNING: Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

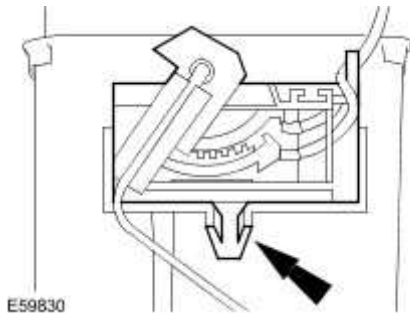
- 1 Remove the fuel pump module.
 - . For additional information, refer to Fuel Pump Module - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 (19.45.08)

- 2 . Disconnect the fuel level sender electrical connector.



E61882

3 . Remove the fuel level sender and harness.



Installation



WARNING: Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

1 . To install, reverse the removal procedure.

Fuel Level Sender RH - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999

Removal



WARNING: Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



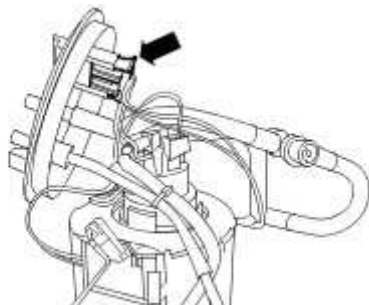
WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

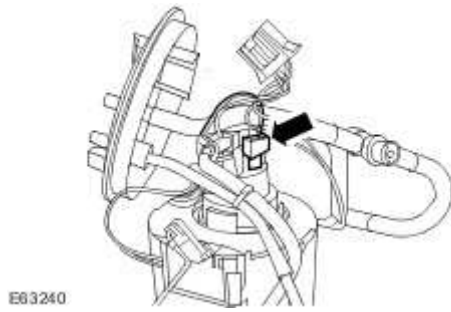
- 1 Remove the fuel pump module.
 - . For additional information, refer to Fuel Pump Module - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 (19.45.08)

- 2 . Disconnect the fuel pump module electrical connector.

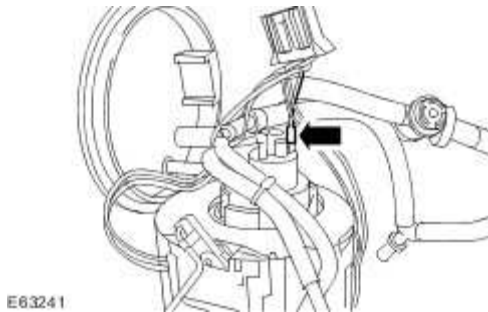


E63239

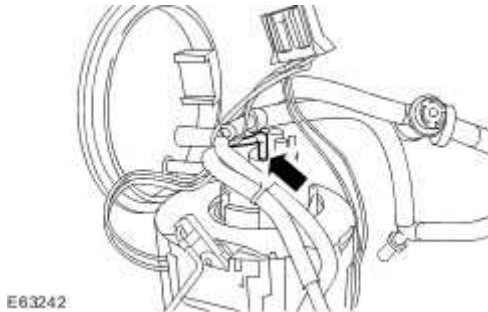
3 . Disconnect the fuel level sender electrical connector.



4 . Disconnect the fuel level sender electrical connector.

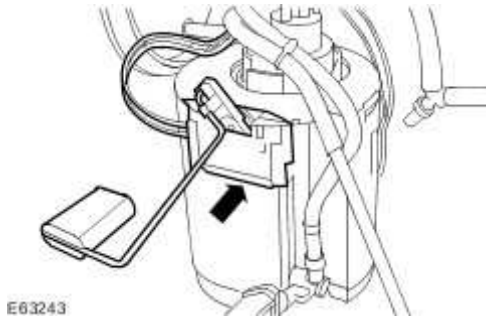


5 . Disconnect the fuel level sender electrical connector.



6 . Remove the fuel level sender and harness.

▶ Cut the fuel level sender harness tie strap.



Installation



WARNING: Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

- 1 . To install, reverse the removal procedure.

Fuel Level Sender RH - 2.7L V6 - TdV6

Removal



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.

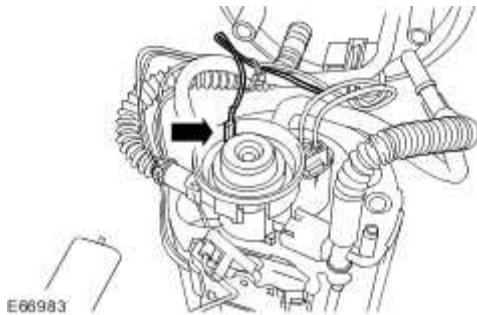


WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

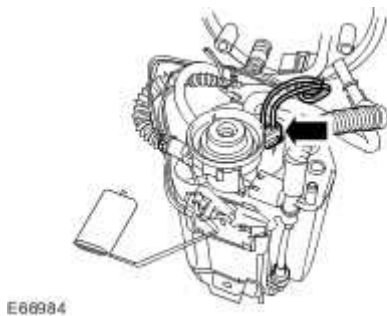
- 1 . Remove the fuel pump module.

For additional information, refer to Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08)

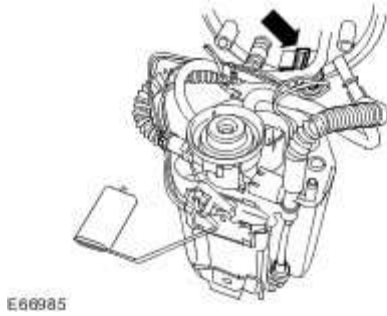
- 2 . Disconnect the fuel level sender electrical connector.



- 3 . Disconnect the fuel level sender electrical connector.

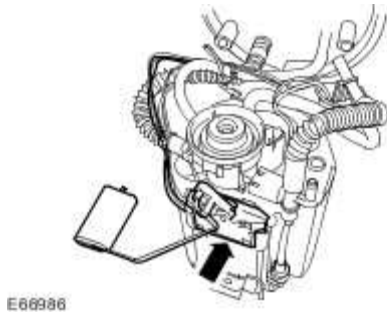


- 4 . Disconnect the fuel pump module electrical connector.



5 . Remove the fuel level sender and harness.

▶ Cut the fuel level sender harness tie straps.



Installation



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

- 1 . To install, reverse the removal procedure.

Fuel Pump Module - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 (19.45.08)


Special Service Tools



Remover/Installer, Fuel Pump Module/Fuel Transfer Pump Locking Ring
310-072A

Removal

All vehicles

- 1  **WARNING:** Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke, carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long period of time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

Disconnect the battery ground cable. <<414-01>>

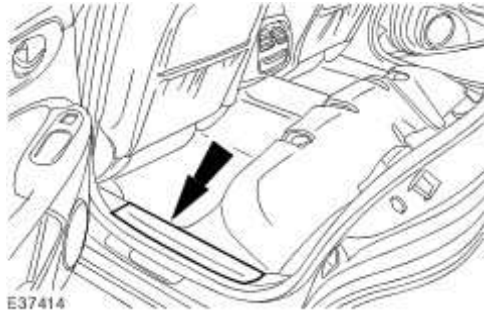
2 . Detach the fuel tank filler pipe cap.

3 . De-pressurize the fuel system. <<310-00>>

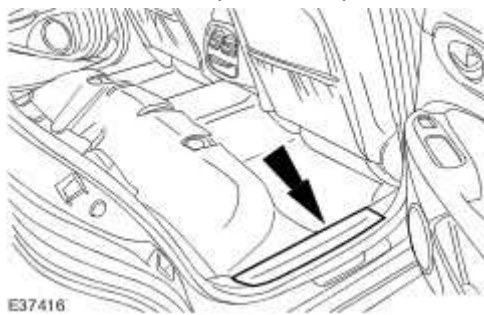
4 . Drain the fuel system. <<310-00>>

5 . Remove the rear seat cushion. <<501-10>>

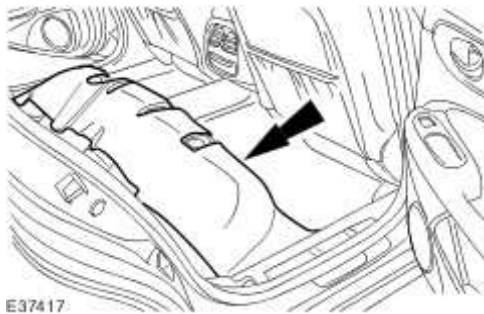
6 . Remove the scuff plate trim panel.



7 . Remove the scuff plate trim panel.

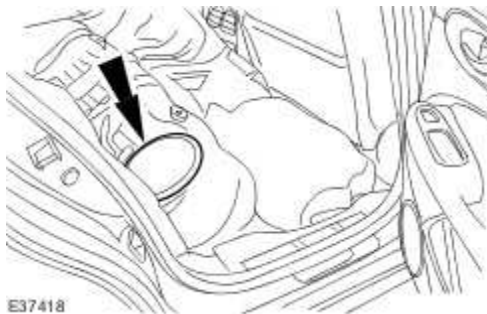


8 . Detach and reposition the floor covering.

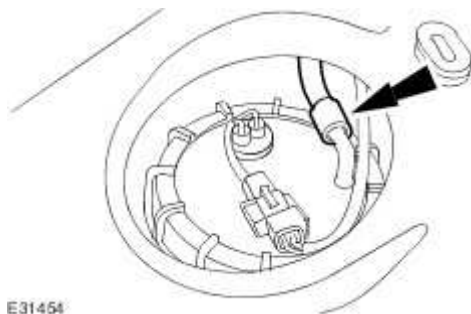


Vehicles without supercharger

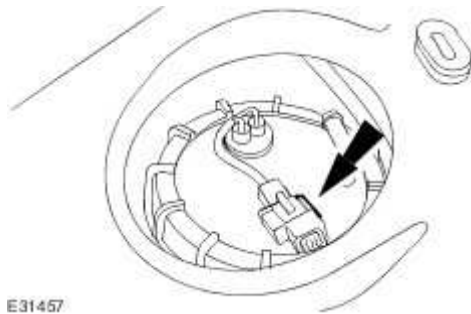
9 . Remove the floor aperture cover.



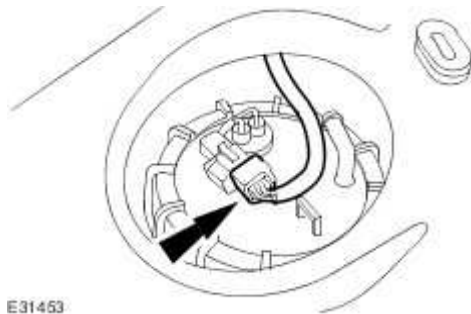
10 . Disconnect the fuel pump module quick release coupling.



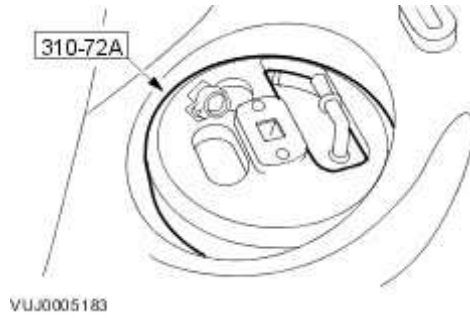
11 . Detach the fuel pump module electrical connector from the retaining bracket.



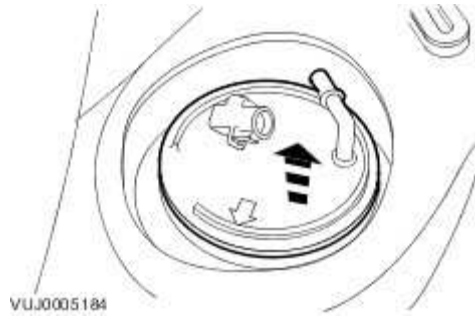
12 . Disconnect the fuel pump module electrical connector.



13 . Using the special tool, remove the fuel pump module locking ring.



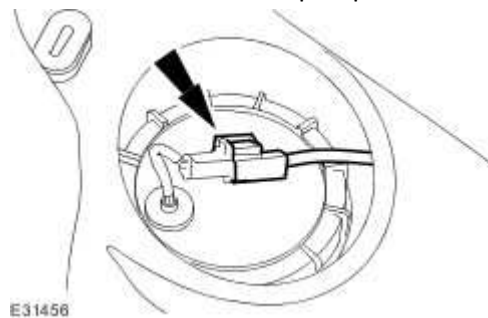
14 . Detach and reposition the upper part of the fuel pump module.



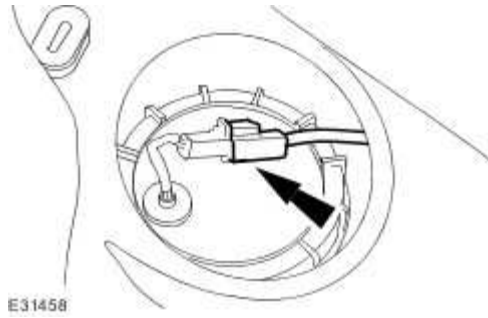
15 . Remove the floor aperture cover.



16 . Detach the fuel transfer pump module electrical connector from the retaining bracket.



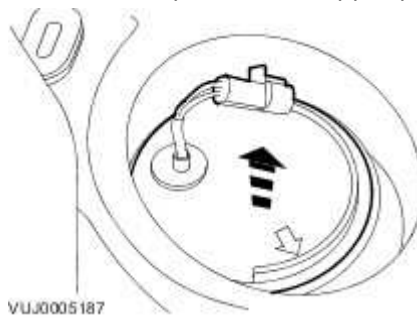
17 . Disconnect the fuel transfer pump electrical connector.



18 . Using the special tool, remove the fuel transfer pump locking ring.



19 . Detach and reposition the upper part of the fuel transfer pump.



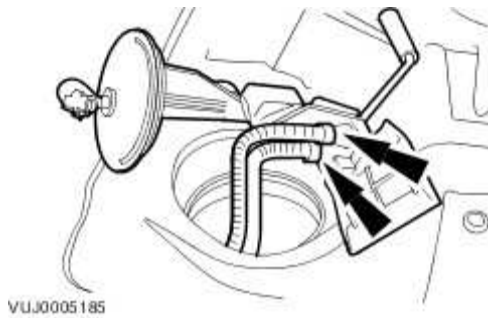
20 .  **CAUTION:** Make sure no damage occurs to the fuel level float.

NOTE:

Remove and discard the fuel transfer pump O-ring seal.

Remove the fuel transfer pump.

- ▶ Disconnect the fuel cross over lines.



- 21 .  **CAUTION:** Make sure no damage occurs to the fuel level float.

Remove the fuel pump module.

- ▶ Remove and discard the fuel pump module O-ring seal.

Vehicles with supercharger

- 22 . **NOTE:**

Left-hand shown, right-hand similar.

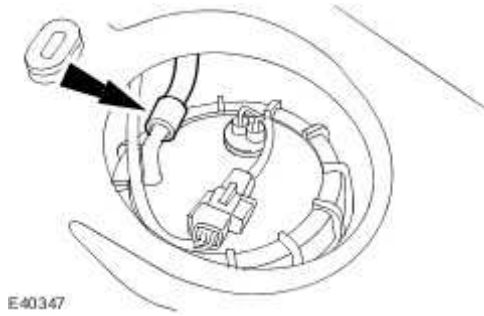
Remove the floor aperture cover.



- 23 . **NOTE:**

Left-hand shown, right-hand similar.

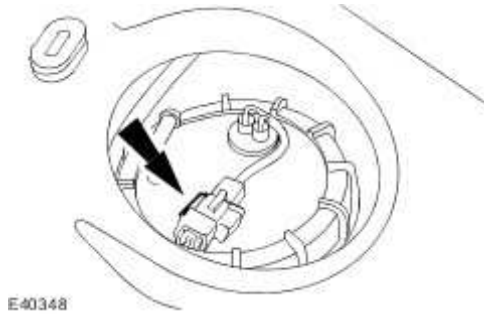
Disconnect the fuel pump module quick release coupling.



24 . **NOTE:**

Left-hand shown, right-hand similar.

Detach the fuel pump module electrical connector from the retaining bracket.



25 . **NOTE:**

Left-hand shown, right-hand similar.

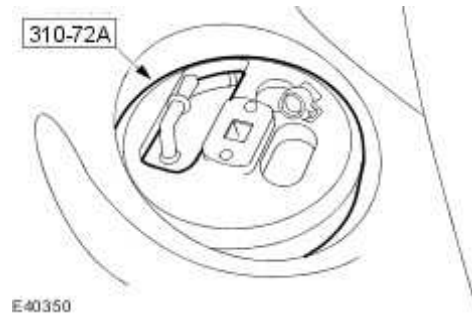
Disconnect the fuel pump module electrical connector.



26 . **NOTE:**

Left-hand shown, right-hand similar.

Using the special tool, remove the fuel pump module locking ring.




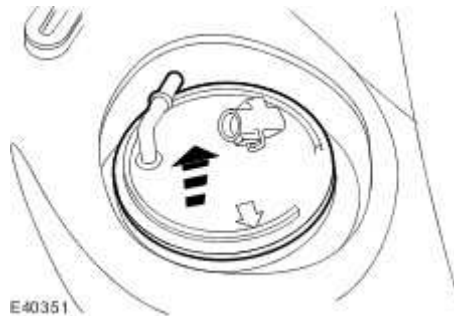
27.  **CAUTION:** Make sure no damage occurs to the fuel level float.

NOTE:

Left-hand shown, right-hand similar.

Remove the fuel pump module.

-  Remove and discard the fuel pump module O-ring seal.



Installation

Vehicles with supercharger

1.  **CAUTION:** Make sure the arrow on the fuel pump module and the 'SC' marker on

the fuel tank are aligned.



CAUTION: Make sure no damage occurs to the fuel level float.

NOTE:

Install a new O-ring seal to the fuel pump module flange.

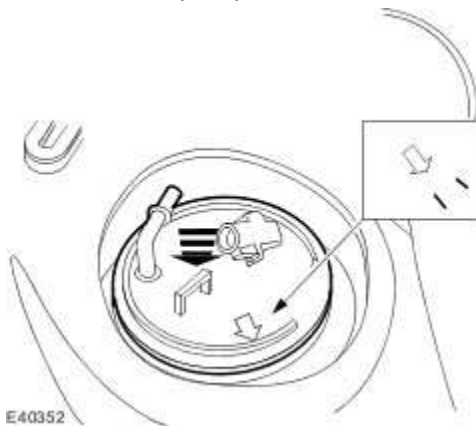
NOTE:

Take care not to stretch the O-ring seal.

NOTE:

Left-hand shown, right-hand similar.

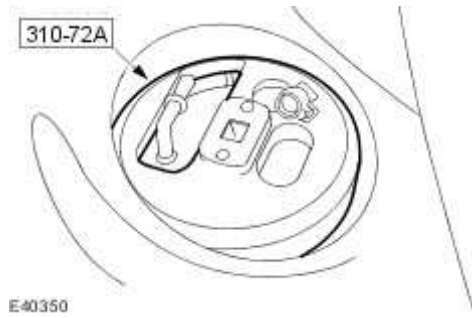
Install the fuel pump module.



2 . NOTE:

Left-hand shown, right-hand similar.

Using the special tool, tighten to 70 Nm.



3 . NOTE:

Left-hand shown, right-hand similar.

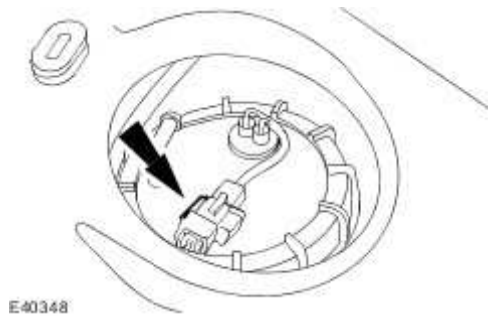
Connect the fuel pump module electrical connector.



4 . NOTE:

Left-hand shown, right-hand similar.

Attach the fuel pump module electrical connector to the retaining bracket.

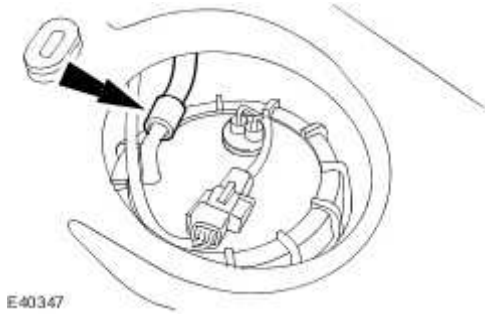


5 NOTE:

Left-hand shown, right-hand similar.

Connect the fuel pump module quick release coupling.

- ▶ Make sure the quick release coupling has latched onto the fuel pump module fuel pipe by pulling the pipe after the connection has been made.



6 . Install the floor aperture cover.



Vehicles without supercharger

- 7
- ⚠ **CAUTION:** Make sure the arrow on the fuel pump module and the 'NA' marker on the fuel tank are aligned.

- ⚠ **CAUTION:** Make sure no damage occurs to the fuel level float.

NOTE:

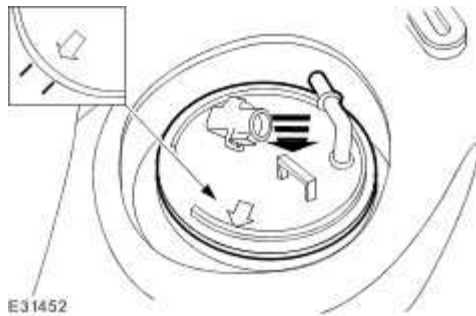
Install a new O-ring seal to the fuel pump module flange.

NOTE:

Take care not to stretch the O-ring seal.

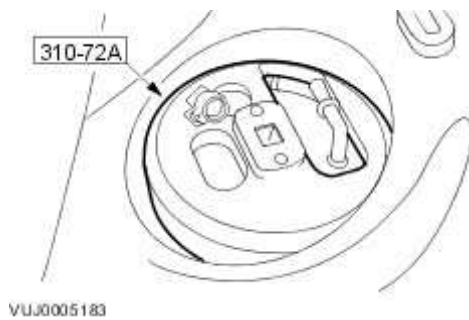
Install the fuel pump module.

- ▶ Feed the fuel cross-over lines through the fuel pump module hole and across the front of the fuel tank saddle.

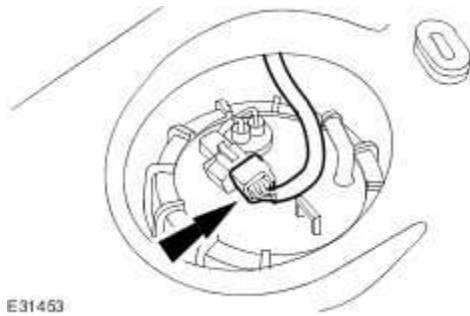


8 . Using the special tool, install the fuel pump locking ring.

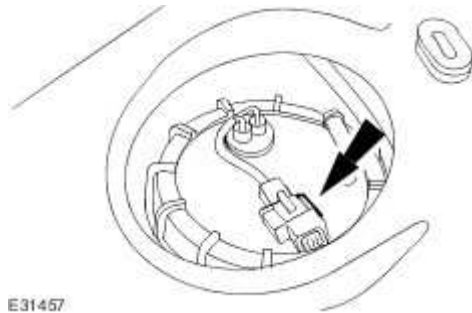
- ▶ Tighten to 70 Nm.



9 . Connect the fuel pump module electrical connector.

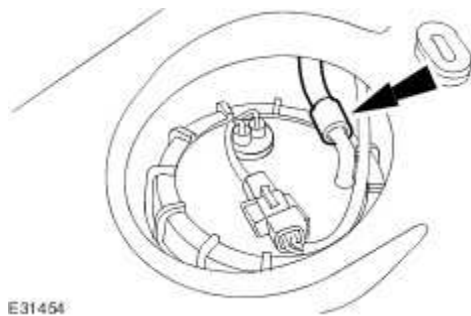


10 . Attach the fuel pump module electrical connector to the retaining bracket.

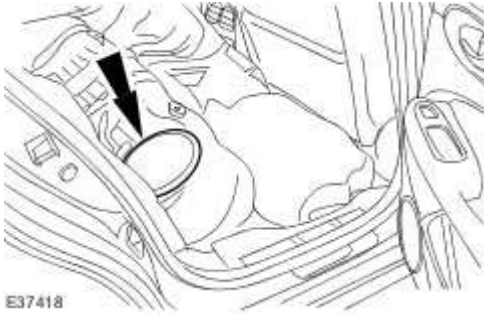


11 Connect the fuel pump module quick release coupling.

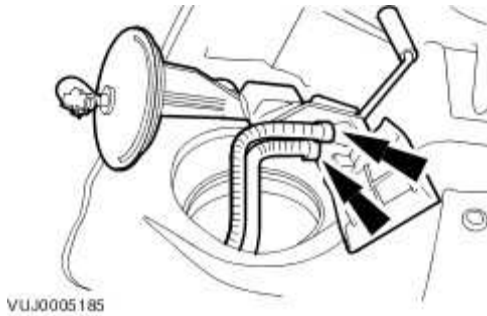
- ▶ Make sure the quick release coupling has latched onto the fuel pump module fuel pipe by pulling the pipe after the connection has been made.



12 . Install the floor aperture cover.



13 . Connect the fuel cross over lines.



14



CAUTION: Make sure the arrow on the fuel transfer pump lines up with the 'NA' marker on the fuel tank.



CAUTION: Make sure no damage occurs to the fuel level float.

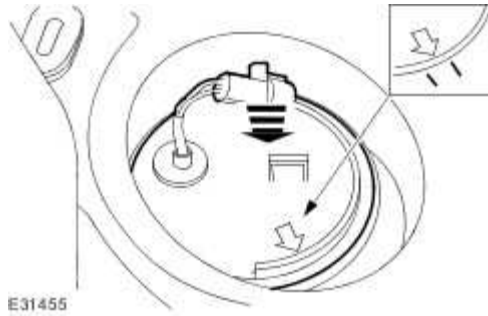
NOTE:

Install a new O-ring seal to the fuel transfer pump flange.

NOTE:

Take care not to stretch the O-ring seal.

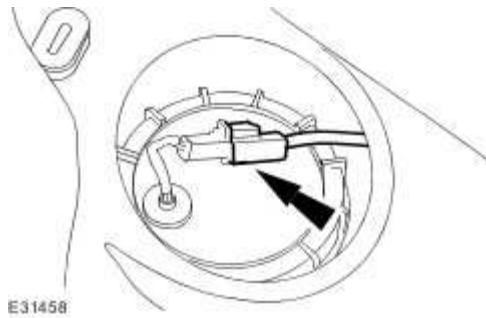
Install the fuel transfer pump.



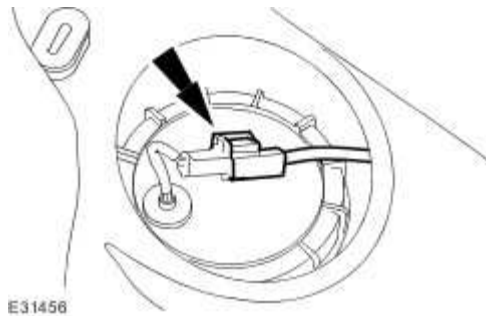
15 . Using the special tool, tighten to 70 Nm.



16 . Connect the fuel transfer pump electrical connector.



17 . Attach the fuel transfer pump module electrical connector to the retaining bracket.

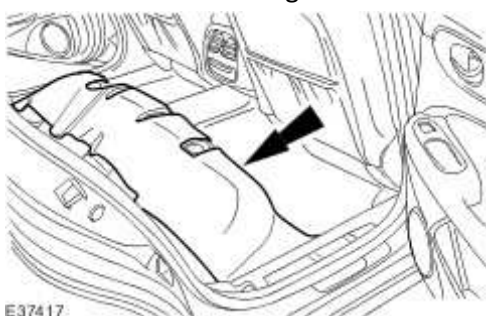


18 . Install the floor aperture cover.

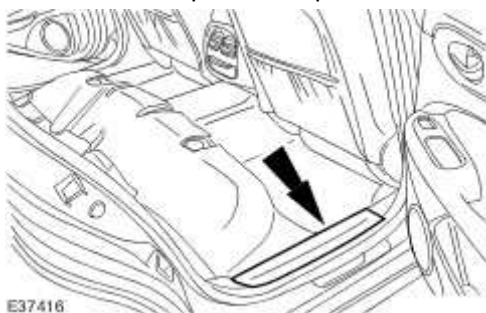


All vehicles

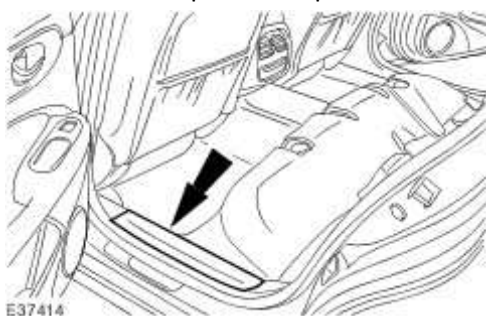
19 . Attach the floor covering.



20 . Install the scuff plate trim panel.



21 . Install the scuff plate trim panel.



22 . Install the rear seat cushion. <<501-10>>

23 . Attach the fuel tank filler pipe cap.

24 . Connect the battery ground cable. <<414-01>>

Fuel Pump Module - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999 (19.45.08)

Special Service Tools



Remover/Installer, Fuel Pump Module/Fuel Transfer Pump Locking Ring
310-146

Removal



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

NOTE:

Federal market vehicles, refer to step 12.

NOTE:

Non federal market vehicles, refer to step 13.

1 . NOTE:

All vehicles.

Open the fuel tank filler pipe flap.

2 . Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

3 . Detach the fuel tank filler pipe cap.

4 . Release the pressure in the fuel system.

. For additional information, refer to Fuel System Pressure Release - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (19.50.02)

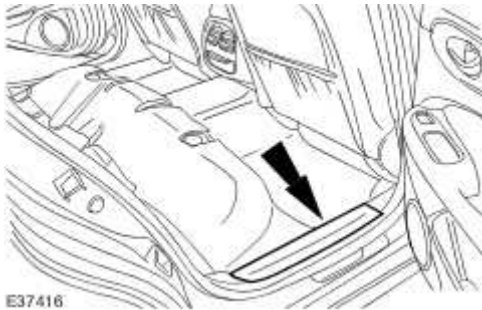
5 . Drain the fuel system.

For additional information, refer to Fuel Tank Draining - VIN Range: G45704->G999999

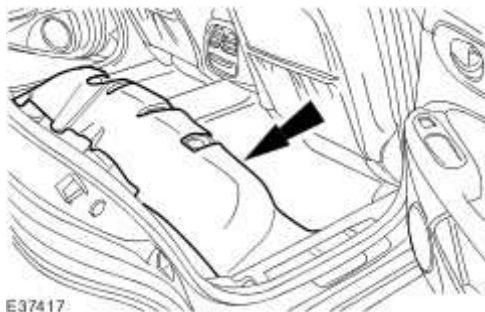
6 . Remove the rear seat cushion.

For additional information, refer to Rear Seat Cushion (76.70.37)

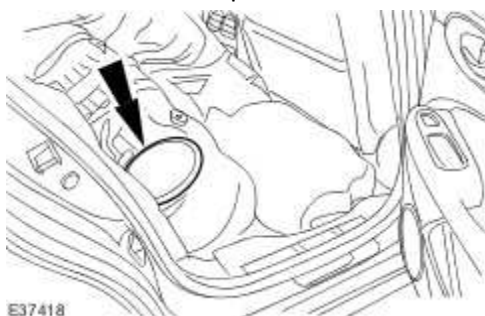
7 . Remove the scuff plate trim panel.



8 . Detach and reposition the floor covering.

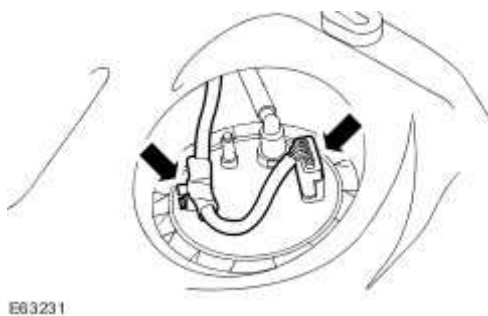


9 . Remove the floor aperture cover.



10 . Disconnect the fuel pump module electrical connector.

▶ Detach the fuel pump module wiring harness from the retaining bracket.



11 . Disconnect the fuel pump module quick release coupling.

12 . **NOTE:**

Federal market vehicles only.

Remove the fuel pump module locking ring.

 Remove and discard the O-ring seal.

13 . NOTE:

Non federal market vehicles only.

Using the special tool, remove the fuel pump module locking ring.

 Remove and discard the O-ring seal.

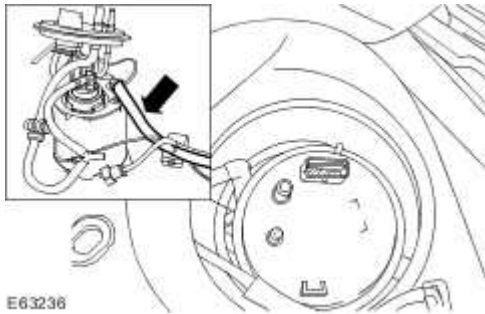
14 . NOTE:

All vehicles.

Disconnect the fuel transfer module transfer feed tube.

15 . Disconnect the left-hand fuel sender gauge electrical connector.

16 . Disconnect the fuel transfer module transfer return tube.



17



CAUTION: Make sure no damage occurs to the fuel level float.

Remove the fuel pump module.



Press down and rotate the base of the fuel pump module counter-clockwise.

Installation



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

NOTE:


Federal market vehicles, refer to step 6.

NOTE:

Non federal market vehicles, refer to step 5.

1



 **CAUTION:** On vehicles with supercharger make sure the arrow on the fuel pump module and the 'SC' marker on the fuel tank are aligned.



⚠ CAUTION: On vehicles without supercharger make sure the arrow on the fuel transfer module and the 'NA' marker on the fuel tank are aligned.



 **CAUTION:** Make sure no damage occurs to the fuel level float.

NOTE:

All vehicles.


Install the fuel pump module.

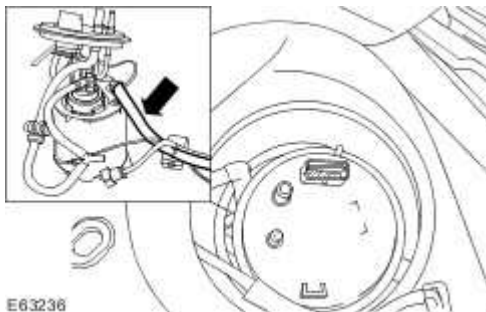


 Press down and rotate the base of the fuel pump module clockwise.

2 Connect the fuel transfer module transfer return tube.




 Make sure the coupling has latched onto the fuel pump module by pulling the tube after the connection has been made.



E63236

3 . Connect the left-hand fuel sender gauge electrical connector.

4 Connect the fuel transfer module transfer feed tube.


 Make sure the quick release coupling has latched onto the fuel pump module fuel tube by pulling the tube after the connection has been made.

5 . **NOTE:**

Non federal market vehicles only.

Using the special tool, install the fuel pump module locking ring.

 Install a new O-ring seal.

 Tighten to 60 Nm.

6 . **NOTE:**

Federal market vehicles only.

Install the fuel pump module locking ring.

 Install a new O-ring seal.

 Tighten to 4 Nm.

7 NOTE:

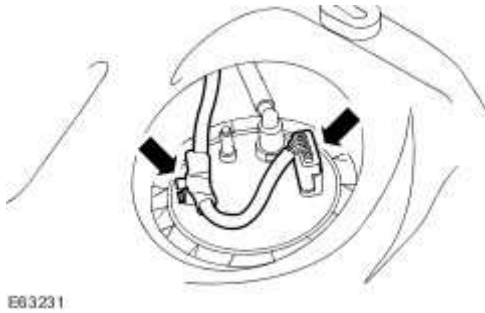
All vehicles.

Connect the fuel pump module quick release coupling.

- ▶ Make sure the quick release coupling has latched onto the fuel pump module fuel pipe by pulling the pipe after the connection has been made.

8 . Connect the fuel pump module electrical connector.

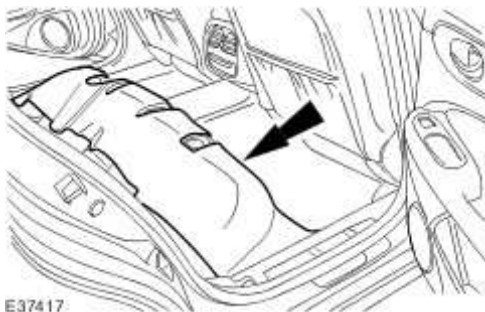
- ▶ Attach the fuel pump module wiring harness to the retaining bracket.



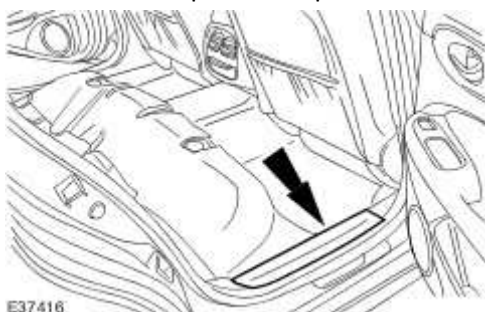
9 . Install the floor aperture cover.



10 . Attach the floor covering.



- 11 . Install the scuff plate trim panel.



- 12 . Install the rear seat cushion.
For additional information, refer to Rear Seat Cushion (76.70.37)
- 13 . Attach the fuel tank filler pipe cap.
- 14 . Connect the battery ground cable.
For additional information, refer to Battery Connect (86.15.15)
- 15 . Close the fuel tank filler pipe flap.

Fuel Pump Module - 2.7L V6 - TdV6 (19.45.08)

Special Service Tools



Remover/Installer, Fuel Pump Module/Fuel Transfer Pump Locking Ring
310-146

Removal



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



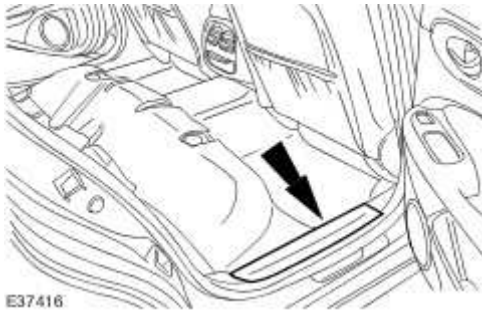
WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



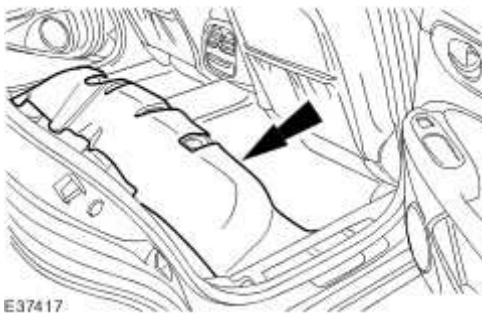
WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Detach the fuel tank filler pipe cap.
- 3 Release the pressure in the fuel system.
 - . For additional information, refer to Fuel System Pressure Release - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (19.50.02)
- 4 . Drain the fuel system.
For additional information, refer to Fuel Tank Draining - VIN Range: G45704->G99999
- 5 . Remove the rear seat cushion.
For additional information, refer to Rear Seat Cushion (76.70.37)

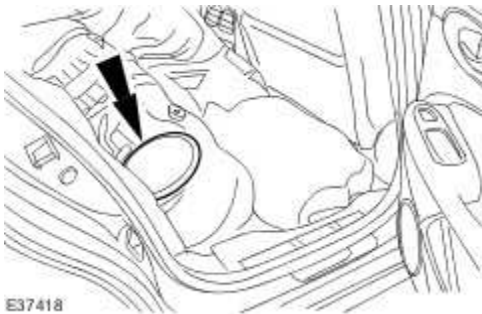
6 . Remove the scuff plate trim panel.



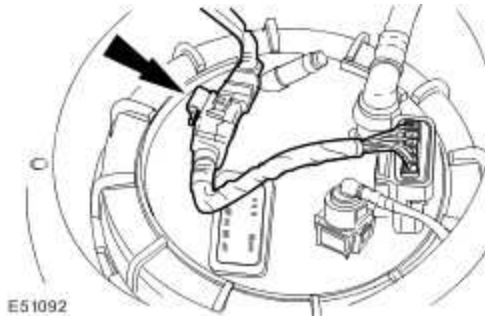
7 . Detach and reposition the floor covering.



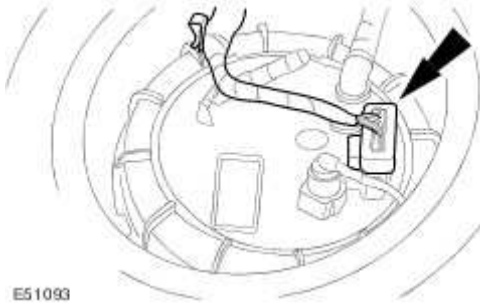
8 . Remove the floor aperture cover.



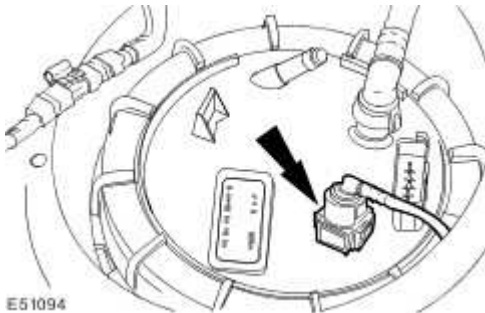
9 . Detach the fuel pump module electrical connector from the retaining bracket.



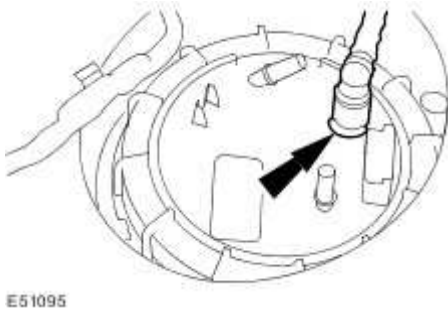
10 . Disconnect the fuel pump module electrical connector.



11 . Disconnect the fuel fired booster heater fuel supply line quick release coupling.
For additional information, refer to Quick Release Coupling - Push Connect



12 . Disconnect the fuel supply line quick release coupling.
For additional information, refer to Quick Release Coupling - Push Connect

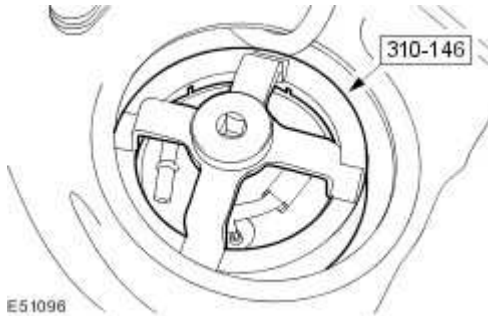


13

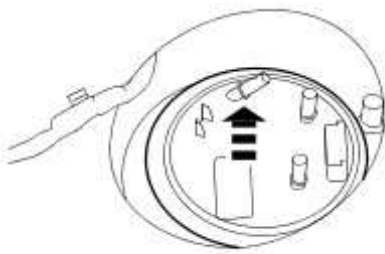


CAUTION: Make sure no damage occurs to the fuel pump module when removing the locking ring.

Using the special tool, remove the fuel pump module locking ring.

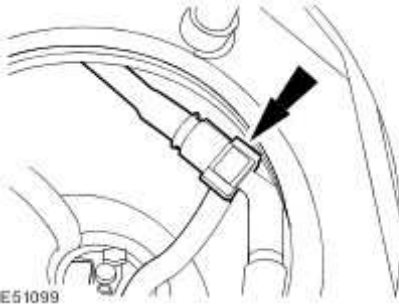


14 . Detach and reposition the upper part of the fuel pump module.

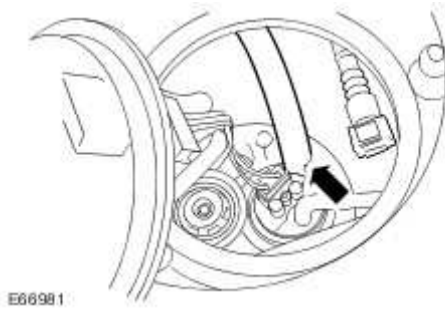


15 . Disconnect the fuel transfer line quick release coupling.

For additional information, refer to Quick Release Coupling - Push Connect




16 . Disconnect the fuel transfer line.




17.  **CAUTION:** Make sure no damage occurs to the fuel level float.


Remove the fuel pump module.


-  Remove and discard the fuel pump module gasket.



Installation

-  **WARNING:** Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.

-  **WARNING:** Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.

-  **WARNING:** Do not smoke or carry lighted tobacco or open flame of any type when working

on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

1



· **CAUTION:** Make sure no damage occurs to the fuel level float or fuel pump module components.

NOTE:

Install a new gasket to the fuel pump module flange.

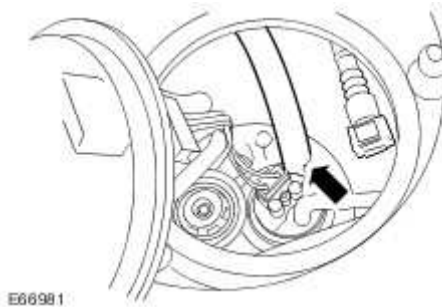
NOTE:

Take care not to stretch the gasket.

Install the fuel pump module.

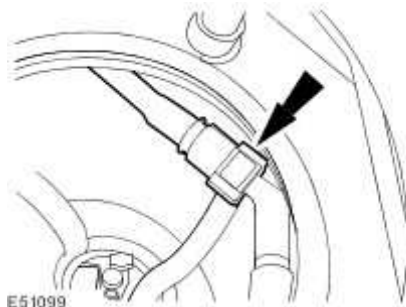


2 . Connect the fuel transfer line.

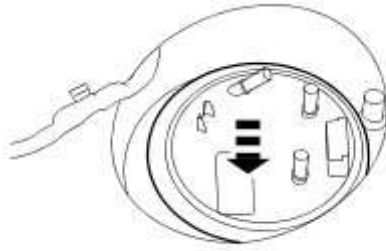


3 . Connect the fuel transfer pipe quick release coupling.

For additional information, refer to Quick Release Coupling - Push Connect .

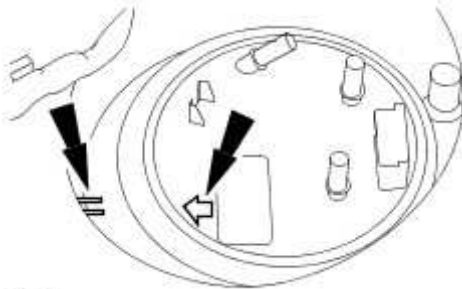


4 . Reposition and align the upper part of the fuel pump module.



E51102


5 . Align the arrow on the fuel pump module with the alignment marks on the fuel tank.

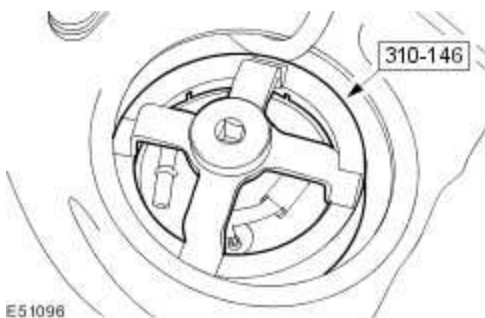


E51103

6  **CAUTION: Make sure no damage occurs to the fuel pump module when installing the locking ring.**

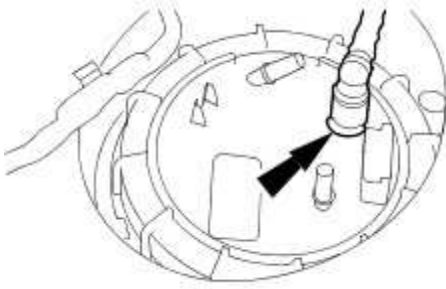
Using the special tool, install the fuel pump module locking ring.

 Tighten to 60 Nm.



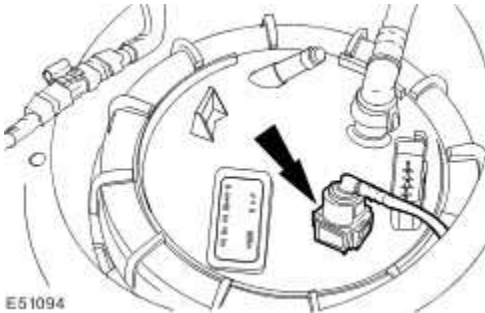
E51096

7 . Connect the fuel pump module quick release coupling.
For additional information, refer to Quick Release Coupling - Push Connect



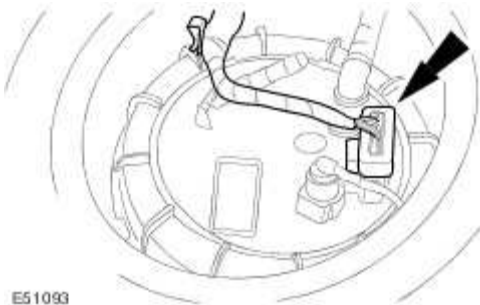
E51095

- 8 . Connect the fuel fired booster heater fuel supply line quick release coupling.
For additional information, refer to Quick Release Coupling - Push Connect



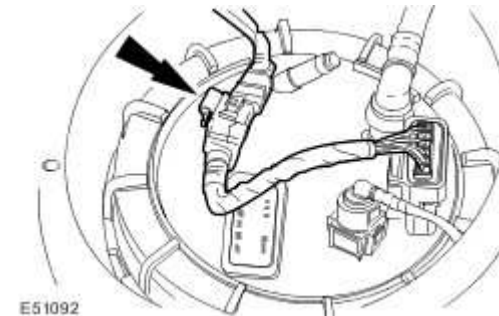
E51094

- 9 . Connect the fuel pump module electrical connector.



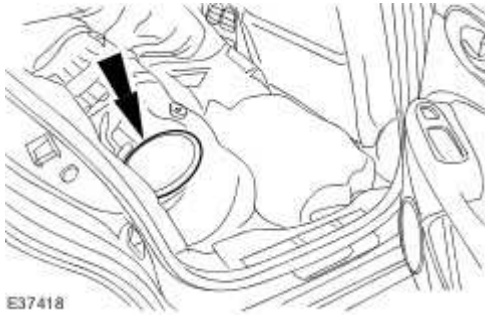
E51093

- 10 . Attach the fuel pump module electrical connector to the retaining bracket.

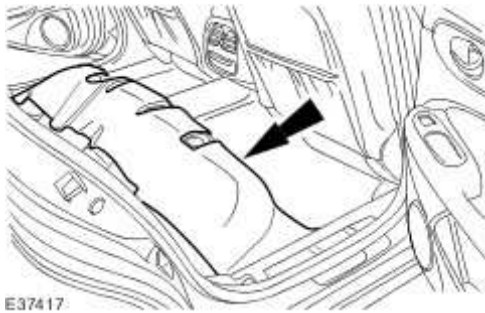


E51092

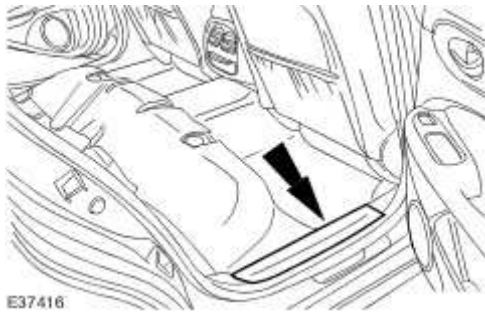
11 . Install the floor aperture cover.



12 . Attach the floor covering.



13 . Install the scuff plate trim panel.



14 . Install the rear seat cushion.

For additional information, refer to Rear Seat Cushion (76.70.37)

15 . Attach the fuel tank filler pipe cap.

16 . Close the fuel tank filler pipe flap.

17 . Connect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)

Fuel Tank - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (19.55.01)

Removal

1



- **WARNING:** Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

Drain the fuel tank.

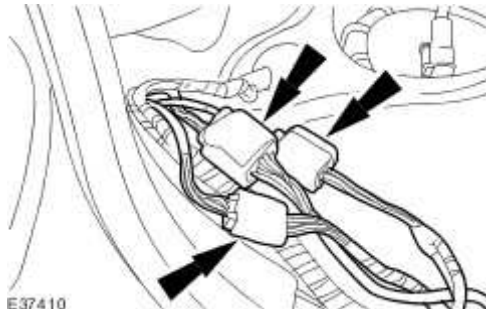
For additional information, refer to Fuel Tank Draining - VIN Range: G00442->G45703

For additional information, refer to Fuel Tank Draining - VIN Range: G45704->G99999

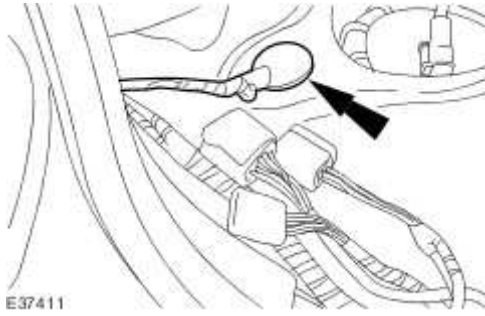
2 . Remove the rear seat cushion.

For additional information, refer to Rear Seat Cushion (76.70.37)

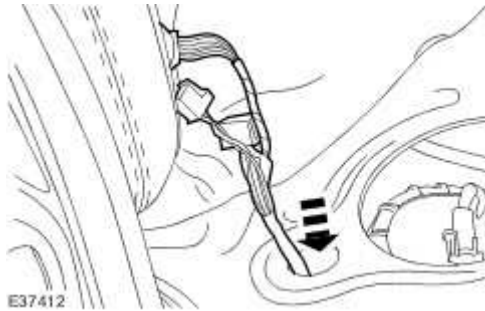
3 . Disconnect the fuel tank electrical connectors.



4 . Remove the wiring grommet from the floor pan.



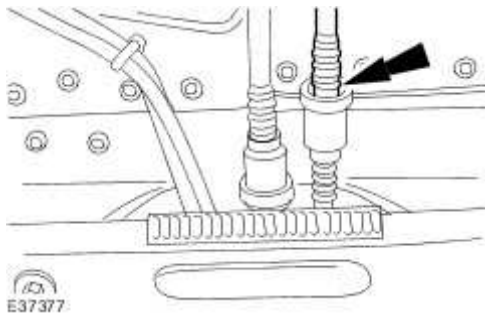
5 . Feed the wiring loom and connectors through the grommet hole in the vehicle floor pan.



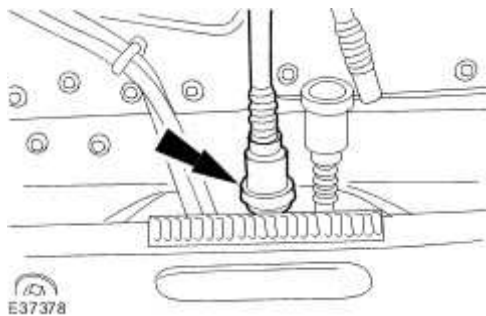
6 . Remove the driveshaft.

For additional information, refer to Driveshaft (47.15.01)

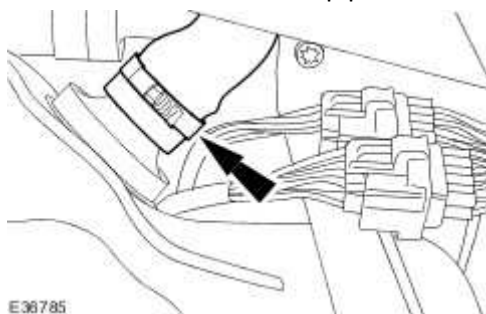
7 . Disconnect the evaporative emissions pipe.



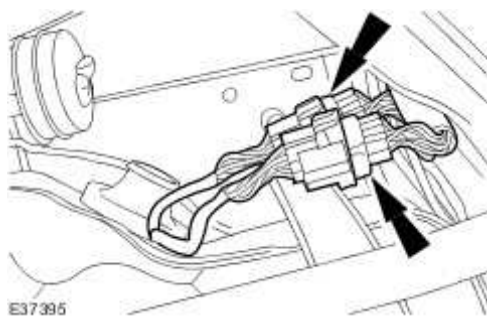
8 . Disconnect the fuel supply hose.



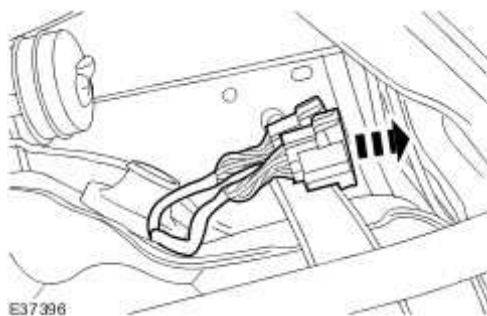
9 . Remove the fuel tank filler pipe to fuel tank hose.



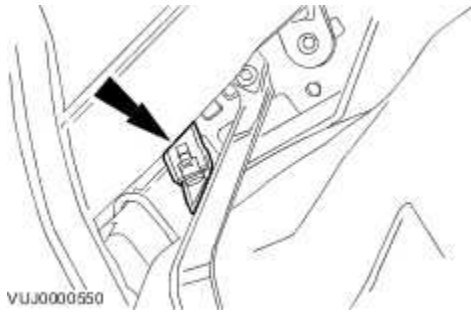
10 . Disconnect the rear axle electrical connectors.



11 . Detach the rear axle electrical connectors.



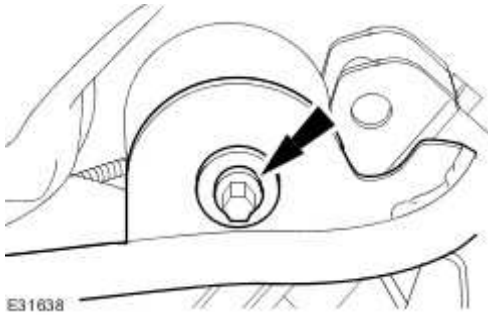
12 . Disconnect the evaporative emission pipe.



13 . **NOTE:**

Left-hand shown, right-hand similar.

Remove and discard the 2 rear subframe front retaining bolts

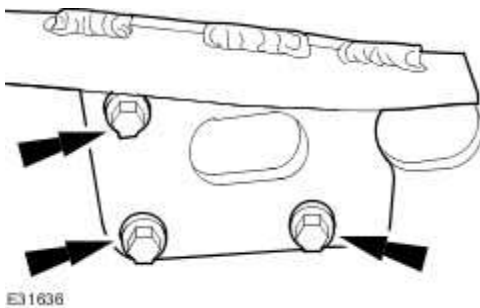


14 . **NOTE:**

Left-hand shown, right-hand similar.

Remove the noise, vibration and harshness brace.

▶ Remove the 6 bolts.



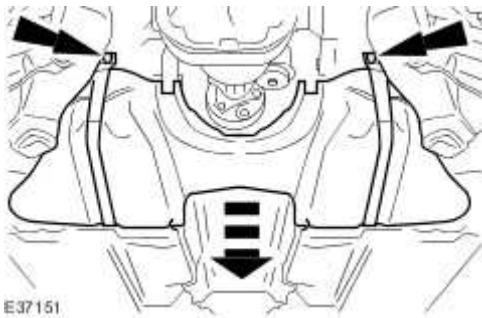
15



CAUTION: When supporting the fuel tank, use a suitable packing material to prevent damage to the underside of the fuel tank.

Remove the fuel tank.

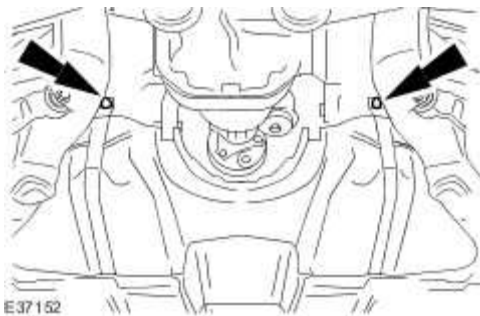
▶ Detach the fuel tank support straps.



Installation

1 . To install, reverse the removal procedure.

▶ Tighten to 35 Nm.

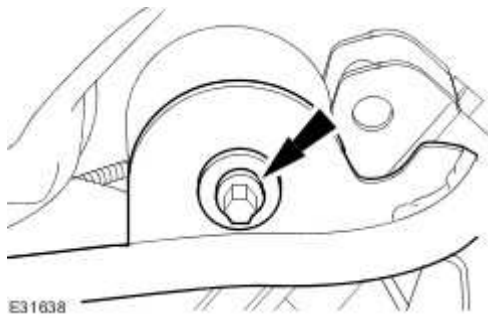


2 . **NOTE:**

Left-hand shown, right-hand similar

Loosely install the 2 rear subframe front retaining bolts.

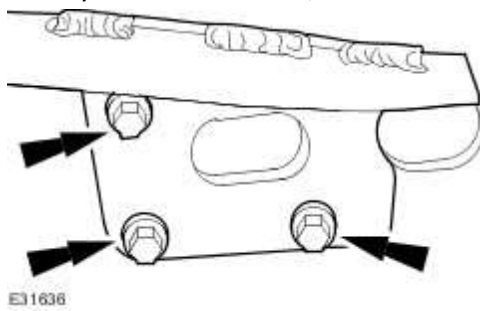
▶ Install new retaining bolts.



3 . NOTE:

Left-hand shown, right-hand similar

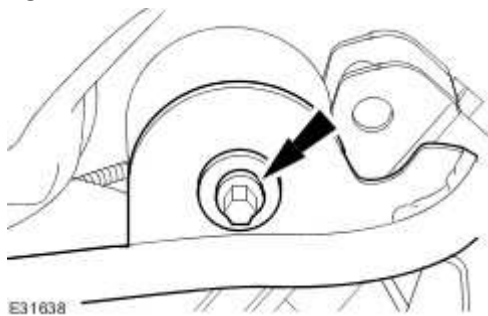
Loosely install the 6 noise, vibration and harshness brace retaining bolts.



4 . NOTE:

Left-hand shown, right-hand similar

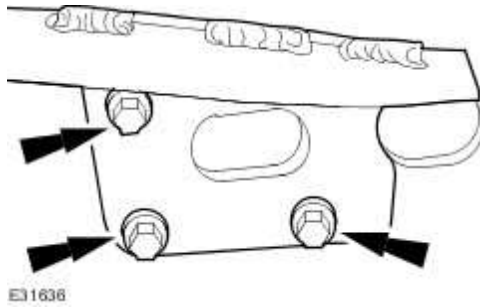
Tighten the 2 bolts to 125 Nm.



5 . **NOTE:**

Left-hand shown, right-hand similar

Tighten the 6 bolts to 48 Nm.



Fuel Tank - 2.7L V6 - TdV6 (19.55.01)

Removal



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in

personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

- 1 . Drain the fuel tank.

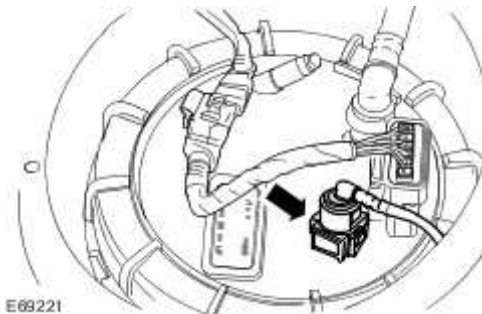
For additional information, refer to Fuel Tank Draining - VIN Range: G45704->G99999

- 2 . **NOTE:**

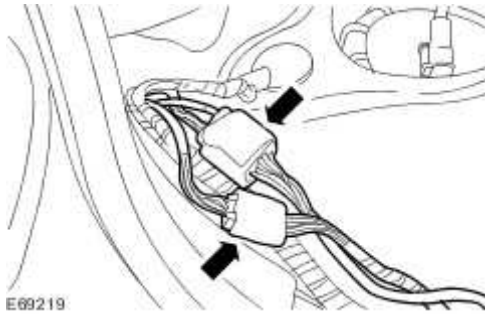
Fit suitable blanking plugs to the exposed ports.

Disconnect the fuel fired booster heater fuel supply line quick release coupling.

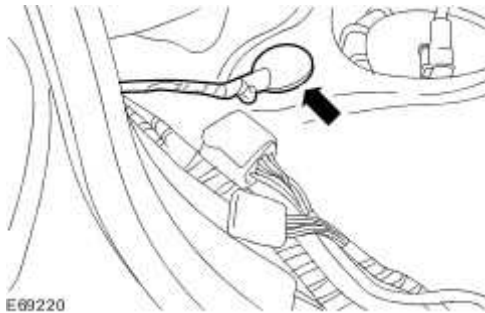
For additional information, refer to Quick Release Coupling - Push Connect



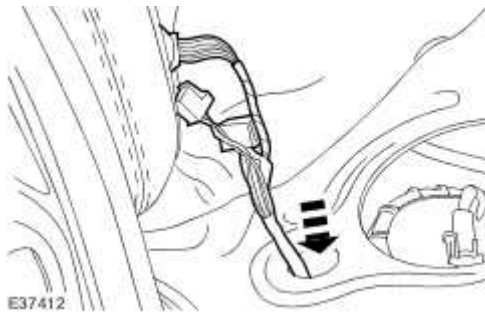
- 3 . Disconnect the fuel tank electrical connectors.



- 4 . Remove the wiring grommet from the floor pan.



- 5 . Feed the wiring loom and connectors through the grommet hole in the vehicle floor pan.

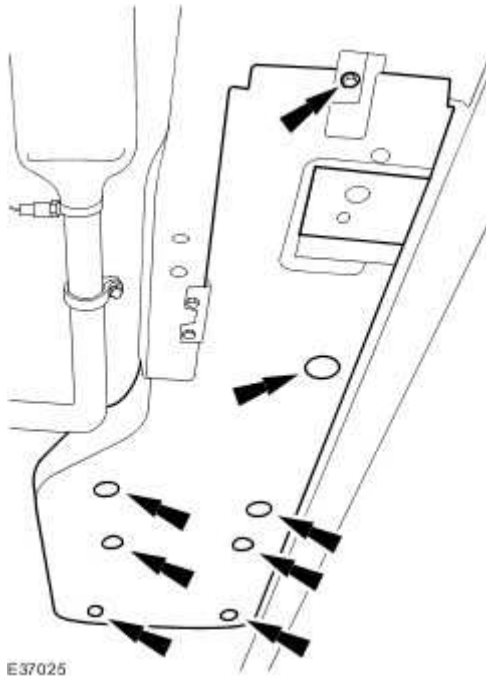


- 6 . Raise the vehicle.
For additional information, refer to Lifting

7 . **NOTE:**

Left-hand shown, right-hand similar.

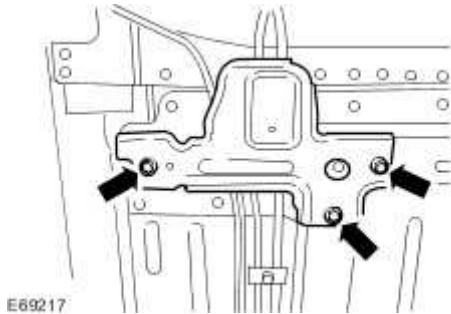
Remove the splash shields.



8 . Remove the driveshaft.

For additional information, refer to Driveshaft (47.15.01)

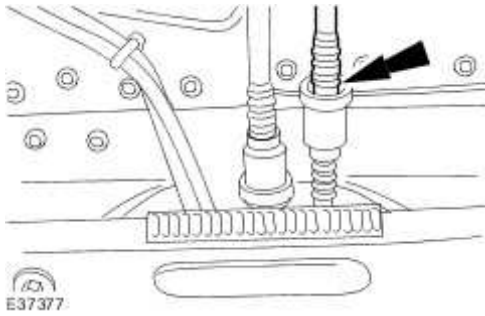
9 . Remove the fuel lines protective bracket.



10 . **NOTE:**

Fit suitable blanking plugs to the exposed ports.

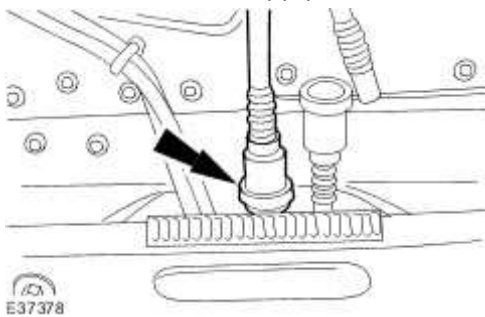
Disconnect the fuel return line.



11 . NOTE:

Fit suitable blanking plugs to the exposed ports.

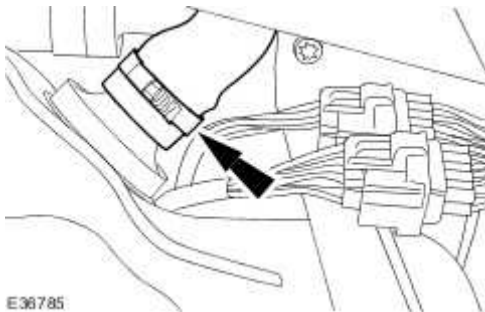
Disconnect the fuel supply line.



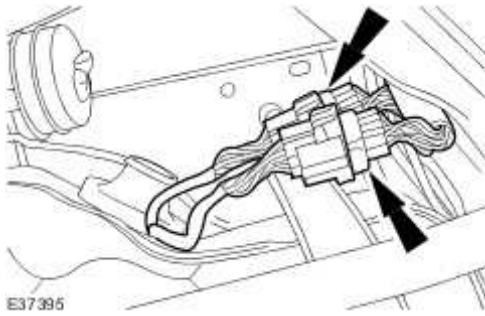
12 . NOTE:

Fit suitable blanking plugs to the exposed ports.

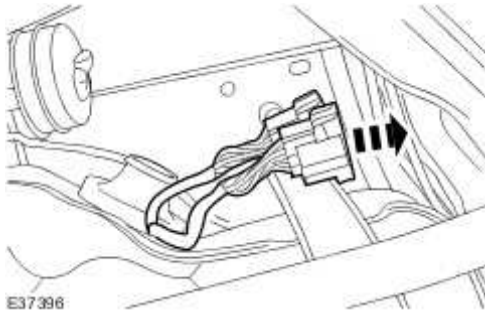
Disconnect the fuel tank filler pipe to fuel tank hose.



13 . Disconnect the rear axle electrical connectors.



14 . Detach the rear axle electrical connectors.



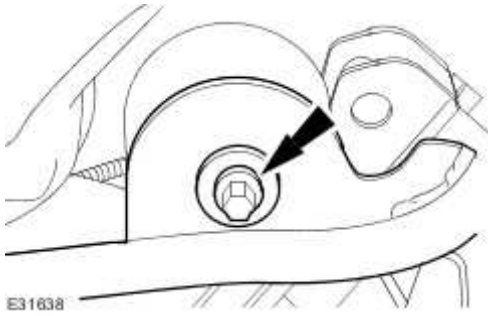
15 . Detach the evaporative emission cannister.



16 . **NOTE:**

Left-hand shown, right-hand similar.

Remove and discard the 2 rear subframe front retaining bolts

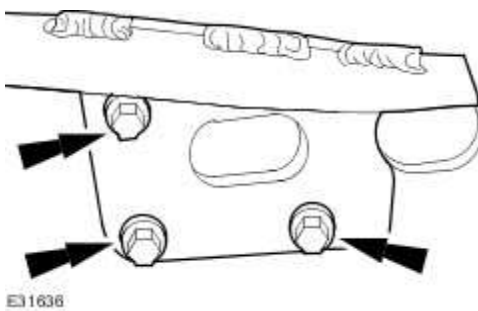


17 . **NOTE:**

Left-hand shown, right-hand similar.

Remove the noise, vibration and harshness brace.

▶ Remove the 6 bolts.



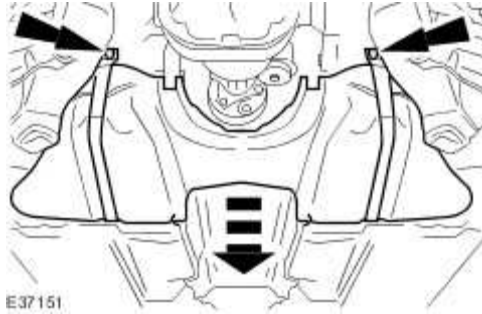
18



CAUTION: When supporting the fuel tank, use a suitable packing material to prevent damage to the underside of the fuel tank.

Remove the fuel tank.

▶ Detach the fuel tank support straps.



Installation



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.




WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

1 . To install, reverse the removal procedure.

 Tighten to 35 Nm.

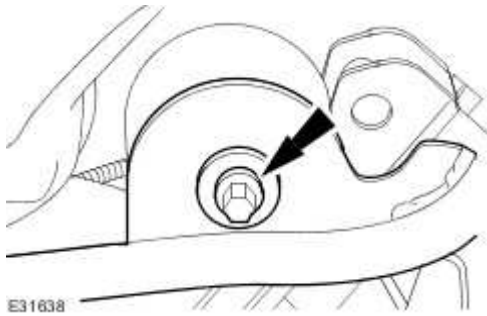


2 . NOTE:

Left-hand shown, right-hand similar

Loosely install the 2 rear subframe front retaining bolts.

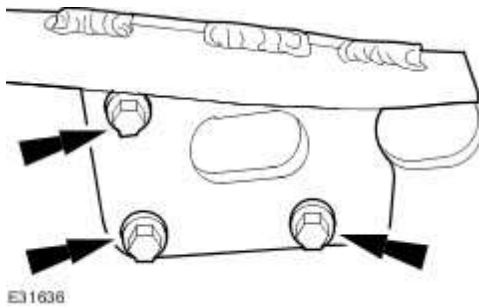
▶ Install new retaining bolts.



3 . NOTE:

Left-hand shown, right-hand similar

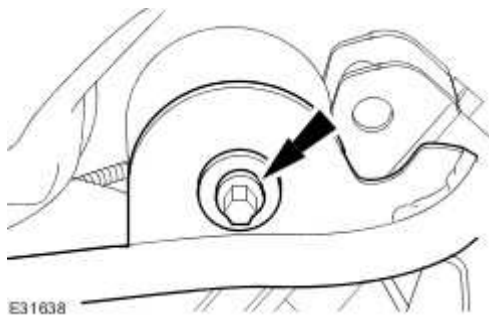
Loosely install the 6 noise, vibration and harshness brace retaining bolts.



4 . NOTE:

Left-hand shown, right-hand similar

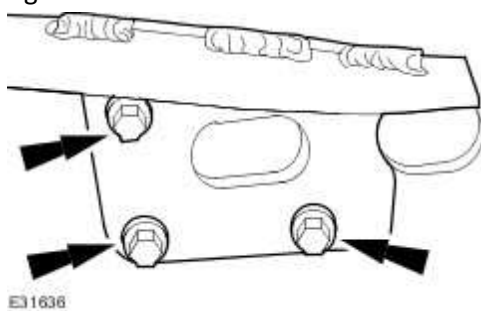
Tighten the 2 bolts to 125 Nm.



5 . NOTE:

Left-hand shown, right-hand similar

Tighten the 6 bolts to 48 Nm.



Fuel Tank Filler Pipe (19.55.33)

Removal



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in

personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.

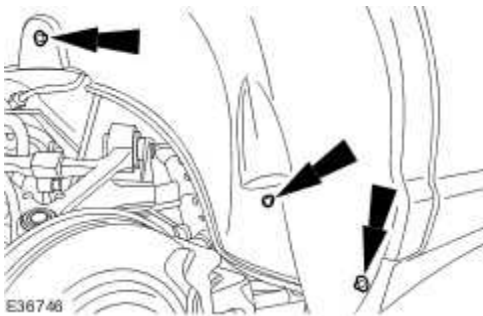


WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.



CAUTION: Ensure filler hose worm drive retaining clip is not overtightened. Failure to follow these instructions may result in damage to the fuel tank assembly.

- 1 . Remove the fuel tank filler pipe cap.
- 2 . Remove the wheel and tire assembly. <<204-04>>
- 3 . Remove the rear fender splash shield retaining screws.

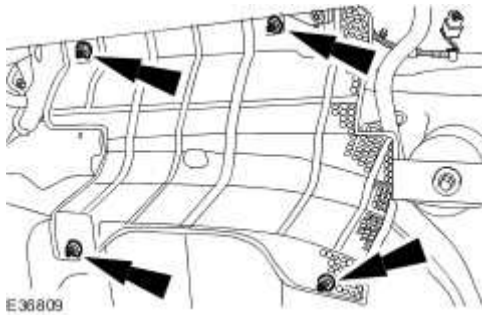


4 . Remove the rear fender splash shield.



5 . Remove the right-hand rear muffler. <<309-00>>

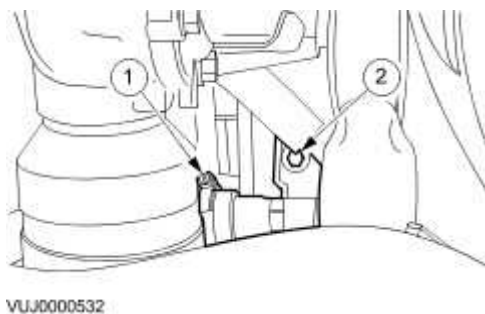
6 . Remove the exhaust heat shield.



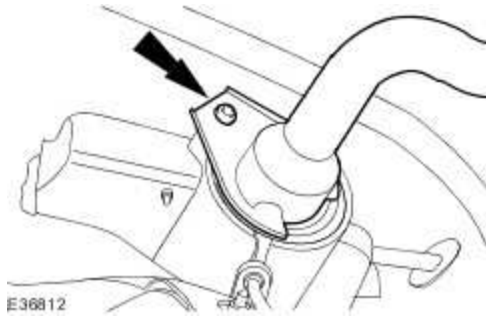
7 . Detach the fuel filler pipe.

1) Release the fuel filler hose retaining clip.

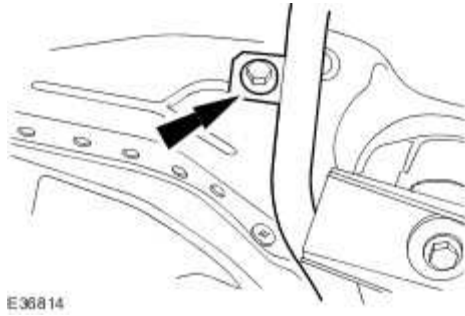
2) Remove the fuel filler pipe securing bolt.



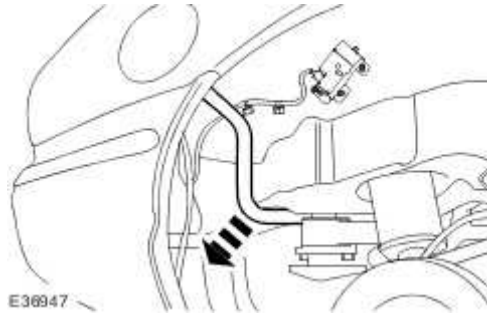
8 . Detach the fuel filler pipe.



9 . Detach the fuel filler pipe.

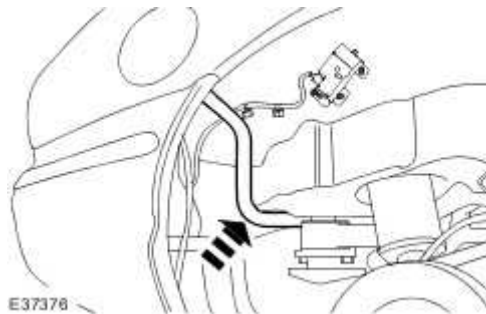


10 . Remove the fuel filler pipe.



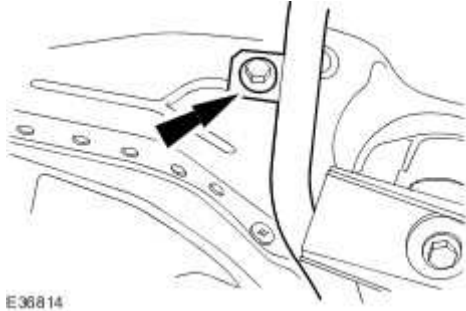
Installation

1 . Install the fuel filler pipe.



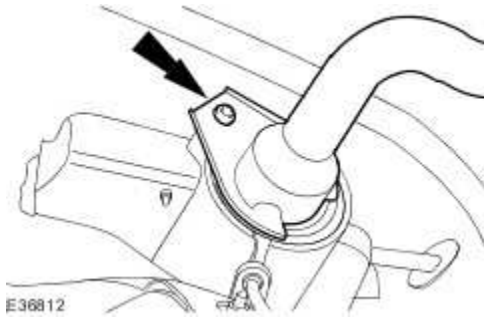
2 . Attach the fuel filler pipe.

▶ Tighten to 5 Nm.



3 . Attach the fuel filler pipe.

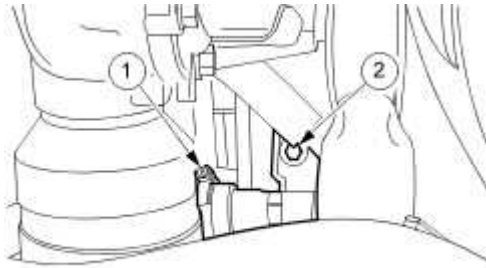
▶ Tighten to 4 Nm.



4 . Attach the fuel filler pipe.

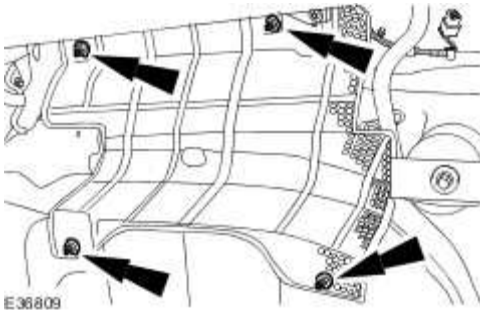
1) Tighten to 2 Nm.

2) Tighten to 5 Nm.



VUJ0000532

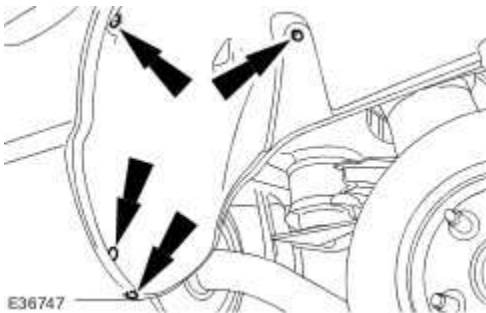
5 . Install the exhaust heat shield.



E36809

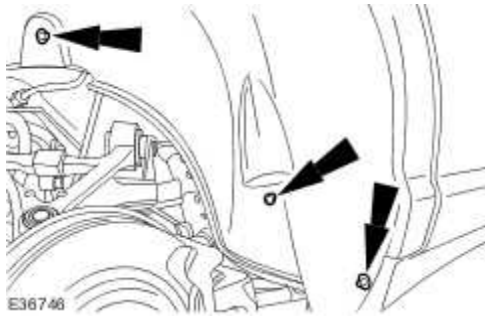
6 . Install the rear fender splash shield.

▶ Refit the rear fender splash shield retaining screws.



E36747

7 . Install the rear fender splash shield retaining screws.



8 . Install the wheel and tire assembly. <<204-04>>

9 . Install the fuel tank filler pipe cap.

Fuel Transfer Pump - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G00442->G45703 (19.45.21)

Special Service Tools



Remover/Installer, Fuel Pump Module/Fuel Transfer Pump Locking Ring
310-072A

Removal

1



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is

switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

Disconnect the battery ground cable. <<414-01>>

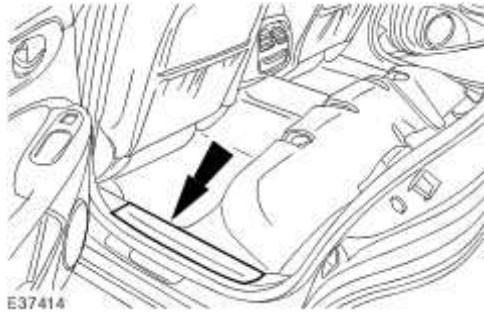
2 . Detach the fuel tank filler pipe cap.

3 . De-pressurize the fuel system. <<310-00>>

4 . Drain the fuel system. <<310-00>>

5 . Remove the rear seat cushion. <<501-10>>

6 . Remove the scuff plate trim panel.



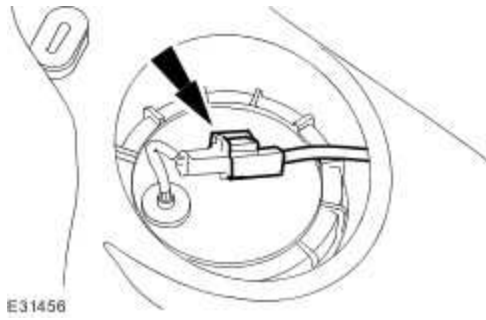
7 . Detach and reposition the floor covering.



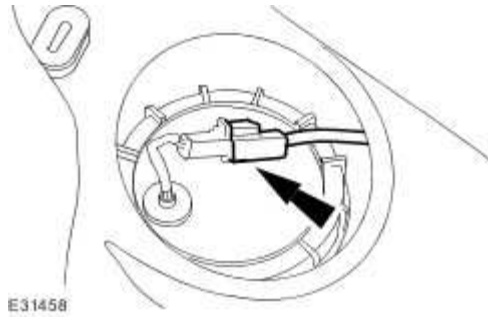
8 . Remove the floor aperture cover.



9 . Detach the fuel transfer pump module electrical connector from the retaining bracket.



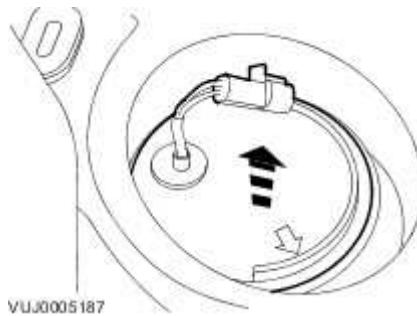
10 . Disconnect the fuel transfer pump electrical connector.



11 . Using the special tool, remove the fuel transfer pump locking ring.



12 . Detach and reposition the upper part of the fuel transfer pump.



13 .



CAUTION: Make sure no damage occurs to the fuel level float.

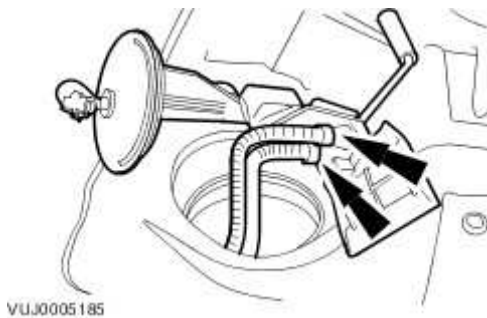
NOTE:

Remove and discard the fuel transfer pump gasket.

Remove the fuel transfer pump.



Disconnect the fuel cross over lines.



Installation

1



CAUTION: Make sure the arrow on the fuel transfer pump lines up with the 'NA' marker on the fuel tank.



CAUTION: Make sure no damage occurs to the fuel level float.

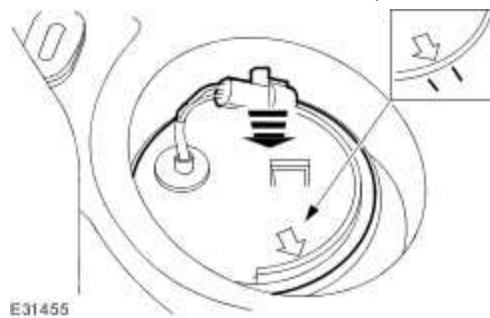
NOTE:

Install a new gasket to the fuel transfer pump flange.

NOTE:

Take care not to stretch the gasket.

To install, reverse the removal procedure.



2 . Tighten to 70 Nm.



Fuel Transfer Unit - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8, VIN Range: G45704->G99999

Special Service Tools



Remover/Installer, Fuel Pump Module/Fuel Transfer Pump Locking Ring
310-146

Removal



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

NOTE:

Federal market vehicles, refer to steps 12 and 21.

NOTE:

Non federal market vehicles, refer to steps 13 and 22.

1 . Open the fuel tank filler pipe flap.

2 . Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

3 . Detach the fuel tank filler pipe cap.

4 Release the pressure in the fuel system.

- . For additional information, refer to Fuel System Pressure Release - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (19.50.02)

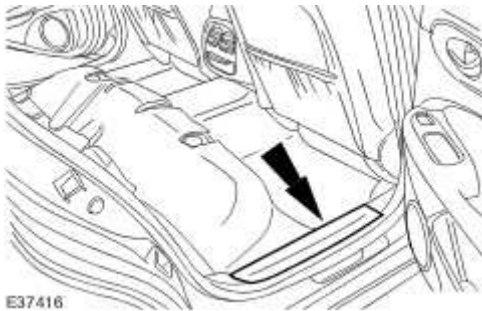
5 . Drain the fuel system.

For additional information, refer to Fuel Tank Draining - VIN Range: G45704->G99999

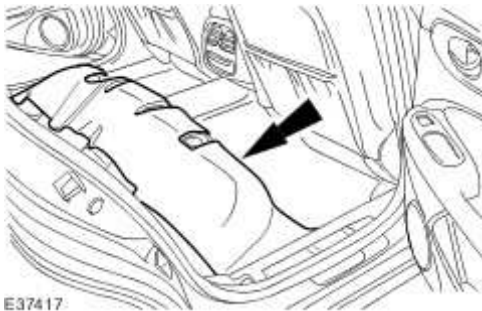
6 . Remove the rear seat cushion.

For additional information, refer to Rear Seat Cushion (76.70.37)

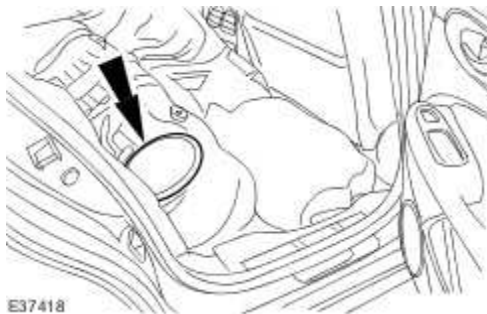
7 . Remove the scuff plate trim panel.



8 . Detach and reposition the floor covering.

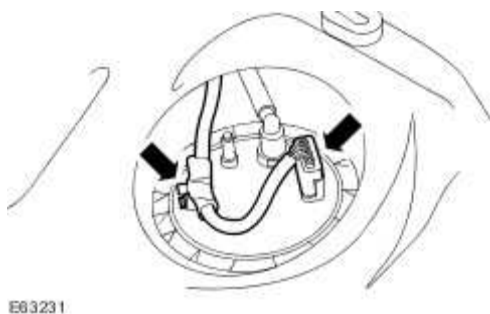


9 . Remove the floor aperture cover.

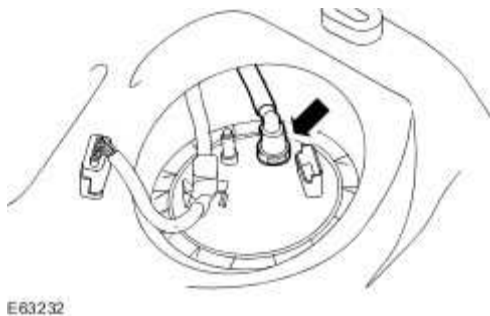


10 . Disconnect the fuel pump module electrical connector.

▶ Detach the fuel pump module wiring harness from the retaining bracket.



11 . Disconnect the fuel pump module quick release coupling.

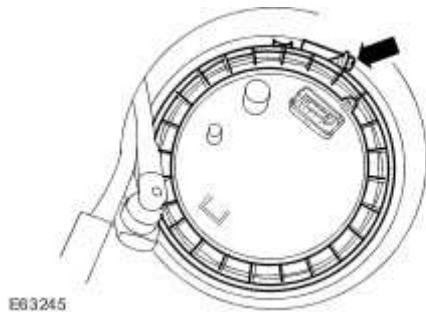


12 . **NOTE:**

Federal market vehicles only.

Remove the fuel pump module locking ring.

▶ Remove and discard the O-ring seal.

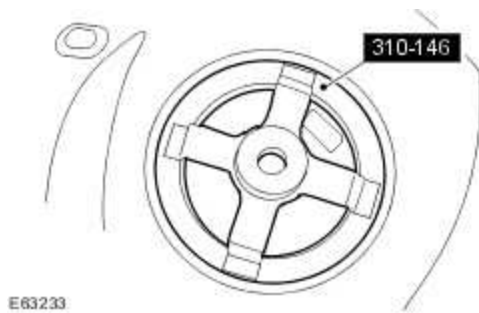


13 . NOTE:

Non federal market vehicles only.

Using the special tool, remove the fuel pump module locking ring.

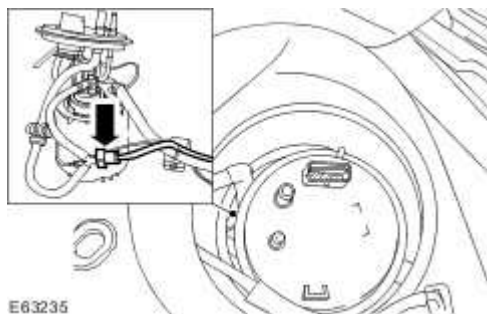
▶ Remove and discard the O-ring seal.



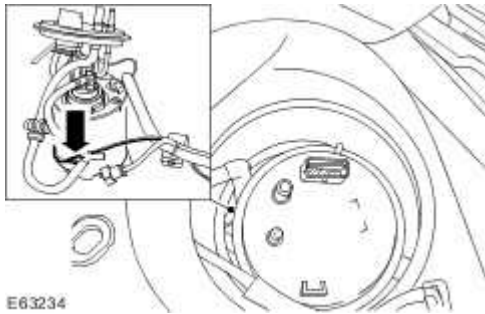
14 . NOTE:

All vehicles.

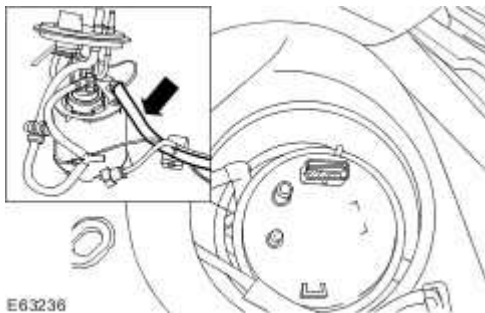
Disconnect the fuel transfer unit transfer feed tube.



15 . Disconnect the left-hand fuel sender gauge electrical connector.



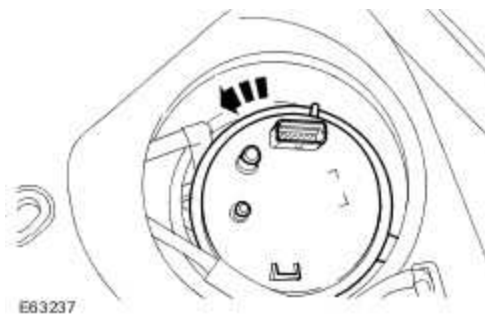
16 . Disconnect the fuel transfer unit transfer return tube.



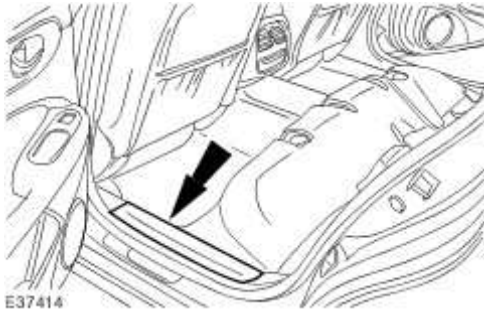
17 Release the fuel pump module.



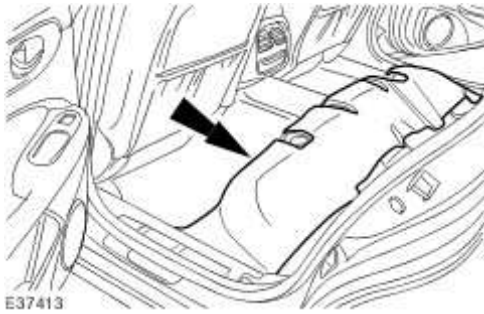
Press down and rotate the base of the fuel pump module counter-clockwise.



18 . Remove the scuff plate trim panel.



19 . Detach and reposition the floor covering.



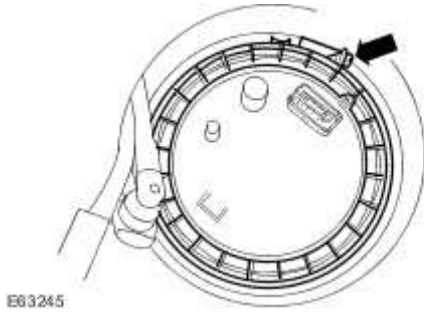
20 . Remove the floor aperture cover.



21 . **NOTE:**

Federal market vehicles only.

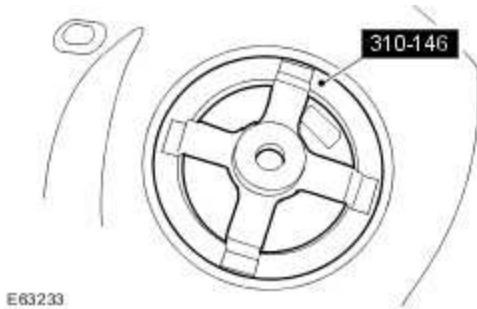
Remove the fuel transfer unit locking ring.



22 . NOTE:

Non federal market vehicles only.

Using the special tool, remove the fuel transfer unit locking ring.



23



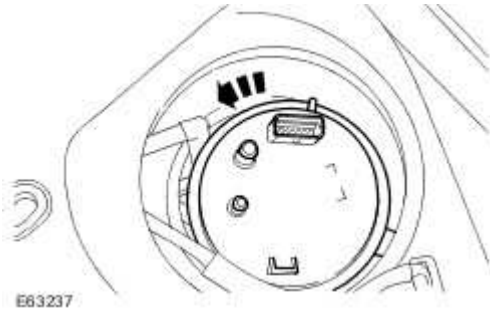
CAUTION: Make sure no damage occurs to the fuel level float.

NOTE:

All vehicles.

Remove the fuel transfer unit.

- Press down and rotate the base of the fuel transfer unit counter-clockwise.
- Remove and discard the O-ring seal.



Installation

NOTE:

Federal market vehicles, refer to steps 3 and 13.

NOTE:

Non federal market vehicles, refer to steps 2 and 12.

1 .



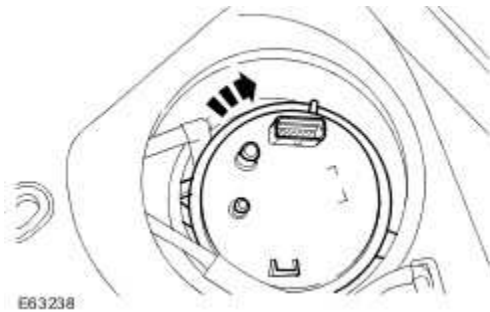
CAUTION: Make sure no damage occurs to the fuel level float.

NOTE:

All vehicles.

Install the fuel transfer unit.

- ▶ Press down and rotate the base of the fuel transfer unit clockwise.
- ▶ Install a new O-ring seal.

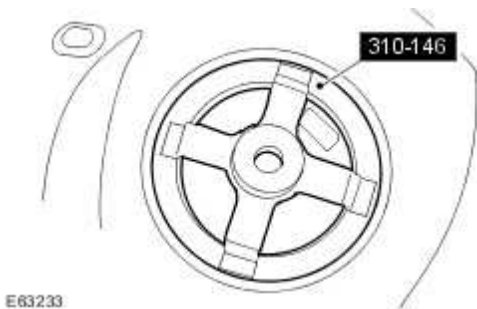


2 . NOTE:

Non federal market vehicles only.

Using the special tool, install the fuel transfer unit locking ring.

▶ Tighten to 60 Nm.

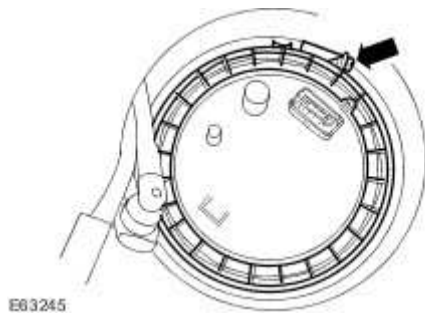


3 . NOTE:

Federal market vehicles only.

Install the fuel transfer unit locking ring.

▶ Tighten to 4 Nm.



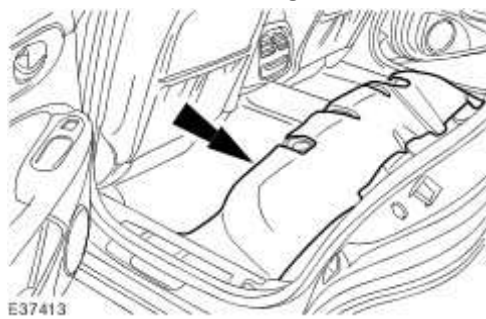
4 . NOTE:

All vehicles.

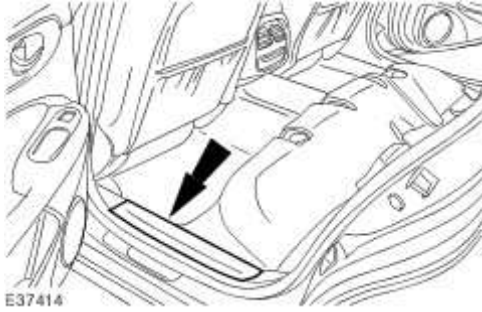
Install the floor aperture cover.





5 . Attach the floor covering.




6 . Install the scuff plate trim panel.

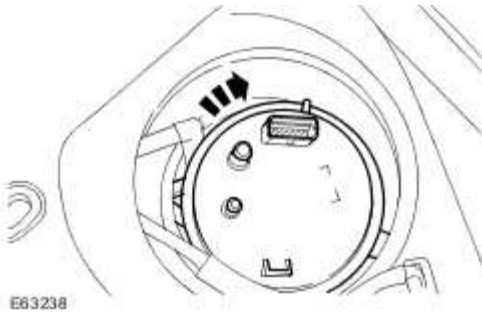


- 7
- 
CAUTION: On vehicles with supercharger make sure the arrow on the fuel pump module and the 'SC' marker on the fuel tank are aligned.



CAUTION: On vehicles without supercharger make sure the arrow on the fuel transfer unit and the 'NA' marker on the fuel tank are aligned.

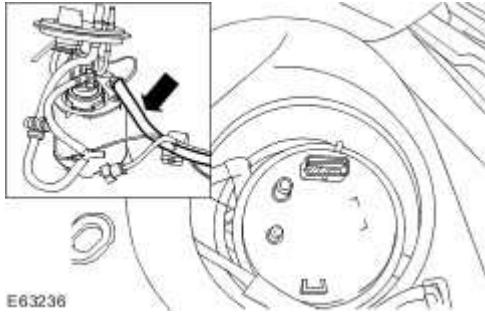
Secure the fuel pump module.

-  Press down and rotate the base of the fuel pump module clockwise.



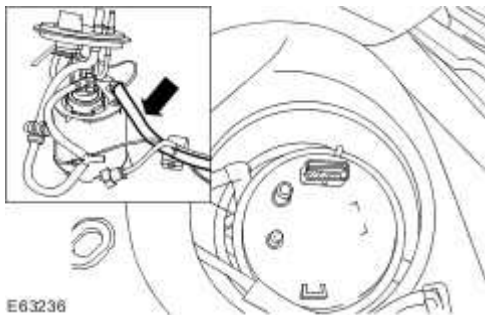
- 8 Connect the fuel transfer unit transfer return tube.

-  Make sure the coupling has latched onto the fuel pump module by pulling the tube after the connection has been made.

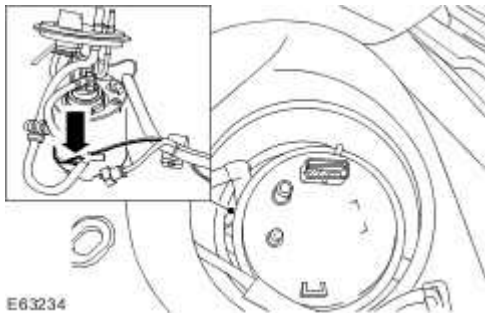


9 Connect the fuel transfer unit transfer return tube.

- ▶ Make sure the coupling has latched onto the fuel pump module by pulling the tube after the connection has been made.

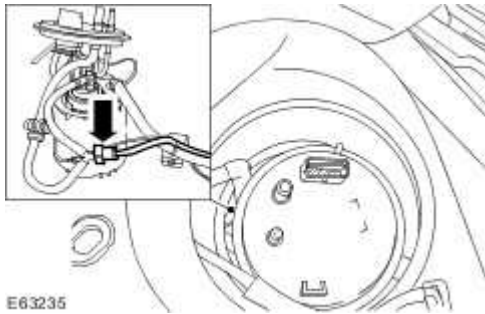


10 . Connect the left-hand fuel sender gauge electrical connector.



11 Connect the fuel transfer unit transfer feed tube.

- ▶ Make sure the quick release coupling has latched onto the fuel pump module fuel tube by pulling the tube after the connection has been made.



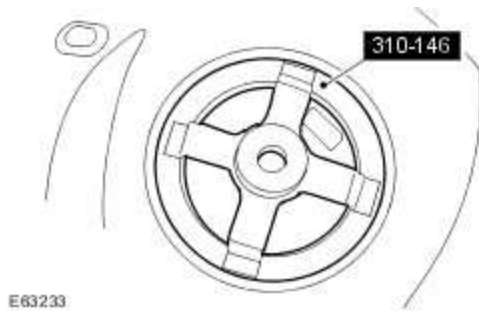
12 . NOTE:

Non federal market vehicles only.

Using the special tool, install the fuel pump module locking ring.

▶ Install a new O-ring seal.

▶ Tighten to 60 Nm.

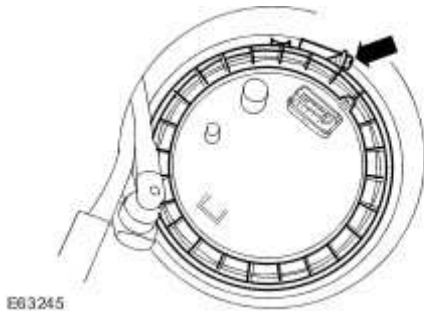


13 . NOTE:

Federal market vehicles only.

Install the fuel pump module locking ring.

▶ Tighten to 4 Nm.

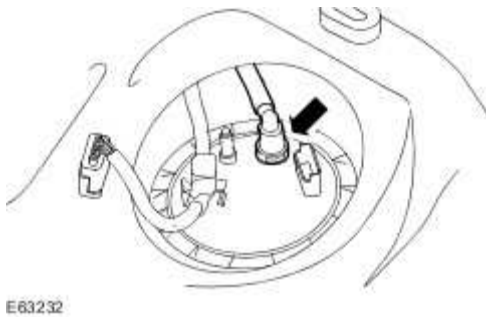


14 NOTE:

All vehicles.

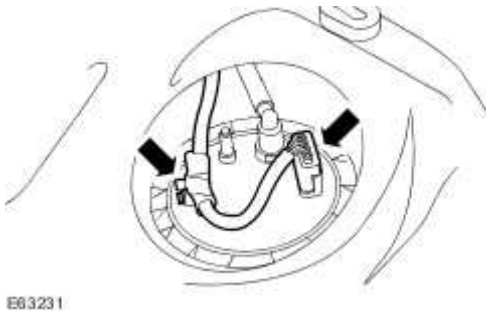
Connect the fuel pump module quick release coupling.

- ▶ Make sure the quick release coupling has latched onto the fuel pump module fuel pipe by pulling the pipe after the connection has been made.

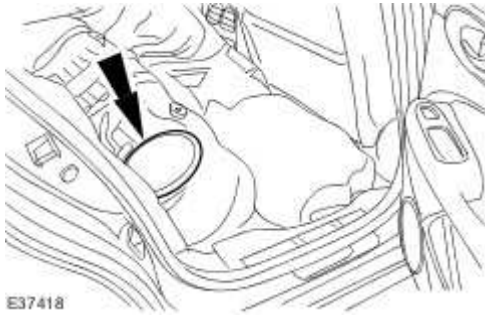


15 . Connect the fuel pump module electrical connector.

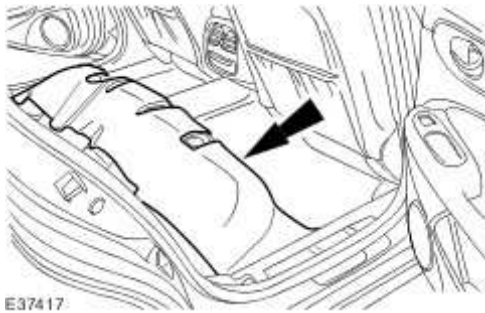
- ▶ Attach the fuel pump module wiring harness to the retaining bracket.



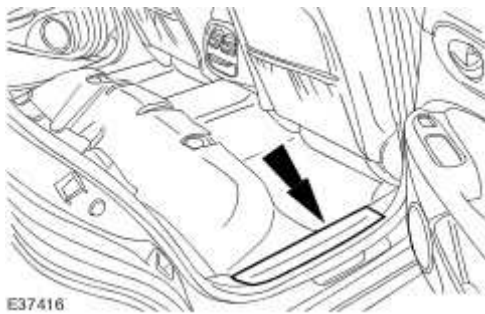
16 . Install the floor aperture cover.



17 . Attach the floor covering.



18 . Install the scuff plate trim panel.



19 . Install the rear seat cushion.

For additional information, refer to Rear Seat Cushion (76.70.37)

20 . Attach the fuel tank filler pipe cap.

21 . Connect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)

22 . Close the fuel tank filler pipe flap.

Fuel Transfer Unit - 2.7L V6 - TdV6

Special Service Tools



Remover/Installer, Fuel Pump Module/Fuel Transfer Pump Locking Ring
310-146

Removal



WARNING: Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.



WARNING: Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.



WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.



WARNING: The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.



WARNING: After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.



WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.



WARNING: If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



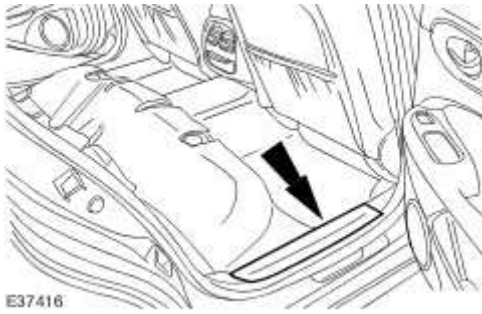
WARNING: If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.



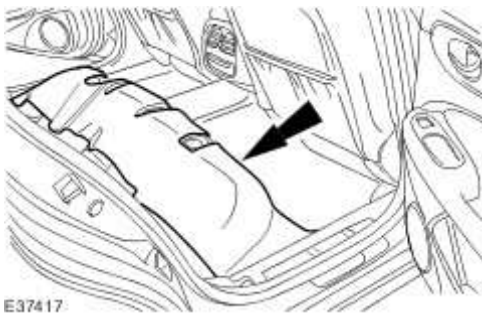
WARNING: Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

- 1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect
- 2 . Detach the fuel tank filler pipe cap.
- 3 Release the pressure in the fuel system.
 - . For additional information, refer to Fuel System Pressure Release - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8/3.0L NA V6 - AJ27/3.5L NA V8 - AJV8 (19.50.02)
- 4 . Drain the fuel system.
For additional information, refer to Fuel Tank Draining - VIN Range: G45704->G99999
- 5 . Remove the rear seat cushion.
For additional information, refer to Rear Seat Cushion (76.70.37)

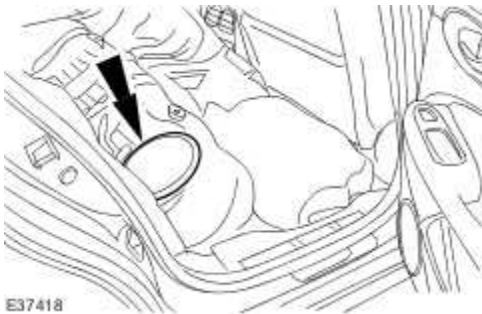
6 . Remove the scuff plate trim panel.



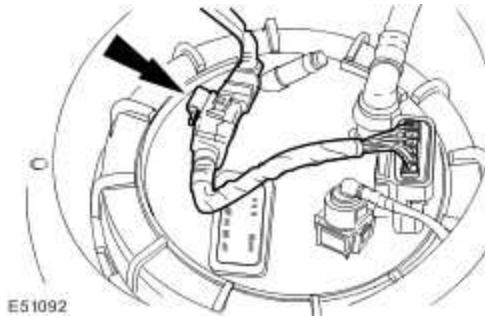
7 . Detach and reposition the floor covering.



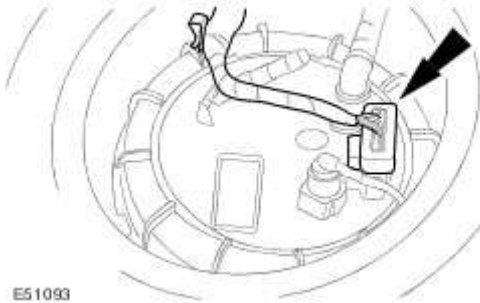
8 . Remove the floor aperture cover.



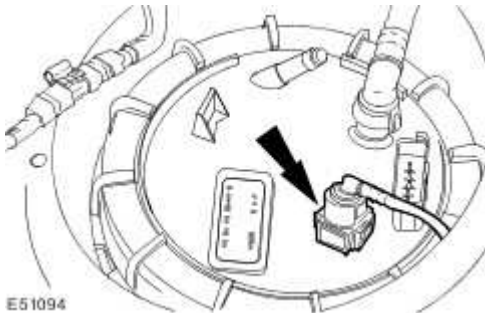
9 . Detach the fuel pump module electrical connector from the retaining bracket.



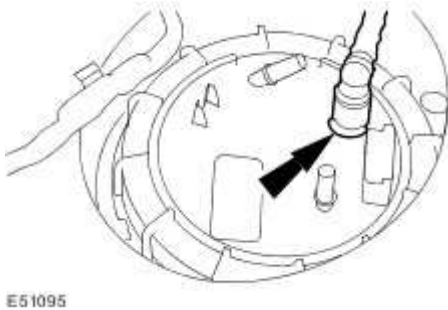
10 . Disconnect the fuel pump module electrical connector.



11 . Disconnect the fuel fired booster heater fuel supply line quick release coupling.
For additional information, refer to Quick Release Coupling - Push Connect



12 . Disconnect the fuel supply line quick release coupling.
For additional information, refer to Quick Release Coupling - Push Connect



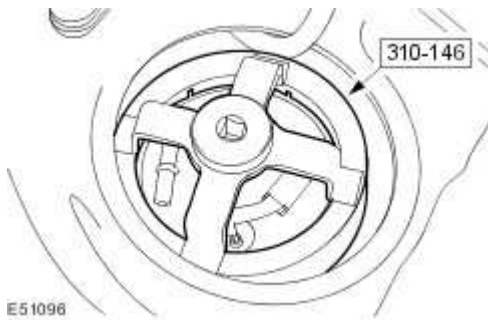
13



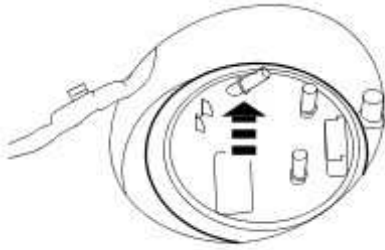
CAUTION: Make sure no damage occurs to the fuel pump module when removing the locking ring.

Using the special tool, remove the fuel pump module locking ring.

▶ Remove and discard the O-ring seal.

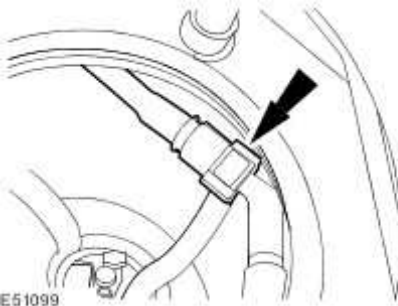


14 . Detach and reposition the upper part of the fuel pump module.

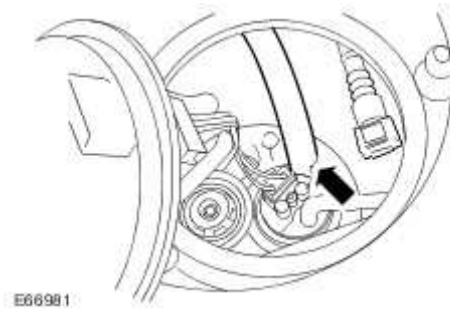


15 . Disconnect the fuel transfer line quick release coupling.

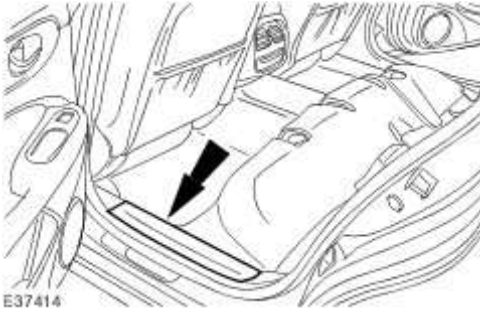
For additional information, refer to Quick Release Coupling - Push Connect



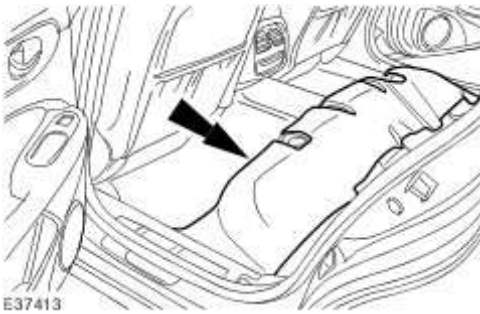
16 . Disconnect the fuel transfer line.



17 . Remove the scuff plate trim panel.



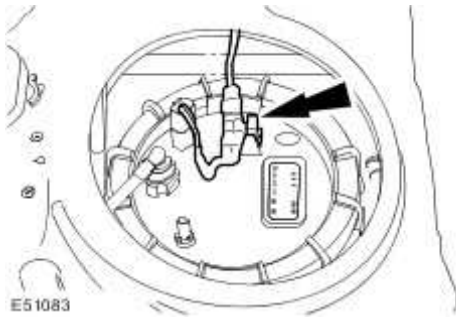
18 . Detach and reposition the floor covering.



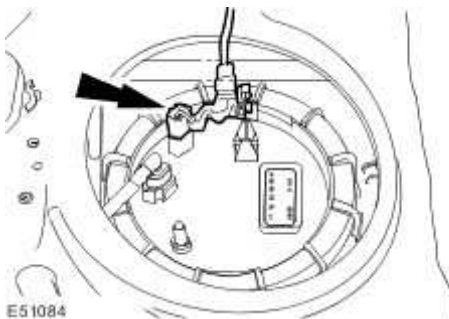
19 . Remove the floor aperture cover.



20 . Detach the fuel transfer unit electrical connector from the retaining bracket.

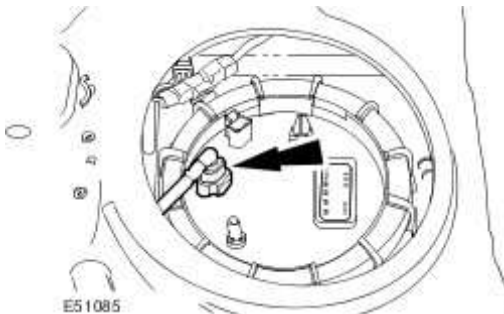


21 . Disconnect the fuel transfer unit electrical connector.



22 . Disconnect the fuel return line from the fuel transfer unit.

For additional information, refer to Quick Release Coupling - Push Connect



23

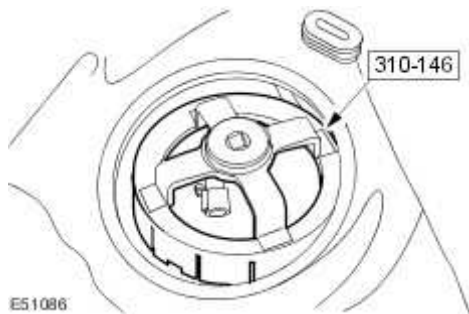


CAUTION: Make sure no damage occurs to the fuel transfer unit when removing the locking ring.

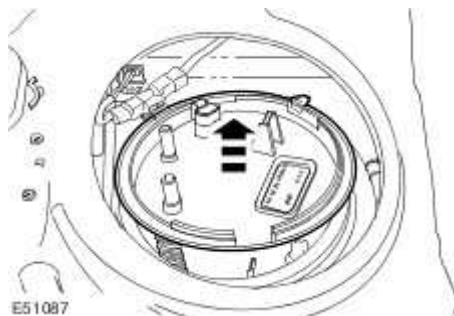
Using the special tool, remove the fuel transfer unit locking ring.



Remove and discard the O-ring seal.



24 . Detach and reposition the upper part of the fuel transfer unit.

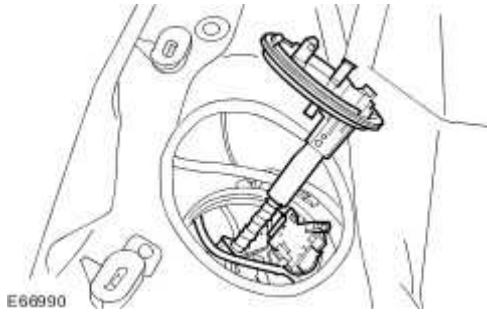


25 .  **CAUTION:** Make sure no damage occurs to the fuel level float.

Remove the fuel level float.

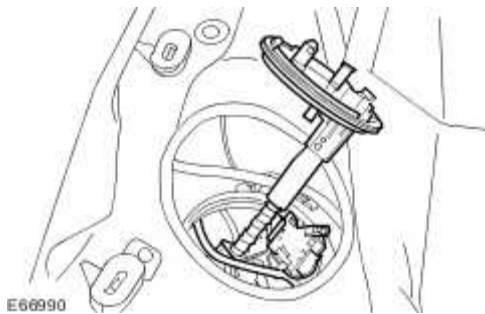


26 . Remove the fuel transfer unit.



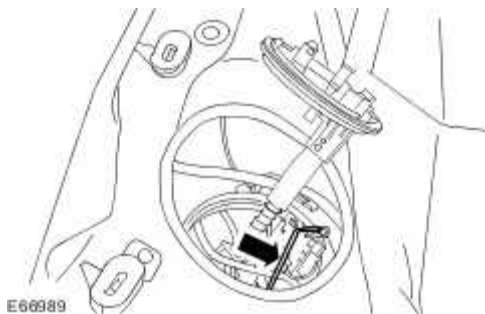
Installation

- 1 . Install the fuel transfer unit.

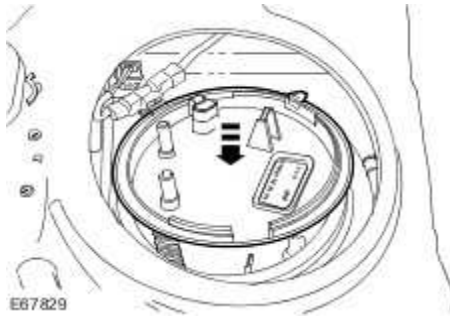


- 2 .  **CAUTION:** Make sure no damage occurs to the fuel level float.

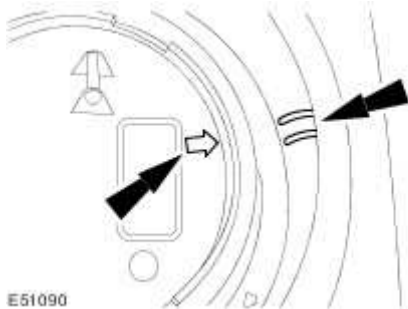
Install the fuel level float.




- 3 . Reposition and align the upper part of the fuel transfer unit.



4 . Align the arrow on the fuel transfer unit with the alignment marks on the fuel tank.

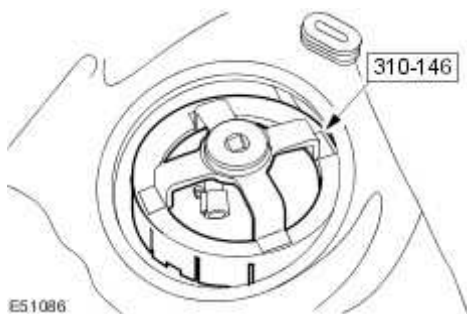


5  **CAUTION:** Make sure no damage occurs to the fuel transfer unit when installing the locking ring.

Using the special tool, install the fuel transfer unit locking ring.

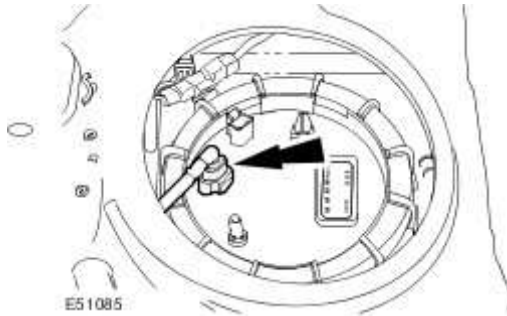
► Install a new O-ring seal.

► Tighten to 60 Nm.

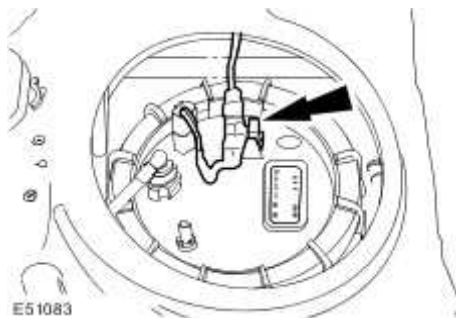


6 . Connect the fuel return line to the fuel transfer unit.

For additional information, refer to Quick Release Coupling - Push Connect



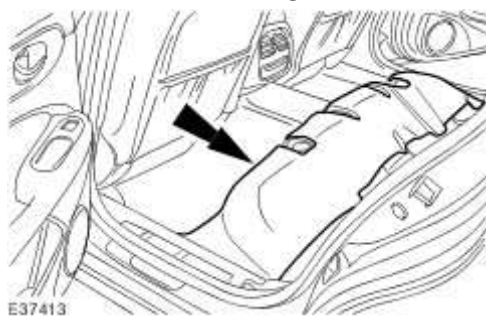
7 . Attach the fuel transfer unit electrical connector to the retaining bracket.



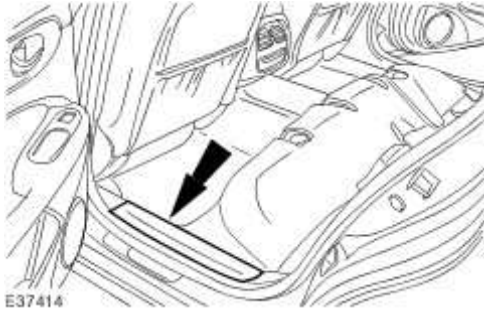
8 . Install the floor aperture cover.



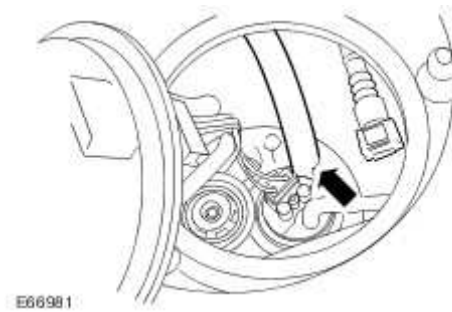
9 . Attach the floor covering.



10 . Install the scuff plate trim panel.

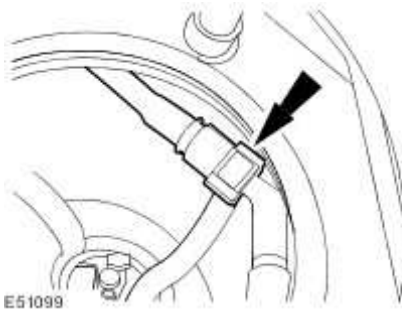


11 . Connect the fuel transfer line.

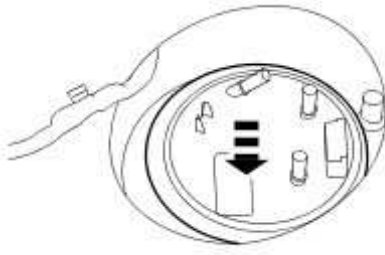


12 . Connect the fuel transfer pipe quick release coupling.

For additional information, refer to Quick Release Coupling - Push Connect .

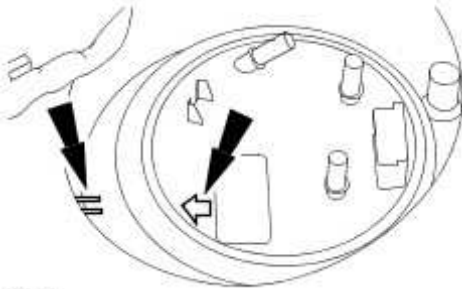


13 . Reposition and align the upper part of the fuel pump module.



E51102

14 . Align the arrow on the fuel pump module with the alignment marks on the fuel tank.



E51103

15

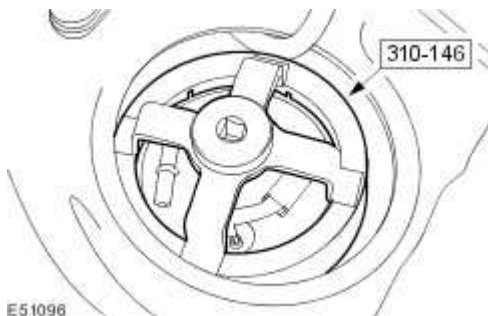


CAUTION: Make sure no damage occurs to the fuel pump module when installing the locking ring.

Using the special tool, install the fuel pump module locking ring.

▶ Install a new O-ring seal.

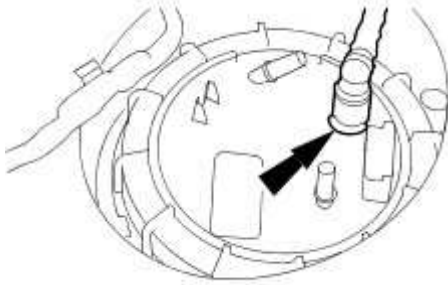
▶ Tighten to 60 Nm.



E51098

16 . Connect the fuel pump module quick release coupling.

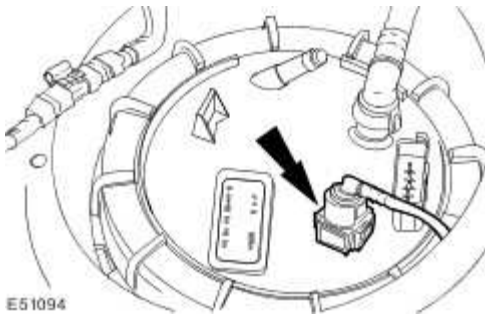
For additional information, refer to Quick Release Coupling - Push Connect



E51095

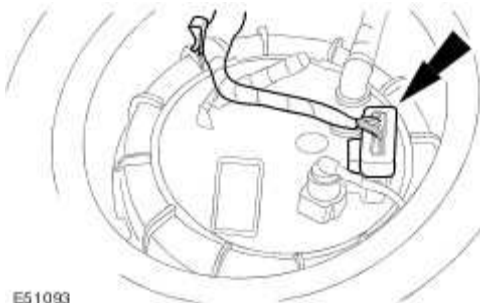
17 . Connect the fuel fired booster heater fuel supply line quick release coupling.

For additional information, refer to Quick Release Coupling - Push Connect



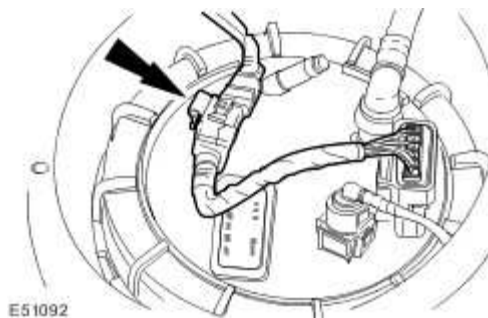
E51094

18 . Connect the fuel pump module electrical connector.



E51093

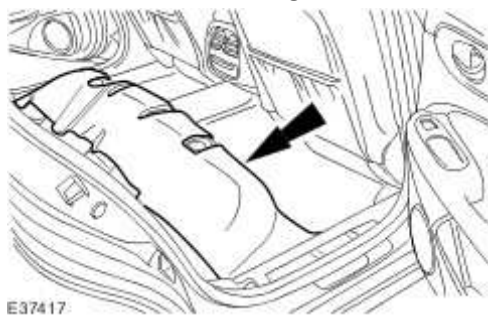
19 . Attach the fuel pump module electrical connector to the retaining bracket.



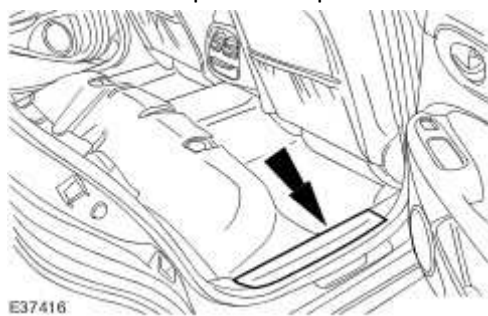
20 . Install the floor aperture cover.



21 . Attach the floor covering.



22 . Install the scuff plate trim panel.



23 . Install the rear seat cushion.

For additional information, refer to Rear Seat Cushion (76.70.37)

24 . Attach the fuel tank filler pipe cap.

25 . Close the fuel tank filler pipe flap.

26 . Connect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)

Inertia Fuel Shutoff (IFS) Switch (18.30.35)

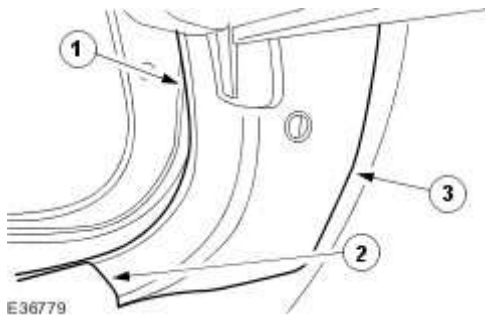
Removal

1 . Remove the cowl side trim panel.

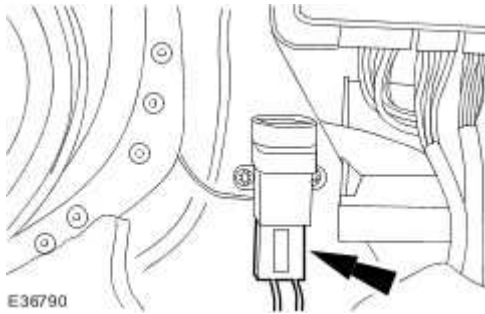
1) Detach the door opening weatherstrip.

2) Detach the scuff plate trim panel.

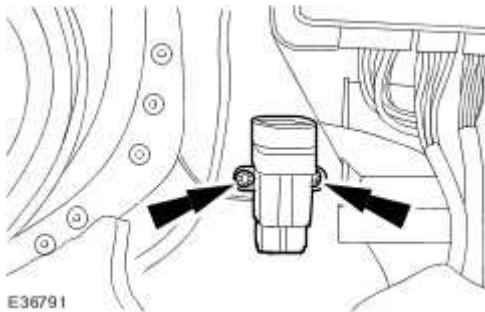
3) Remove the cowl side trim panel.



2 . Disconnect the inertia fuel shutoff (IFS) switch electrical connector.



3 . Remove the IFS switch.



Installation

- 1 . To install, reverse the removal procedure.

310-02 : Acceleration Control

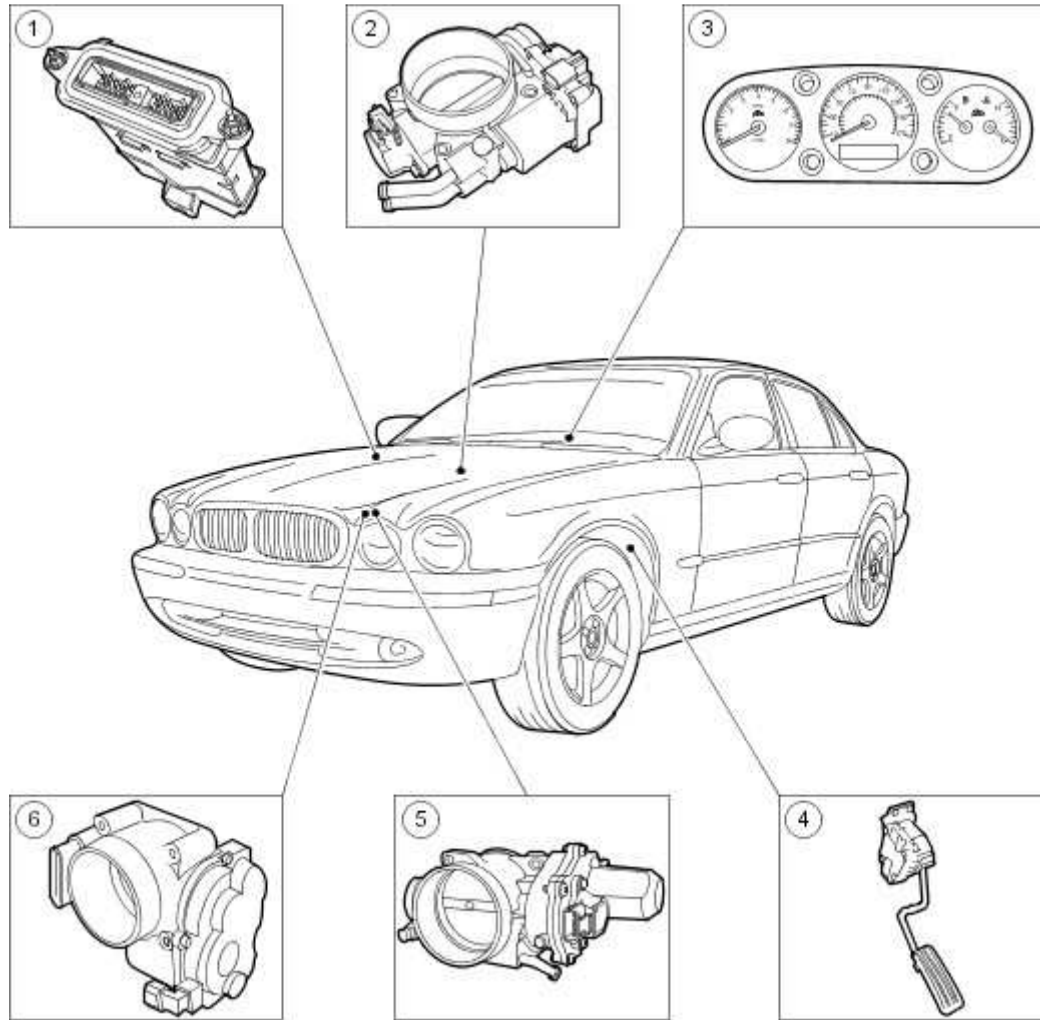
Specifications

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Accelerator pedal	10	7	89

Acceleration Control



E31773

Item	Part Number	Description
1	—	Engine control module (ECM)
2	—	Throttle body (Vehicles with supercharger)
3	—	Instrument cluster (IC)
4	—	Accelerator pedal
5	—	Throttle body (Vehicles without supercharger)
6	—	Throttle body (Vehicles with 3.0L engine)

When the accelerator pedal is applied, the two accelerator position sensors measure the pedal movement and provide an output voltage proportional to pedal movement to the engine control module (ECM). Two sensors are used as a safety feature. The accelerator pedal has

two return springs to guarantee the accelerator returns to the zero position when the pedal is released. Whilst comparison checks are carried out on the accelerator pedal for rational values, communications within the ECM are monitored for rational values and responses.

The ECM then provides an output, based on the accelerator pedal position, which drives a DC motor which positions the throttle blade at the requested angle. The throttle blade position is monitored by two sensors for rational value.

The acceleration control system has the necessary safety features to monitor the correct operation of all the components. Depending on the failure state, the acceleration control system can be put in appropriate safe state, from restricting the RPM to limp home mode.

Acceleration Control

- 1 . Verify the customer concern by operating the system.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.
- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 4 . If the concern is not visually evident, use a fault code reader to retrieve fault codes before proceeding to the Symptom Chart.

DTC P1240, P1241, P1242

Possible Source(s):

Accelerator pedal power supply circuit out of range

Action(s) to take:

GO to Pinpoint Test A.

DTC P1122, P1123, P1215, P1216, P1344

Possible Source(s):

Accelerator pedal demand sensor output circuit out of range

Action(s) to take:

GO to Pinpoint Test B.

DTC P0121, P0122, P0123

Possible Source(s):

Throttle position sensor circuit out of range

Action(s) to take:

GO to Pinpoint Test C.

DTC P1251, P1658, P1631,
P1657

Possible Source(s):

Throttle motor relay failure

Action(s) to take:

GO to Pinpoint Test D.

DTC P1243

Possible Source(s):

Accelerator pedal demand sensor ground; open circuit

Action(s) to take:

GO to Pinpoint Test E.

DTC P1611, P1633

Possible Source(s):

Engine control module (ECM) failure

Action(s) to take:

INSTALL a new ECM. For additional information, refer to <<303-14>>.

DTC P1254, P1250

Possible Source(s):

Throttle limp home spring malfunction.

Action(s) to take:

INSTALL a new throttle body. For additional information refer to <<303-14>>.

PINPOINT TEST G240070p1 : DTC P1240, P1241, P1242

G240070t1 : CHECK THE POWER SUPPLY TO THE ACCELERATOR PEDAL DEMAND SENSOR

1. TURN the ignition switch to the RUN position. 2. Measure the voltage between electrical connector CA88 pin 5 (Y) and ground. 3. Measure the voltage between electrical connector CA88 pin 2 (Y) and ground.

Is the voltage less than 4.5 volts?

-> Yes

GO to Pinpoint Test G240070t2.

.

-> **No**

DIAGNOSE the electronic engine control system. For additional information, refer to <<303-14>>.

G240070t2 : CHECK CONTINUITY OF THE ACCELERATOR PEDAL DEMAND SENSOR POWER SUPPLY CIRCUIT

1. Turn the ignition switch to the OFF position. 2. Disconnect the ECM electrical connector PI 1 and the accelerator pedal electrical connector CA 88. 3. Measure the resistance between PI 1 pin 13 (Y) and CA88 pin 5 (Y). 4. Measure the resistance between PI 1 pin 12 (OY) and CA88 pin 2 (OY).

Is the resistance less than 5 ohms?

-> **Yes**

GO to Pinpoint Test G240070t3.

.

-> **No**

REPAIR the power supply circuit from the ECM to the accelerator pedal. CLEAR the DTC. TEST the system for normal operation.

G240070t3 : CHECK THE ACCELERATOR PEDAL DEMAND SENSOR POWER SUPPLY FOR A SHORT CIRCUIT TO GROUND

1. Measure the resistance between CA88 pin 5 (Y) and ground. 2. Measure the resistance between CA88 pin 2 (OY) and ground.

Is the resistance greater than 10,000 ohms?

-> **Yes**

DIAGNOSE the electronic engine control system. For additional information, refer to <<303-14>>.

-> **No**

REPAIR the power supply circuit from the ECM to the accelerator pedal. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G240070p2 : DTC P1122, P1123, P1215, P1216, P1344

G240070t4 : CHECK THE ACCELERATOR PEDAL DEMAND SENSOR OUTPUT

1. Turn the ignition switch to the RUN position. 2. Measure the voltage between electrical connector CA88 pin 1 (O) and ground with the accelerator pedal released and with the accelerator pedal at full throttle. 3. Measure the voltage between electrical connector CA88 pin 4 (B) and ground with the accelerator pedal released and with the accelerator pedal at full throttle.

Does the voltage vary between 0.75 volts and 3.5 volts?

-> **Yes**

GO to Pinpoint Test G240070t7.

.

-> **No**

GO to Pinpoint Test G240070t5.

.

G240070t5 : CARRY OUT AN ACCELERATOR PEDAL POSITION SENSOR COMPONENT CHECK

1. Remove the accelerator pedal. For additional information, refer to
2. Measure the resistance between pin 1 and pin 6 of the accelerator pedal. 3. Measure the resistance between pin 4 and pin 5 of the accelerator pedal.

Is the resistance between pin 1 and pin 6 between 546 and 1134 ohms, and between pin 4 and pin 5 between 975 and 2025 ohms?

-> **Yes**

GO to Pinpoint Test G240070t6.

.

-> **No**

INSTALL a new accelerator pedal. For additional information, refer to
CLEAR the DTC. TEST the system for normal operation.

G240070t6 : CHECK THE ACCELERATOR PEDAL DEMAND SENSOR CIRCUIT FOR A SHORT TO GROUND

1. Disconnect the ECM electrical connector PI 1. 2. Measure the resistance between electrical connector CA 88 pin 1 (O) and ground. 3. Measure the resistance between electrical connector CA88 pin 4 (B) and ground.

Is the resistance greater than 10,000 ohms?

-> **Yes**

GO to Pinpoint Test G240070t7.

.

-> **No**

REPAIR the accelerator pedal demand sensor circuit from the ECM to the accelerator pedal. CLEAR the DTC. TEST the system for normal operation.

G240070t7 : CHECK THE ACCELERATOR PEDAL DEMAND SENSOR CIRCUIT FOR OPEN CIRCUIT

1. Disconnect the ECM electrical connector PI 1 and the accelerator pedal electrical connector CA 88.
2. Measure the resistance between PI 1 pin 103 (O) and CA 88 pin 1 (O). 3. Measure the resistance between PI 1 pin 102 (B) and CA 88 pin 4 (B).

Is the resistance less than 5 ohms?

-> Yes

DIAGNOSE the electronic engine control system. For additional information, refer to <<303-14>>.

-> No

REPAIR the accelerator pedal demand sensor circuit from the ECM to the accelerator pedal. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G240070p3 : DTC P0121, P0122, P0123

G240070t8 : CHECK THE POWER SUPPLY TO THE THROTTLE POSITION SENSOR

1. Turn the ignition switch the to the RUN position. 2. Measure the voltage between the throttle position sensor electrical connector PI 26 pin 4 (OY) and ground.

Is the voltage less than 4.5 volts?

-> Yes

GO to Pinpoint Test G240070t9.

.

-> No

GO to Pinpoint Test G240070t11.

.

G240070t9 : CHECK THE THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT FOR OPEN CIRCUIT

1. Turn the ignition switch to the OFF position. 2. Disconnect the ECM electrical connector PI 1 and the throttle position sensor electrical connector PI 26. 3. Measure the resistance between PI 1 pin 12 (OY) and PI 26 pin 4 (OY).

Is the resistance less than 5 ohms?

-> Yes

GO to Pinpoint Test G240070t10.

.

-> No

REPAIR the throttle position sensor power supply circuit from the ECM to the throttle position sensor. CLEAR the DTC. TEST the system for normal operation.

G240070t10 : CHECK THE THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT FOR A SHORT TO GROUND

1. Measure the resistance between PI 26-pin 4 (OY) and ground.

Is the resistance greater than 10,000 ohms?

-> Yes

DIAGNOSE the electronic engine control system. For additional information, refer to <<303-14>>.

-> No

REPAIR the throttle position sensor power supply circuit from the ECM to the throttle position sensor. CLEAR the DTC. TEST the system for normal operation.

G240070t11 : CHECK THE THROTTLE POSITION SENSOR GROUND CIRCUIT

1. Turn the ignition switch to the OFF position. 2. Disconnect the throttle position sensor electrical connector PI 26. 3. Measure the resistance between PI 26 pin 1 (BG) and ground.

Is the resistance less than 5 ohms?

-> Yes

GO to Pinpoint Test G240070t13.

.

-> No

GO to Pinpoint Test G240070t12.

.

G240070t12 : CHECK THE THROTTLE POSITION SENSOR GROUND WIRE FOR OPEN CIRCUIT

1. Disconnect the ECM electrical connector PI I and the throttle position sensor electrical connector PI 26. 2. Measure the resistance between PI 26 pin 1 (BG) and PI 1 pin 19 (BG).

Is the resistance less than 5 ohms?

-> Yes

GO to Pinpoint Test G240070t13.

.

-> No

REPAIR the throttle position sensor ground circuit from the ECM to the throttle position sensor. CLEAR the DTC. TEST the system for normal operation.

G240070t13 : CHECK THE THROTTLE POSITION SENSOR

1. Measure the resistance between PI 26 pin 2 and PI 26 pin 4. 2. Measure the resistance between PI 26 pin 3 and PI 26 pin 4.

Are the resistor values the same?

-> Yes

GO to Pinpoint Test G240070t14.

.

-> No

INSTALL a new throttle body. For additional information refer to <<303-14>>.

G240070t14 : CHECK CONTINUITY OF THE THROTTLE POSITION SENSOR OUTPUT CIRCUIT

1. Measure the resistance between PI 1 pin 75 (R) and PI 26 pin 3 (R). 2. Measure the resistance between PI 1 pin 76 (Y) and PI 26 pin 2 (Y).

Is the resistance less than 5 ohms?

-> Yes

GO to Pinpoint Test G240070t15.

.

-> No

REPAIR the circuit from the ECM to the throttle position sensor. CLEAR the DTC. TEST the system for normal operation.

G240070t15 : CHECK THE THROTTLE POSITION SENSOR OUTPUT CIRCUIT FOR A SHORT TO GROUND

1. Measure the resistance between PI 26 pin 3 (R) and ground. 2. Measure the resistance between PI 26 pin 2 (Y) and ground.

Is the resistance greater than 10,000 ohms?

-> Yes

DIAGNOSE the electronic engine control system. For additional information, refer to <<303-14>>.

-> No

REPAIR the circuit from the ECM to the throttle position sensor. CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G240070p4 : DTC P1251, P1658, P1631, P1657

G240070t16 : CHECK THE THROTTLE MOTOR RELAY

1. Turn the ignition switch to the RUN position.

Does the throttle motor relay make an audible click?

-> Yes

GO to Pinpoint Test G240070t17.

.

-> No

GO to Pinpoint Test G240070t22.

.

G240070t17 : CHECK THE ECM POWER SUPPLY FROM THE THROTTLE MOTOR RELAY

1. Measure the voltage between the throttle motor relay connector FH 32D pin 5 (NR) and ground.

Is the voltage greater than 10 volts?

-> Yes

GO to Pinpoint Test G240070t18.

.

-> No

GO to Pinpoint Test G240070t19.

.

G240070t18 : CHECK CONTINUITY OF THE ECM POWER SUPPLY WIRE FROM THE THROTTLE MOTOR RELAY

1. Turn the ignition switch to the OFF position. 2. Disconnect the ECM electrical connector PI 1 and remove the throttle motor relay. 3. Measure the resistance between the throttle motor relay electrical connector FH 32D pin 5 (NR) and the ECM electrical connector PI 1 pin 134 (GU).

Is the resistance less than 5 ohms?

-> Yes

DIAGNOSE the electronic engine control system. For additional information, refer to <<303-14>>.

-> No

REPAIR the ECM power supply wire from the throttle motor relay. CLEAR the DTC. TEST the system for normal operation.

G240070t19 : CHECK FUSE 18 IN THE FRONT POWER DISTRIBUTION BOX (FPDB)

1. Check the fuse.

Is the fuse OK?

-> **Yes**

GO to Pinpoint Test G240070t20.

.

-> **No**

GO to Pinpoint Test G240070t21.

.

G240070t20 : CHECK THE THROTTLE MOTOR RELAY POWER SUPPLY CIRCUIT

1. Remove the throttle motor relay. 2. Measure the voltage between the throttle motor relay connector FH 32D pin 3 (YR) and ground.

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the throttle motor relay power supply circuit. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new throttle motor relay. CLEAR the DTC. TEST the system for normal operation.

G240070t21 : CHECK FUSE 18 FOR A SHORT TO GROUND

1. Measure the resistance between fuse 18 and ground.

Is the resistance greater than 10,000 ohms?

-> **Yes**

INSTALL a new fuse. CLEAR the DTC. TEST the system for normal operation.

-> **No**

REPAIR short to ground between engine compartment fuse box and the throttle motor relay. INSTALL a new fuse. CLEAR the DTC. TEST the system for normal operation.

G240070t22 : CHECK THE POWER SUPPLY CIRCUIT TO THE THROTTLE MOTOR RELAY COIL

1. Turn the ignition switch to the RUN position. 2. Measure the voltage between the throttle motor relay connector FH 32D pin 1 (GR) and ground.

Is the voltage greater than 10 volts?

-> **Yes**

GO to Pinpoint Test G240070t23.

.

-> **No**

REPAIR the throttle motor relay coil power supply circuit from the engine compartment fuse box.
CLEAR the DTC. TEST the system for normal operation.

G240070t23 : CHECK CONTINUITY OF THE THROTTLE MOTOR RELAY COIL

1. Remove the throttle motor relay (if not already removed). 2. Measure the resistance between terminal 1 and terminal 2 of the throttle motor relay.

Is the resistance between 70 and 90 ohms?

-> **Yes**

GO to Pinpoint Test G240070t24.

.

-> **No**

INSTALL a new throttle motor relay. CLEAR the DTC. TEST the system for normal operation.

G240070t24 : CHECK CONTINUITY OF THE THROTTLE MOTOR RELAY GROUND CIRCUIT

1. Disconnect the ECM electrical connector PI 1. 2. Measure the resistance between the throttle motor relay electrical connector FH 32D pin 2 (GR) and the ECM electrical connector PI 1 pin 52 (GR).

Is the resistance less than 5 ohms?

-> **Yes**

DIAGNOSE the electronic engine control system. For additional information, refer to <<303-14>>.

-> **No**

REPAIR the throttle motor relay ground circuit from the ECM to the engine compartment fuse box.
CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST G240070p5 : DTC P1243

G240070t25 : CHECK THE ACCELERATOR PEDAL DEMAND SENSOR GROUND CIRCUIT

1. Disconnect the ECM electrical connector PI 1 and the accelerator pedal electrical connector CA 88.
2. Measure the resistance between PI 1 pin 19 (BG) and CA 88 pin 6 (BG). 3. Measure the resistance between PI 1 pin 20 (BG) and CA 88 pin 3 (BG).

Is the resistance less than 5 ohms?

-> **Yes**

DIAGNOSE the electronic engine control system. For additional information, refer to <<303-14>>.

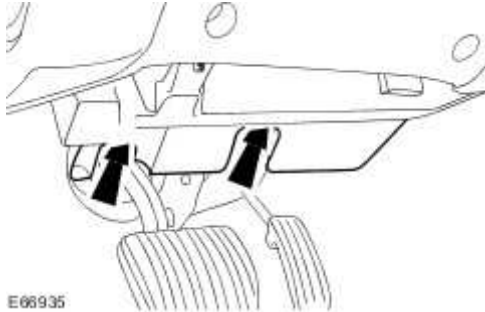
-> **No**

REPAIR the accelerator pedal demand sensor ground circuit from the accelerator pedal to the ECM.
CLEAR the DTC. TEST the system for normal operation.

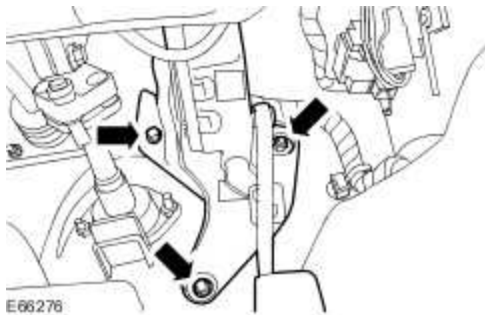
Accelerator Pedal (19.20.01)

Removal

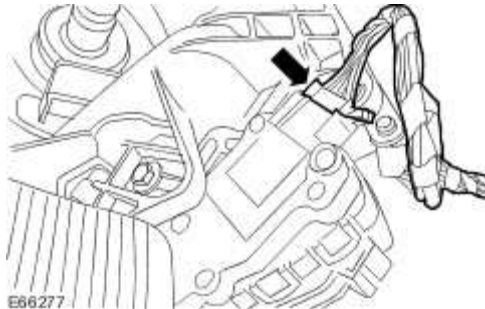
- 1 . Remove the driver side instrument panel lower trim panel.



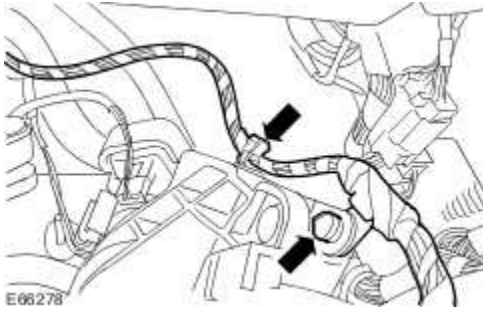
- 2 . Detach the accelerator pedal retaining bracket.



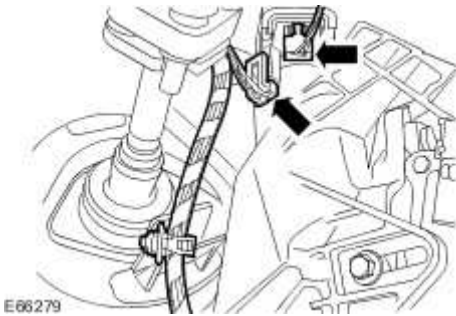
- 3 . Disconnect the accelerator pedal electrical connector.



- 4 . Detach the accelerator pedal wiring harness.

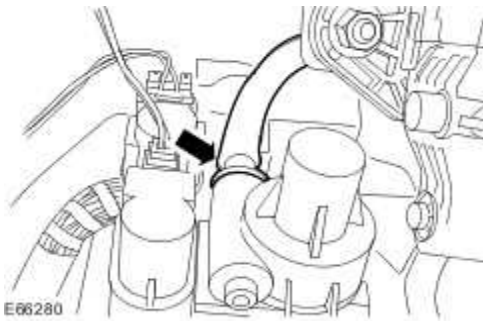


5 . Disconnect the electrical connectors.



6 . Remove the accelerator pedal.

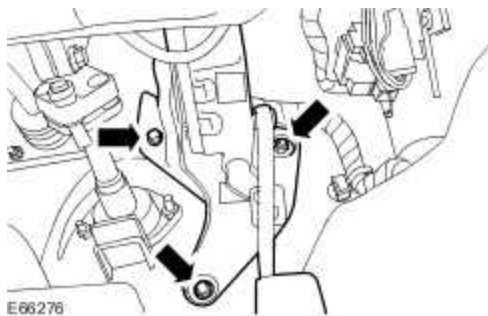
▶ Disconnect the height adjustable drive cable.



Installation

1 . To install, reverse the removal procedure.

▶ Tighten to 10 Nm.



E66276

310-03 : Speed Control

Specifications

Specifications

General Specifications

Item	Specification
Speed control module vertical alignment	$90^{\circ} \pm 0.75^{\circ}$

Torque Specifications

Description	Nm	lb-ft	lb-in
Speed control module retaining nuts	5	-	44
Speed control module alignment bolt lock nut	5	-	44

Speed Control Module Alignment - VIN Range: G00442->H18679

Special Service Tools



E31844

Inclinometer

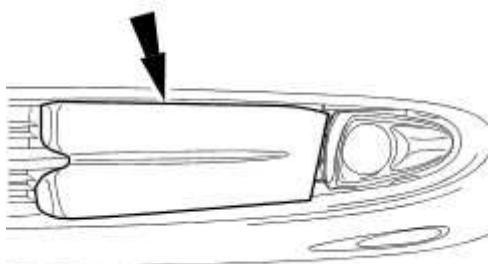
501-F007

1. **NOTE:**

Make sure the vehicle is positioned on level ground such as the headlamp alignment area.

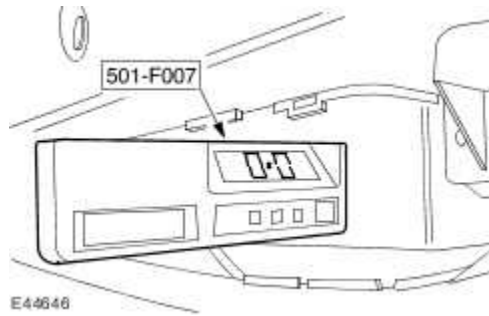
Level the vehicle ride height. For additional information, refer to the Jaguar approved diagnostic system.

2. Remove the left-hand front bumper access cover.



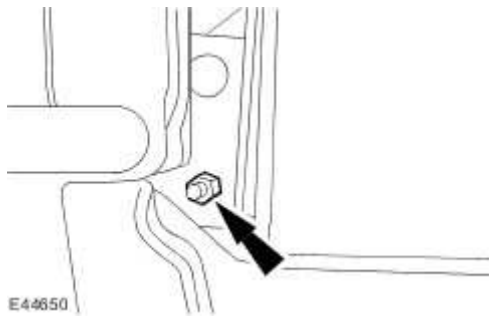
E44643

3. Using the special tool, check the speed control module vertical levelling.

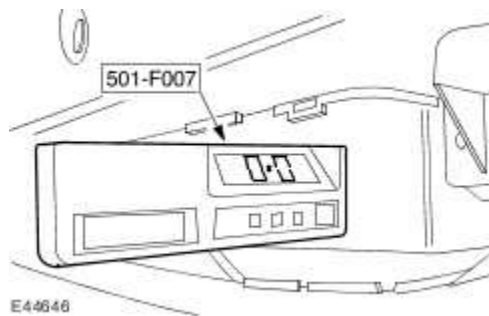


4. Level the speed control module.

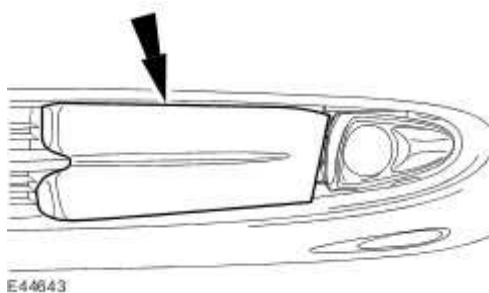
- Rotate the speed control module levelling bolt to achieve a reading of zero degrees $\pm 0.75^\circ$.



5. Using the special tool, check the speed control module vertical levelling.



6. Install the left-hand front bumper access cover.



7. Carry out the speed control module calibration procedure. For further information, refer to the

Jaguar approved diagnostic system.

Speed Control Module Alignment - VIN Range: H18680->H99999

Special Service Tools



E31844

Inclinometer

501-F007

1. Remove the radiator splash shield.

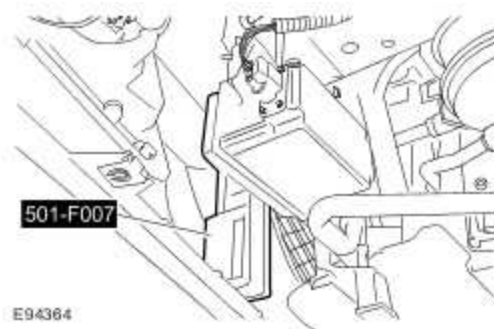
Radiator Splash Shield (76.22.90)

2. **NOTE:**

Make sure the vehicle is positioned on level ground such as the headlamp alignment area.

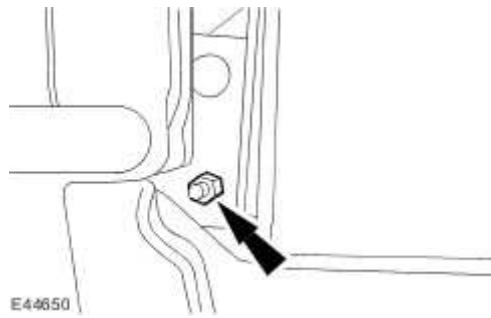
Level the vehicle ride height. For additional information, refer to the Jaguar approved diagnostic system.

3. Using the special tool, check the speed control module vertical leveling.



4. Level the speed control module.

- Rotate the speed control module leveling bolt to achieve a reading of 90 degrees \pm 0.75°.



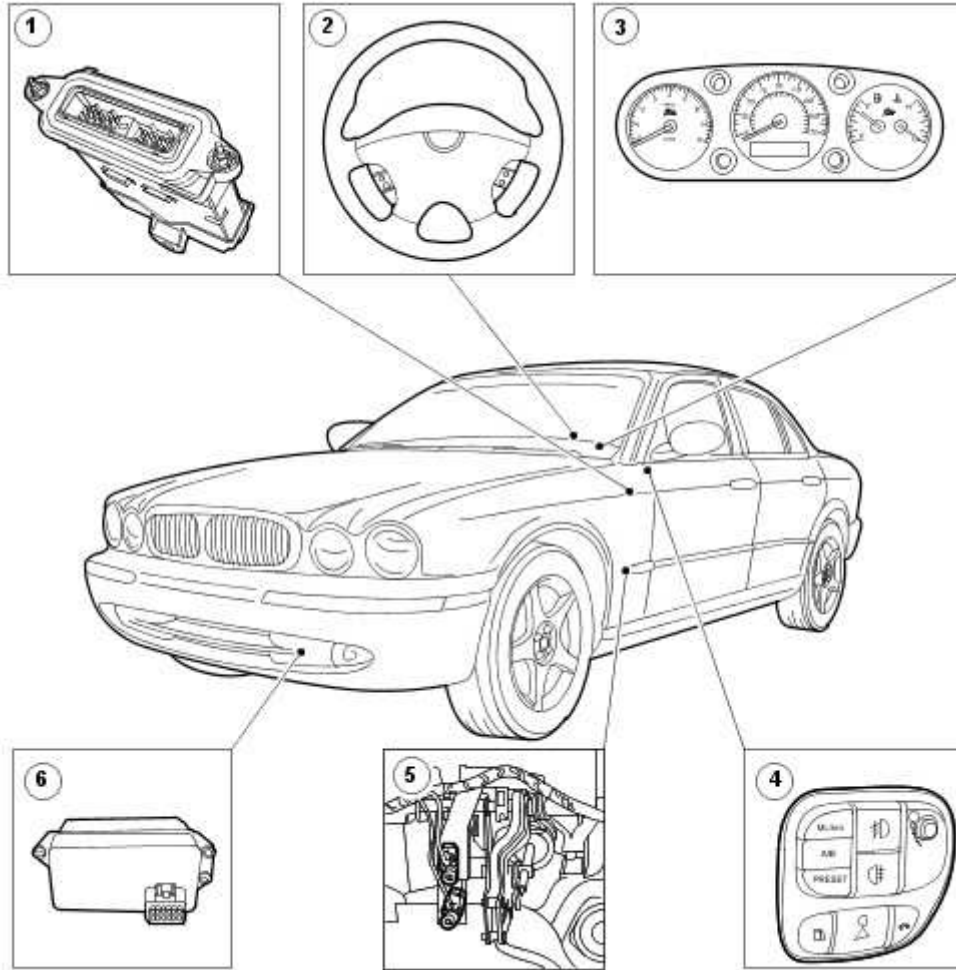
5. Using the special tool, check the speed control module vertical leveling.



6. Carry out the speed control module calibration procedure. For further information, refer to the Jaguar approved diagnostic system.

7. Install the radiator splash shield.
Radiator Splash Shield (76.22.90)

Speed Control - VIN Range: G00442- >G45703



E36786

Item	Part Number	Description
1	—	Engine control module (ECM)
2	—	Speed control actuator switches
3	—	Message center
4	—	Forward alert switch - vehicles with adaptive speed control

5	—	Brake pedal position switch and speed control deactivation switch
6	—	Adaptive speed control module - vehicles with adaptive speed control

System operation

The speed control system is inoperative below 43 kph (27 mile/h) and inoperative above the following speeds:

193 kph (120 mile/h) for vehicles fitted with a 3.0L engine.

201 kph (125 mile/h) for all other variants.

The speed control system is designed to maintain a selected vehicle speed between these two parameters.

Any of the switches operated by the brake will interrupt the speed control operation by switching the signal to the engine control module (ECM). This will allow the system to go into STANDBY mode. Pressing the RESUME switch with the vehicle travelling above 43 kph (27 mile/h) while the system is in STANDBY mode will allow the vehicle to accelerate until the last set speed is resumed.

Steering Wheel Switches

RESUME Switch

When the RESUME switch is pressed with the vehicle travelling above 43 kph (27 mile/h) with the system in STANDBY mode, the vehicle is allowed to accelerate until the last set speed is resumed. The RESUME switch will not function if the ignition switch has been cycled or if the vehicle speed is below 43 kph (27 mile/h).

CANCEL Switch

When the CANCEL switch is pressed with the vehicle travelling above 43 kph (27 mile/h) the system will enter STANDBY mode.

SET Switch

When the SET +/- switch is pressed with the vehicle travelling above 43 kph (27 mile/h) the system allows the vehicle speed to be maintained to ± 1.62 kph (1 mile/h). Pressing the SET +/- switch will increase or decrease the vehicle speed respectively until the switch is released. If the respective switch is pressed momentarily, the speed will accelerate or decelerate in 1.62 kph (1 mile/h) increments.

Brake Pedal Position (BPP) Switch

If the brake pedal is activated while the speed control system is active, the ECM receives a signal from the brake pedal position switch. This will cancel speed control and allow the throttle blade to return to the position as demanded by the accelerator pedal.

Speed Control Deactivation Switch (brake).

If the brake pedal is activated while the speed control system is active, the ECM receives a signal from the speed control deactivation switch. This will cancel speed control and allow the throttle blade to return to the position as demanded by the accelerator pedal.

Adaptive speed control

On vehicles for certain markets, an adaptive speed control system is installed as an option. In addition to the normal vehicle speed control functions, this system enables a preset distance to be maintained behind a moving vehicle immediately ahead, without driver intervention.

Automatic Switch Off - Vehicles with Adaptive Speed Control

The adaptive speed control will disengage, but not clear the memory when:

- the CANCEL button is activated.
- the brake pedal is applied.
- the vehicle speed falls below 26Km/h (16mph).
- neutral, park or reverse gear positions are selected.
- traction control is activated.

The adaptive speed control will disengage, and clear the memory when:

- the ignition switch is set to position '0'.
- maximum vehicle speed is reached.
- the parkbrake is applied.
- a fault occurs in the adaptive speed control system.

Forward Alert Switch - Vehicles with Adaptive Speed Control

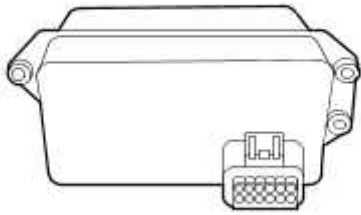


E44824

Forward Alert

The forward alert system is switched on and off by the forward alert switch, which is incorporated in to the message center switch. The forward alert system additionally provides warnings while the adaptive speed control is not activated.

Speed Control Module - Vehicles with Adaptive Speed Control



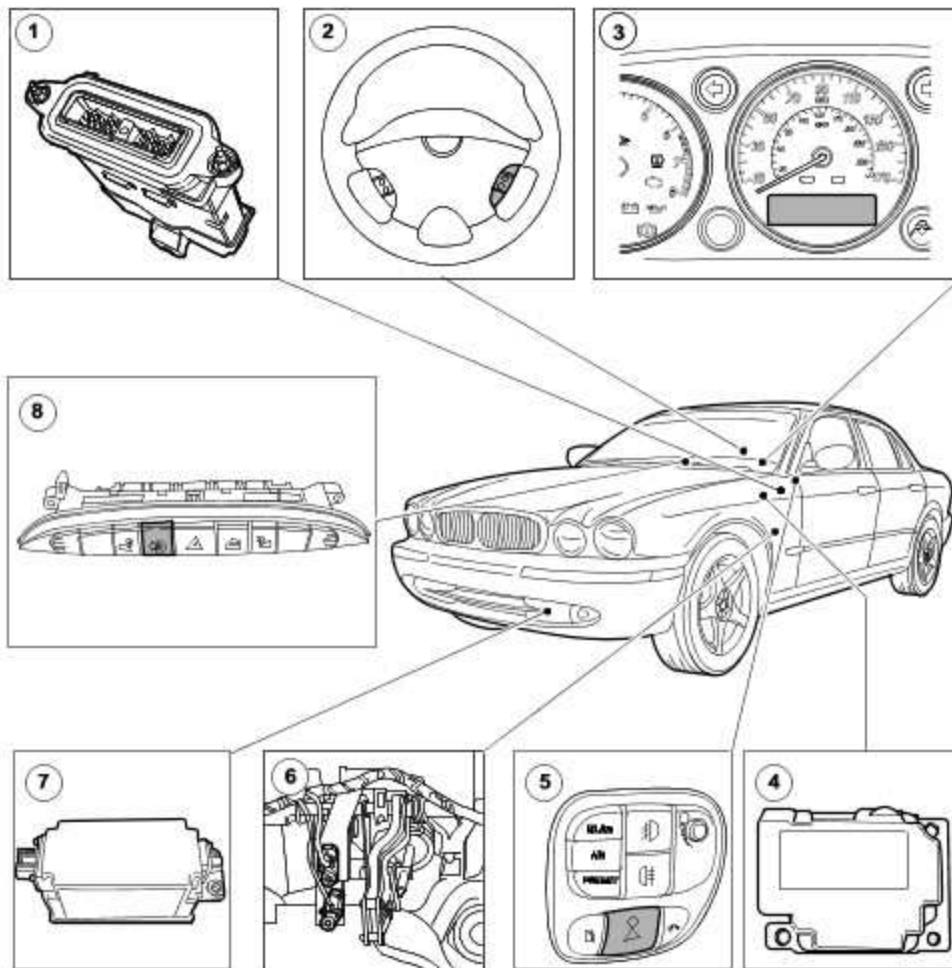
E44823

The adaptive speed control module incorporates a radar sensor and yaw rate sensor to provide system control functions.

Adaptive Speed Control Failure

If a fault occurs during any adaptive speed control operation the adaptive speed control system will be deactivated and will remain in this state until the fault is rectified. The message center will display 'CRUISE NOT AVAILABLE'.

Speed Control - VIN Range: G45704- >G99999



E64559

Item	Part Number	Description
1	—	Engine control module (ECM)
2	—	Speed control steering wheel switches
3	—	Message center
4	—	Speed control module - vehicles with adaptive speed control
5	—	Forward alert switch - vehicles with adaptive speed control
6	—	Brake pedal position switch and speed control deactivation switch

7	—	Speed control sensor - vehicles with adaptive speed control
8		Automatic speed limiter switch - vehicles with automatic speed limiter

System operation

The speed control system is inoperative below 32 kph (20 mile/h) and above 250 kph (155 mile/h).

The speed control system is designed to maintain a selected vehicle speed between 32 kph (20 mile/h) and 180 kph (112 mile/h).

Any of the switches operated by the brake will interrupt the speed control operation by switching the signal to the engine control module (ECM). This will allow the system to go into STANDBY mode. Pressing the RESUME switch with the vehicle travelling above 32 kph (20 mile/h) while the system is in STANDBY mode will allow the vehicle to accelerate until the last set speed is resumed.

Speed Control Steering Wheel Switches

RESUME Switch

When the RESUME switch is operated with the vehicle travelling above 32 kph (20 mile/h) with the system in STANDBY mode, the vehicle is allowed to accelerate until the last set speed is resumed. The RESUME switch will not function if the ignition switch has been cycled or if the vehicle speed is below 32 kph (20 mile/h).

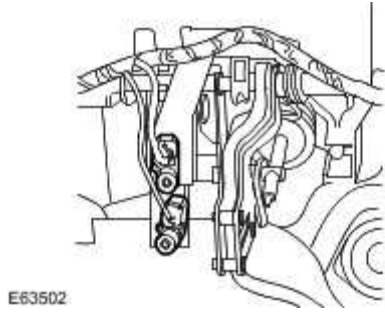
CANCEL Switch

When the CANCEL switch is operated with the vehicle travelling above 32 kph (20 mile/h) the system will enter STANDBY mode.

SET Switch

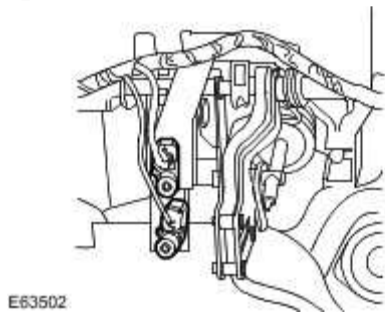
When the SET +/- switch is operated with the vehicle travelling above 32 kph (20 mile/h) the system allows the vehicle speed to be maintained to ± 1.62 kph (1 mile/h). Pressing the SET +/- switch will increase or decrease the vehicle speed respectively until the switch is released. If the respective switch is pressed momentarily, the speed will accelerate or decelerate in 1.62 kph (1 mile/h) increments.

Brake Pedal Position (BPP) Switch



If the brake pedal is operated while the speed control system is active, the ECM receives a signal from the BPP switch. This will cancel vehicle speed control and allow the throttle blade to return to the position as demanded by the accelerator pedal.

Speed Control Deactivation Switch (brake).



If the brake pedal is activated while the speed control system is active, the ECM receives a signal from the speed control deactivation switch. This will cancel speed control and allow the throttle blade to return to the position as demanded by the accelerator pedal.

Adaptive Speed Control

On vehicles for certain markets, an adaptive speed control system is installed as an option. In addition to the normal vehicle speed control functions, this system enables a preset distance to be maintained behind a moving vehicle immediately ahead, without driver intervention.

Automatic Switch Off - Vehicles with Adaptive Speed Control

The adaptive speed control will disengage, but not clear the memory when:

- the CANCEL button is operated.
- the brake pedal is applied.
- the vehicle speed falls below 26 kph (16 mile/h).
- neutral, park or reverse gear positions are selected.
- traction control is activated.
- cruise override activated for more than five minutes.

The adaptive speed control will disengage, and clear the memory when:

the ignition switch is set to position '0'.

a fault occurs in the adaptive speed control system.

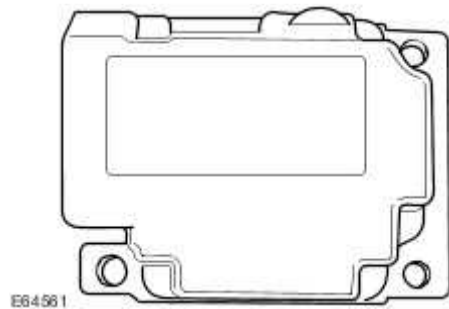
Forward Alert Switch - Vehicles with Adaptive Speed Control



Forward Alert

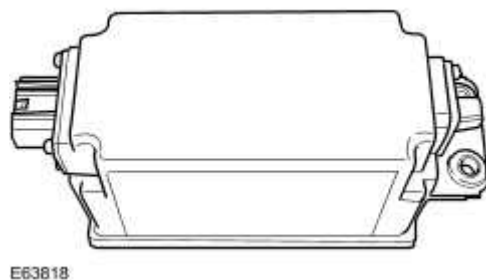
The forward alert system is switched on and off by the forward alert switch, which is incorporated into the message center switch. The forward alert system additionally provides warnings while the adaptive speed control is not activated.

Speed Control Module - Vehicles with Adaptive Speed Control



The speed control module provides system control functions.

Speed Control Sensor - Vehicles with Adaptive Speed Control



The speed control sensor incorporates the forward looking radar sensor.

Adaptive Speed Control Failure

If a fault occurs during any adaptive speed control operation, the adaptive speed control system will deactivate and will remain in this state until the fault is rectified. The 'CRUISE NOT AVAILABLE' message will be displayed on the message center on 'demand' by trying to operate the steering wheel control switches. This on 'demand' strategy is intended to show that adaptive speed control is not available and another fault may exist. For example: If an anti-lock brake system or traction control error message is displayed this would imply that the brake system may be effecting or inhibiting the adaptive speed control. If the message center displays 'CRUISE NOT AVAILABLE' permanently or no message is displayed, this may imply that the vehicle has an ECM fault.

Automatic Speed Limiter

The automatic speed limiter enables the vehicle speed to be limited. The vehicle speed is selected from the message center, the ECM limits the throttle response and stops the vehicle from accelerating over the preset speed limit.

Note: Automatic speed limiter is restricted to controlling the throttle only.

Note: Automatic speed limiter is unable to request automatic braking.

Automatic Speed Limiter Switch

Vehicles fitted with an automatic speed limiter are fitted with an automatic speed limiter master switch. This switch is intended for use as an automatic speed limiter ON/OFF switch, it also functions as a selection switch between adaptive/normal speed control and the automatic speed limiter options.



E63503

If the automatic speed limiter is selected the adaptive/normal speed control is cancelled.

If the automatic speed limiter is NOT selected the adaptive/normal speed control can be used.

The automatic speed limiter switch will be a standard fit to all XJ variations.

The automatic speed limiter switch is illuminated when switched on.

Cruise switches

Existing speed control; switch pack is used for automatic speed limiter.

Set +/- switch.

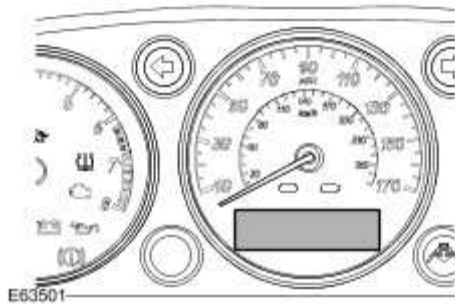
Resume switch.

Resume switch.

Cancel switch.

When adaptive speed control is fitted, the headway switches have no effect on automatic speed limiter.

Message center



Automatic Speed Limiter Messages

The automatic speed limiter will keep the driver informed of it's status by displaying messages in the message center.

Message Displayed	Petrol Description	Diesel Description
LIMITER SET XXX mile/h	Display speed always shown to driver.	Display speed always shown to driver.
LIMITER SET XXX kph	Display speed always shown to driver.	Display speed always shown to driver.
TOO FAST TOO RESUME	Resume pressed at 25 +/- 5 kph above the previous set speed.	Resume pressed at 25 +/- 5 kph above the previous set speed.
OVER LIMIT + Amber light	Vehicle speed at 3 kph (1.8 mile/h) above speed limiter speed.	Vehicle speed at 3.25 kph (2.0 mile/h) above speed limiter speed.
OVER LIMIT + Flashing Amber Light	Vehicle speed at 15 kph (9.3 mile/h) above speed limiter speed.	Vehicle speed at 7.5 kph (4.6 mile/h) above speed limiter speed.
OVER LIMIT + Flashing Amber light + bong	Vehicle speed at 15 kph (9.3 mile/h) above speed limiter speed for period of time X.	Vehicle speed at 7.5 kph (4.6 mile/h) above speed limiter speed for period of time X.

Activation of the Automatic Speed Limiter

The driver has the ability to change trip units, which will make the display speed change in increments of 2 kph or 1 mile/h.

The automatic speed limiter can be set using the set +/- switch to the nearest 2 kph (1 mile/h) depending on the drivers selected trip units.

The automatic speed limiter can be ramped up to major increments of 10 kph or 5 mile/h depending on the drivers selected trip units.

The automatic speed limiter has a minimum set speed of approximately 32 kph (20 mile/h).

The automatic speed limiter will stay active and not cancel if the vehicle speed falls below the minimum set speed.

Maximum Operating Speed of the Automatic Speed Limiter

Engine	Maximum Speed
2.7L Diesel	249 kph (155 mile/h)
3.0L	249 kph (155 mile/h)
3.5L	249 kph (155 mile/h)
4.2L	249 kph (155 mile/h)
4.2L Supercharged	249 kph (155 mile/h)

Cancellation of the Automatic Speed Limiter

The following three actions will cause the automatic speed limiter to cancel.

Cancel switch.

Accelerator kick down.

De-selection by the master switch.

Service Issues

Limiter Not Available

It is difficult to get 'LIMITER NOT AVAILABLE' without a 'CRUISE NOT AVAILABLE' or a throttle malfunction. The automatic speed limiter is designed to limit the throttle and it is therefore very difficult to make the feature fail.

The automatic speed limiter shares the master ON/OFF switch and cruise switches with the speed

control/adaptive speed control. Any failure will inhibit the speed control/adaptive speed control as well as automatic speed limiter.

Over speed down hill

The automatic speed limiter does not have any brake assistance, this means automatic speed limiter will over speed on down hill gradients.

The message center will display over speed warnings if the pre set thresholds have been exceeded. This is the intended functionality.

When message center provides the driver with over speed warnings; it is the driver's responsibility to apply the brakes.

Ramp down of set speed

The driver has the ability to ramp down the set speed i.e. transition from 96.5 kph (60 mile/h) to 48.2 kph (30 mile/h) zone.

Automatic speed limiter is not able to apply the brakes. The vehicle will be slowed down by engine braking ONLY.

The message center will display over speed warnings if the preset thresholds have been exceeded. This is the intended functionality.

When message center provides the driver with over speed warnings; it is the driver's responsibility to apply the brakes.

Differences between Diesel and Petrol Automatic Speed Limiter

Set Events

The diesel automatic speed limiter is set by holding the set + switch for a specific (approximately 400ms) period of time.

The petrol automatic speed limiter is set by pressing and releasing the set + switch.

Automatic Speed Limiter, CC and ACC Tolerances

Both the adaptive speed control and the automatic speed limiter display a 'set speed' to the driver. This 'set speed' should match the speedometer, however it is acceptable for it to be within a tolerance of one increment +/- 1 kph (0.5 mile/h).

When switching between the automatic speed limiter and adaptive speed control functions there may be a difference in speed of +/- 2 kph or +/- 1 mile/h, this is acceptable due to both speeds being calculated on different modules. If the difference is greater than 4 kph or 2 mile/h there may be a configuration issue.

The ECM calculates the displayed speed for the automatic speed limiter.

The ACC module calculates the display speed for the adaptive speed control.

The speedo and set speed tolerance region will be approximately between 48 kph (30 mile/h) and 145 kph (90 mile/h). The speedometer may not match the set speeds when travelling in excess of 145 kph (90 mile/h), this is acceptable.

Speed Control - VIN Range: G00442- >G45703

Principles of Operation

There are two types of speed (cruise) control fitted, adaptive cruise control (ACC) and non-adaptive cruise control.

The non-adaptive system maintains a road speed selected by the driver from the steering wheel switches, and is cancelled by inputs from the steering wheel **CANCEL** switch, the brake pedal (the system will disengage if the brake pedal is pressed), road speed (the system will disengage if the road speed falls below 26 kph [16 mph]), gear selector position (the system will disengage if **NEUTRAL**, **PARK** or **REVERSE** gears are selected), traction or stability control (the system will disengage if the traction or stability control is activated).

The adaptive system also maintains a road speed selected by the driver from the steering wheel switches, and is cancelled by the same inputs (the only difference being that the stored set speed will show in the message center display), but can also maintain a selected gap from the vehicle in front.

The ACC system fitted to this vehicle varies from past ACC systems in that the forward looking radar (FLR) sensor is a separate component and not integrated into the ACC module.

When the system is enabled, the vehicle will maintain the selected speed until another vehicle is detected travelling in the same lane and direction, when it will enter **FOLLOW MODE**.

In this mode, the vehicle will maintain a time gap from the vehicle in front, rather than the selected speed. **This is not a fault**, but a designed feature of the system. The time gap is adjustable, using the **HEADWAY** switches on the steering wheel switch assembly, but will default to a longer gap, unless overridden by the driver.

When the vehicle enters **FOLLOW MODE**, the message center will display the **ACC** tell-tale symbol (see the owner's handbook), with a **GAP** indication for four seconds, and the vehicle will maintain the gap from the vehicle in front until:

- the vehicle in front accelerates to a speed above the stored set speed, in which case the stored set speed will be resumed.

- the vehicle in front moves out of lane, or out of view, in which case the stored set speed will be resumed.

- the vehicle in front slows to below 26 km/h (16 mph), at which speed the system disengages, the message **DRIVER INTERVENE** will display on the message center accompanied by a chime,

and any braking applied by the ACC system will be smoothly reduced. **This is not a fault** but may involve the driver having to take control and brake him/herself.

a new gap distance is set by the driver from the steering wheel switches.

The ACC system can apply the brakes to maintain the gap to the vehicle in front. The braking force which the system can apply is limited, but can be overridden by the driver braking. This action will cancel the cruise control function, but the system will "remember" the stored set speed, and will resume the stored set speed by the driver pressing the **RESUME** switch on the steering wheel switch assembly.

NOTE:

When the system applies the brakes, the brake lights will function exactly as if the driver were braking.

It is possible (for example, when a slow-moving vehicle pulls out into the lane in front), for the degree of braking necessary to avoid a collision to exceed the maximum level of the ACC system. Should this happen, an audible warning will sound, accompanied by a **red** warning light and a **DRIVER INTERVENE** display on the message center, at which point, the driver must take action. **This is not a fault**, but a designed feature of the system.

Should the driver need to go faster than the stored set speed, he/she can override the system simply by pressing the accelerator, in which case, the message center will display **CRUISE OVERRIDE**. When the pedal is released, the system will resume operation in whichever mode is appropriate, follow or selected speed.

Detection

As with most sensors, there are certain conditions under which detection issues can occur. The owner/driver's attention should be drawn to the driver's handbook to avoid misunderstandings as to what is, and isn't, a fault.

Detection issues may occur:

- when driving on a different line to the vehicle in front

- when vehicles edge into your lane.

- when going into or coming out of a bend.

- with detecting motorcycles.

- with detecting stationary objects, such as traffic queues, broken down vehicles, etc.

In circumstances such as these, the ACC system may brake late or unexpectedly, or may increase speed. **This is not a fault**, but is the system reacting to detection issues.

The owner's handbook makes it clear that the system should only be used under suitable conditions, but technicians should be wary of wasting time on complaints which are not actually faults.

Inspection and verification

1 . Verify the customer concern.

2 . Confirm which, if any, warning lights and/or messages were displayed on the instrument cluster.

NOTE:

If any warning lights and/or messages were displayed when the fault occurred, refer to the Driver Information table for DTCs associated with the display, then to the DTC index table for possible sources and actions. Some warnings will appear to clear when the ignition is cycled. This is often because the warning has flagged as a result of one of the vehicle's on-board diagnostic routines having run to detect the fault. If the same routine is not run when the ignition is switched **ON**, the warning will not reflag until the routine does run. See the DTC summaries for drive cycle routines.

3 . Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
FLR sensor levelling	Fuses
Engine oil level	Wiring harness
Cooling system coolant level	Electrical connector(s)
Fuel level	Controller Area Network (CAN) circuits
Fuel contamination/grade/quality	Sensor(s)
Throttle body	Engine control module (ECM)
Poly-vee belt	Transmission control module (TCM)

1 . Verify the following systems are working correctly:

air intake system

cooling system

charging system

fuel charging system

ignition system

braking system

2 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

NOTE:

If a DTC cannot be cleared, then there is a permanent fault present that flags again as soon as it is cleared. (The exception to this is P1260, which will only clear following an ignition **OFF/ON** cycle after rectification).

3 . If the cause is not visually evident and the Jaguar approved diagnostic system is not available, use a scan tool to retrieve the fault codes before proceeding to the diagnostic trouble code (DTC) index chart, or the symptom chart if no DTCs are set.

Forward looking radar (FLR) sensor levelling

An incorrectly aligned FLR sensor can cause incorrect system operation. Before starting any repair work on the ACC system, check the levelling of the FLR sensor. This is carried out in a similar way to the module levelling in previous systems.

Symptom Chart

Symptom	Possible source	Action
Speed control inhibited or disabled	Default mode enabled	Check message center for default message.
	Supply voltage to ACC module	For ACC module circuit tests, GO to Pinpoint Test G240073p9.
	Supply voltage to FLR sensor	For FLR sensor circuit tests, GO to Pinpoint Test G240073p9.
	Steering wheel speed control switch(es)	For steering wheel speed control switch tests, GO to Pinpoint Test G240073p11.
	Steering wheel speed control switch circuit	For steering wheel speed control switch circuit tests, GO to Pinpoint Test G240073p11.
	Throttle sensors	For 3.0 L engine throttle position sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703
	Stop lamp switch	For 3.5 and 4.2 L engine throttle

		position sensor tests, Electronic Engine Controls - VIN Range: G00442->G45703 For brake cancel switch tests, GO to Pinpoint Test G240073p8.
Unable to regulate/adjust vehicle speed	Steering wheel switch malfunction	For speed control switch circuit tests, GO to Pinpoint Test G240073p11. For speed control switch input signal tests, GO to Pinpoint Test G240073p11.
Unable to cancel speed control from steering wheel	Steering wheel switch malfunction	For speed control switch circuit tests, GO to Pinpoint Test G240073p11. For speed control switch input signal tests, GO to Pinpoint Test G240073p11.
Unable to cancel speed control from brake pedal	Brake cancel switch malfunction	For brake cancel switch tests, GO to Pinpoint Test G240073p8.

Driver Information Chart

Warning light	Message	Default Mode	DTC
Red	Engine systems fault	Engine shut-down (all cylinders fuel cut)	P1224
Red	Engine systems fault	Limp-Home	P1229
Red	Engine systems fault	Limp-Home	P0121, P0122, P0123, P0222, P0223
Red	Engine systems fault	Limp-Home	P1251, P1631
Red	Engine systems fault	Limp-Home	P1611
Red	Engine systems fault	Limp-Home	P1633
Red	Engine systems	High idle	P1344, P1122, P1123, P1215, P1216

	fault		
Red	Restricted performance	Limp-Home unavailable	P1254
Red	Restricted performance	Limp-Home unavailable	P1250
Red	Restricted performance	Safety redundancy	P1657, P1658
Red	Restricted performance	Safety redundancy	P1634
None	Cruise override	None	None. See principles of operation in this section
Red	Driver intervene	None	None. See principles of operation in this section
Amber	Cruise not available	None	P1571
Amber	Cruise not available	None	P0568
Amber	Cruise not available	None	P0567
Amber	Cruise not available	None	P0570
Amber	Cruise not available	None	P0569
Amber	Cruise not available	None	P0566
Amber	Cruise not available	None	P1697
Amber	Cruise not available	None	P1696
Amber	Restricted	Engine speed limited	P0116, P0117, P0118, P0125

	performance		
Amber	Restricted performance	Engine speed limited	P0101, P0102, P0103, P0104
Amber	Restricted performance	Engine speed limited	P0300, P0301, p0302, P0303, P0304, P0305, P0306, P0307, P0308, P1313, P1314
Amber	Restricted performance	Engine speed limited	P0327, P0328, P0332, P0333, P1648
Amber	Restricted performance	Engine speed limited	P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358, P1367, P1368
Amber	Restricted performance	Engine speed limited	P0171, P0172, P0174, P0175
Amber	Restricted performance	Engine speed limited	P0201, P0202, P0203, P0204, P0205, P0206, P0207, P0208
Amber	Restricted performance	Engine speed limited	P0335, P0336
Amber	Restricted performance	Engine speed limited, reverse throttle progression enabled	P1642
Amber	Restricted performance	Engine speed limited, reverse throttle progression enabled	P1643
Amber	Restricted performance	Engine speed limited, reverse throttle progression enabled	P0096, P0097, P0098
Amber	Restricted performance	Engine speed limited, reverse throttle progression enabled	P1474
Amber	Restricted performance	Engine speed limited	P1234, P1236, P1338

Default mode definitions

Limp-Home Mode

Throttle motor off

Throttle motor relay off

Throttle motor circuit off

Fuel intervention

Speed (cruise) control inhibited

Limp-Home unavailable

Power limitation

Vehicle speed limited to 120 kph (75 mph)

Reverse throttle progression enabled

Speed (cruise) control inhibited

Reverse Throttle Progression

Throttle opening limited to maximum 30%

NOTE:

The throttle operation uses the same map as for reverse gear.

Engine Speed Limited

Engine runs normally, up to 3000 rpm

Engine speed restricted to 3000 rpm maximum, by fuel cut-off

High Idle

Throttle valve kept in fixed position by motor

Speed (cruise) control inhibited

Safety Redundancy

Power limitation

Vehicle speed limited to 120 kph (75 mph)

Reverse throttle progression enabled

Speed (cruise) control inhibited

Diagnostic trouble code (DTC) index

DTC	Description	Possible Source	Action
C1291	Forward Looking Radar (FLR) sensor temperature out of range	FLR sensor is too warm or too cold FLR sensor failure	Warm up or cool down the FLR sensor to above 40°C or below 70°C. CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new FLR sensor.
C1292	FLR sensor blockage detection	FLR sensor is blocked	Remove any blockages (snow/leaves etc.) from the FLR sensor.
C1293	FLR sensor automatic alignment offset angle out of range	Sensor requires mechanical levelling FLR sensor is in service alignment mode	Check FLR sensor levelling. (This is done in a similar way to control module alignment in earlier systems). Complete service alignment. Refer to the Jaguar approved diagnostic system.
C1294	Active speed or vehicle speed out of range	Speed related fault with the engine control module (ECM), transmission control module (TCM), dynamic suspension control module (DSCM), or instrument cluster modules ACC module failure	Carry out a full vehicle DTC check. Check the ECM, TCM, DSCM, or instrument cluster modules for stored codes. If no DTC's are indicated in the ECM, TCM, DSCM, or instrument cluster modules, INSTALL a new ACC module.
C1459	Forward alert switch circuit failure	Forward alert switch failure Forward alert switch to ACC module circuit short circuit to B+ Forward alert switch to ACC module circuit open circuit	For forward alert switch circuit tests, GO to Pinpoint Test G240073p1.
C1748	Forward alert switch circuit short to GROUND	Forward alert switch failure Forward alert switch to ACC module circuit short circuit to GROUND	For forward alert switch circuit tests, GO to Pinpoint Test G240073p2.
B2373	Forward alert switch LED 1 circuit failure	Forward alert switch failure Forward alert switch LED to ACC module circuit short	For forward alert switch LED tests, GO to Pinpoint Test G240073p3.

		to B+	
		Forward alert switch LED to ACC module circuit open circuit	
C1920	Forward alert switch LED 1 circuit short to GROUND	Forward alert switch failure Forward alert switch LED to ACC module circuit short circuit to GROUND	For forward alert switch LED tests, GO to Pinpoint Test G240073p4.
C1935	Chime circuit failure	Chime module to ACC module circuit short to B+ Chime module to ACC module circuit open circuit	For adaptive speed control chime module circuit tests, GO to Pinpoint Test G240073p5.
B1342	Internal ACC module fault	ACC module failure	INSTALL a new ACC module.
B2369	Chime output circuit short to GROUND	Chime output circuit short to GROUND	For adaptive speed control chime module circuit tests, GO to Pinpoint Test G240073p6.
B2477	Module configuration failure	ACC module is not correctly configured	Configure the ACC module. Refer to the Jaguar approved diagnostic system.
U2023	CAN fault message received from other network modules	CAN/ACC module related fault with the ECM, TCM, DSCM, or instrument cluster modules ACC module internal CAN fault CAN network fault	Carry out a full vehicle DTC check. Check the ECM, TCM, DSCM, or instrument cluster modules for stored ACC related codes. For CAN circuit tests, Communications Network
U2520	CAN IC missing	IC CAN circuit short to B+, open circuit, short circuit to ground	For CAN circuit tests, Communications Network
U2521	CAN DSCM missing	DSCM CAN circuit short to B+, open circuit, short circuit to ground	For CAN circuit tests, Communications Network
U2522	CAN TCM missing	TCM CAN circuit short to B+, open circuit, short circuit to ground	For CAN circuit tests, Communications Network

U2523	CAN ECM missing	ECM CAN circuit short to B+, open circuit, short circuit to ground	For CAN circuit tests, Communications Network
U2516	CAN network fault	Can network circuit fault	For CAN circuit tests, Communications Network
U0433	Invalid data from FLR sensor	FLR sensor failure	INSTALL a new FLR sensor.
U0235	No communication with FLR sensor	FLR sensor FLR sensor CAN circuit	FLR sensor CAN circuit tests, GO to Pinpoint Test G240073p7.
P0610	ACC module vehicle option configuration error	ECM configuration does not support ACC	Check the configuration of the ECM. Refer to the Jaguar approved diagnostic system.
P2583	FLR sensor data	FLR sensor FLR sensor CAN circuit	FLR sensor CAN circuit tests, GO to Pinpoint Test G240073p7.

Pinpoint Tests

PINPOINT TEST G240073p1 : DTC C1459: FORWARD ALERT SWITCH CIRCUIT TESTS

G240073t1 : CHECK THE FORWARD ALERT SWITCH FOR OPEN CIRCUIT

1. Disconnect the battery negative terminal.

Battery Disconnect and Connect 2. Disconnect the ACC module connector IP78. 3. Disconnect the forward alert switch connector IP50. 4. Measure the resistance between the ACC module connector IP78, pin 20 (U) and forward alert switch connector IP50, pin 04 (U).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G240073t8.

G240073t8 : CHECK THE FORWARD ALERT SWITCH FOR SHORT CIRCUIT TO B+

1. Reconnect the battery negative terminal.

Battery Connect (86.15.15) 2. Turn the ignition switch to the **ON** position. 3. Measure the voltage between the ACC module connector IP78, pin 20 (U) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short to B+. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new forward alert switch.

Speed Control Deactivator Switch (19.75.20) CLEAR the DTC. TEST the system for normal operation.

If the DTC is repeated, INSTALL a new ACC module.

Speed Control Module (19.75.26)

PINPOINT TEST G240073p2 : DTC C1748: FORWARD ALERT SWITCH CIRCUIT TEST

G240073t2 : CHECK THE FORWARD ALERT SWITCH CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the battery negative terminal.

Battery Disconnect and Connect 2. Disconnect the ACC module connector IP78. 3. Disconnect the forward alert switch connector IP50. 4. Measure the resistance between the ACC module connector, pin 20 (U) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short to ground. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new forward alert switch.

Speed Control Deactivator Switch (19.75.20) CLEAR the DTC. TEST the system for normal operation.

If the DTC is repeated, INSTALL a new ACC module.

Speed Control Module (19.75.26)

PINPOINT TEST G240073p3 : DTC B2373: FORWARD ALERT SWITCH LED CIRCUIT TESTS

G240073t3 : CHECK THE FORWARD ALERT SWITCH LED CIRCUIT FOR OPEN CIRCUIT

1. Disconnect the battery negative terminal.

Battery Disconnect and Connect 2. Disconnect the ACC module connector IP78. 3. Disconnect the forward alert switch connector IP50. 4. Measure the resistance between the ACC module connector IP78, pin 05 (U) and forward alert switch connector IP50, pin 07 (U).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G240073t9.

G240073t9 : CHECK THE FORWARD ALERT SWITCH LED CIRCUIT FOR SHORT CIRCUIT TO B+

1. Reconnect the battery negative terminal.

Battery Connect (86.15.15) 2. Turn the ignition switch to the **ON** position. 3. Measure the voltage between the ACC module connector IP78, pin 05 (U) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short to B+. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new forward alert switch.

Speed Control Deactivator Switch (19.75.20) CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ACC control module, not the forward looking sensor.

PINPOINT TEST G240073p4 : DTC C1920: FORWARD ALERT SWITCH LED CIRCUIT TESTS

G240073t4 : CHECK THE FORWARD ALERT SWITCH LED CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the battery negative terminal.

Battery Disconnect and Connect 2. Disconnect the ACC module connector IP78. 3. Disconnect the forward alert switch connector IP50. 4. Measure the resistance between the ACC module connector, pin 05 (U) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short to ground. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new forward alert switch.

Speed Control Deactivator Switch (19.75.20) CLEAR the DTC. TEST the system for normal operation.

If the DTC is repeated, INSTALL a new ACC control module, not the forward looking sensor.

PINPOINT TEST G240073p5 : DTC C1935: CHIME CIRCUIT TESTS

G240073t5 : CHECK THE CHIME CIRCUIT FOR OPEN CIRCUIT

1. Disconnect the battery negative terminal.

Battery Disconnect and Connect 2. Disconnect the ACC module connector IP78. 3. Disconnect the chime module connector IP11. 4. Measure the resistance between the ACC module connector IP78, pin 06 (R) and chime module connector IP11, pin 03 (R).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the open circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G240073t10.

G240073t10 : CHECK THE CHIME CIRCUIT FOR SHORT CIRCUIT TO B+

1. Reconnect the battery negative terminal.

Battery Connect (86.15.15) 2. Connect the battery ground terminal. 3. Turn the ignition switch to the **ON** position. 4. Measure the voltage between the ACC module connector IP78, pin 06 (R) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short to B+. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new chime module. CLEAR the DTC. TEST the system for normal operation, If the DTC is repeated, INSTALL a new ACC module.

PINPOINT TEST G240073p6 : DTC B2369: CHIME CIRCUIT TEST

G240073t6 : CHECK THE CHIME CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Disconnect the battery negative terminal.

Battery Disconnect and Connect 2. Disconnect the ACC module connector IP78. 3. Disconnect the chime module connector IP11. 4. Measure the resistance between the ACC module connector IP78, pin 06 (R) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short to ground. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new chime module. CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ACC module.

PINPOINT TEST G240073p7 : DTC U0235, P2583: FLR SENSOR CAN CIRCUIT TESTS

G240073t7 : CHECK THE ACC MODULE TO FLR SENSOR CAN 'L' CIRCUIT FOR OPEN CIRCUIT

1. Disconnect the battery negative terminal.

Battery Disconnect and Connect 2. Disconnect the ACC module connector IP78. 3. Disconnect the FLR sensor connector EC23. 4. Measure the resistance between the ACC module connector IP78, pin 02 (U) and FLR sensor connector EC23, pin 03 (U).

Is the resistance greater than 5 ohms?

-> **Yes**

CHECK connector IP55 for security. REPAIR the open circuit. For additional information, refer to the

wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G240073t11.

G240073t11 : CHECK THE ACC MODULE TO FLR SENSOR CAN 'L' CIRCUIT FOR SHORT CIRCUIT TO B+

1. Reconnect the battery negative terminal.

Battery Connect (86.15.15) 2. Turn the ignition switch to the **ON** position. 3. Measure the voltage between the ACC module connector IP78, pin 02 (U) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short to B+. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G240073t12.

G240073t12 : CHECK THE ACC MODULE TO FLR SENSOR CAN 'L' CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between the ACC module connector IP78, pin 02 (U) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G240073t13.

G240073t13 : CHECK THE ACC MODULE TO FLR SENSOR CAN 'H' CIRCUIT FOR OPEN CIRCUIT

1. Measure the resistance between the ACC module connector IP78, pin 03 (R) and FLR sensor connector EC23, pin 04 (R).

Is the resistance greater than 5 ohms?

-> **Yes**

CHECK connector IP55 for security. REPAIR the open circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G240073t14.

G240073t14 : CHECK THE ACC MODULE TO FLR SENSOR CAN 'H' CIRCUIT FOR SHORT CIRCUIT TO B+

1. Measure the voltage between the ACC module connector IP78, pin 03 (R) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short to B+. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G240073t15.

G240073t15 : CHECK THE ACC MODULE TO FLR SENSOR CAN 'H' CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Measure the resistance between the ACC module connector IP78, pin 03 (R) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new FLR sensor. CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ACC control module.

PINPOINT TEST G240073p9 : ACC SYSTEM VOLTAGE TESTS

G240073t17 : CHECK THE IGNITION SUPPLY TO THE ACC MODULE

1. Disconnect the battery negative terminal.

Battery Disconnect and Connect 2. Disconnect the ACC module connector IP78. 3. Reconnect the battery negative terminal.

Battery Connect (86.15.15) 4. Turn the ignition switch to the **ON** position. 5. Measure the voltage between the ACC connector IP78, pin 14 (WG) and GROUND.

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the ACC connector IP78, pin 14 (WG) and battery. This circuit includes the passenger junction fuse box, (fuse 02). For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G240073t16.

G240073t16 : CHECK THE BATTERY SUPPLY TO THE ACC MODULE

1. Measure the voltage between the ACC connector IP78, pin 15 (NW) and GROUND.

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the ACC module connector IP78, pin 15 (NW) and battery. This circuit includes the passenger junction fuse box, (fuse 27 and the switched system power relay). For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G240073t20.

G240073t20 : CHECK THE GROUND TO THE ACC MODULE

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the battery negative terminal. Battery Disconnect and Connect 3. Measure the resistance between the ACC connector IP78, pin 12 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the circuit between the ACC module connector IP78, pin 12 (B) and ground connection G31AL. Check the ground connection for contamination and security. For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G240073t21.

G240073t21 : CHECK THE IGNITION SUPPLY TO THE FLR SENSOR

1. Disconnect the FLR sensor connector EC23. 2. Reconnect the battery negative terminal. Battery Connect (86.15.15) 3. Turn the ignition switch to the **ON** position. 4. Measure the voltage between the FLR sensor connector EC23, pin 01 (WG) and GROUND.

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the FLR connector EC23, pin 01 (WG) and battery. For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G240073t18.

G240073t18 : CHECK THE BATTERY SUPPLY TO THE FLR SENSOR

1. Measure the voltage between the FLR sensor connector EC23, pin 05 (NW) and GROUND.

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the FLR sensor connector EC23, pin 05 (NW) and battery. For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G240073t22.

G240073t22 : CHECK THE GROUND TO THE FLR SENSOR

1. Turn the ignition switch to the **OFF** position. 2. Measure the resistance between the FLR sensor connector EC23, pin 02 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the circuit between the FLR sensor connector EC23, pin 02 (B) and ground connection G01AL. Check ground connection for contamination and security. For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

No fault is indicated with the ACC system supply voltages or grounds. To continue the diagnostics, return to the Symptom Chart.

PINPOINT TEST G240073p11 : SPEED CONTROL SWITCH CIRCUIT TESTS

G240073t19 : CHECK THE STEERING WHEEL SPEED CONTROL SWITCH CIRCUIT FOR OPEN CIRCUIT

1. Disconnect the battery negative terminal.

Battery Disconnect and Connect 2. Wait one minute for the system to become safe. 3. Disconnect

the ECM connector PI01. 4. Measure the resistance between the ECM connector PI01, pin 47 (WG) and ECM connector PI01, pin 48 (YG).

Is the resistance 4310 ohms?

-> Yes

GO to Pinpoint Test G240073t23.

-> No

GO to Pinpoint Test G240073t29.

G240073t23 : CHECK THE STEERING WHEEL SPEED CONTROL RESUME SWITCH CIRCUIT

1. Measure the resistance between the ECM connector PI01, pin 47 (WG) and ECM connector PI01, pin 48 (YG). 2. Operate the **RESUME** switch.

Does the resistance switch between 4310 ohms and 2110 ohms when the switch is operated?

-> Yes

GO to Pinpoint Test G240073t24.

-> No

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G240073t24 : CHECK THE STEERING WHEEL SPEED CONTROL SET+ SWITCH CIRCUIT

1. Measure the resistance between the ECM connector PI01, pin 47 (WG) and ECM connector PI01, pin 48 (YG). 2. Operate the **SET+** switch.

Does the resistance switch between 4310 ohms and 1110 ohms when the switch is operated?

-> Yes

GO to Pinpoint Test G240073t25.

-> No

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G240073t25 : CHECK THE STEERING WHEEL SPEED CONTROL HEADWAY- SWITCH CIRCUIT

1. Measure the resistance between the ECM connector PI01, pin 47 (WG) and ECM connector PI01, pin 48 (YG). 2. Operate the **HEADWAY-** switch.

Does the resistance switch between 4310 ohms and 600 ohms when the switch is operated?

-> Yes

GO to Pinpoint Test G240073t26.

-> No

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G240073t26 : CHECK THE STEERING WHEEL SPEED CONTROL HEADWAY+ SWITCH CIRCUIT

1. Measure the resistance between the ECM connector PI01, pin 47 (WG) and ECM connector PI01, pin 48 (YG). 2. Operate the **HEADWAY+** switch.

Does the resistance switch between 4310 ohms and 300 ohms when the switch is operated?

-> Yes

GO to Pinpoint Test G240073t27.

-> No

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G240073t27 : CHECK THE STEERING WHEEL SPEED CONTROL SET- SWITCH CIRCUIT

1. Measure the resistance between the ECM connector PI01, pin 47 (WG) and ECM connector PI01, pin 48 (YG). 2. Operate the **SET-** switch.

Does the resistance switch between 4310 ohms and 120 ohms when the switch is operated?

-> Yes

GO to Pinpoint Test G240073t28.

-> No

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G240073t28 : CHECK THE STEERING WHEEL SPEED CONTROL CANCEL SWITCH CIRCUIT

1. Measure the resistance between the ECM connector PI01, pin 47 (WG) and ECM connector PI01, pin 48 (YG). 2. Operate the **CANCEL** switch.

Does the resistance switch between 4310 ohms and zero ohms when the switch is operated?

-> Yes

No fault is indicated with the steering wheel speed control switches or circuit. To continue the diagnostics, return to the Symptom Chart.

-> No

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G240073t29 : CHECK THE STEERING WHEEL SPEED CONTROL SWITCH CIRCUIT FOR OPEN CIRCUIT

1. Disconnect the clockspring connector SW08. 2. Measure the resistance between the clockspring connector SW08, pin 08, component side and clockspring connector SW08, pin 06, component side.

Is the resistance 4310 ohms?

-> Yes

GO to Pinpoint Test G240073t31.

-> No

GO to Pinpoint Test G240073t30.

G240073t30 : CHECK THE STEERING WHEEL SPEED CONTROL SWITCH FOR OPEN CIRCUIT

1. Disconnect the steering wheel speed control switch. 2. Measure the resistance between the steering wheel speed control switch connector pins 01 and 02 component side.

Is the resistance 4310 ohms?

-> Yes

INSTALL a new clockspring.

Clockspring (86.65.92) TEST the system for normal operation.

-> No

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G240073t31 : CHECK THE STEERING WHEEL SPEED CONTROL SWITCH CIRCUIT FOR OPEN CIRCUIT

1. Measure the resistance between the ECM connector PI01, pin 47 (WG) and clockspring connector SW08, pin 08 (YR).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the circuit ECM connector PI01, pin 47 (WG) to clockspring connector SW08, pin 08 (YR). For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> No

GO to Pinpoint Test G240073t36.

G240073t36 : CHECK THE STEERING WHEEL SPEED CONTROL SWITCH CIRCUIT FOR OPEN CIRCUIT

1. Measure the resistance between the ECM connector PI01, pin 48 (YG) and clockspring connector SW08, pin 06 (YG).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the circuit ECM connector PI01, pin 48 (YG) to clockspring connector SW08, pin 06 (YG). For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> No

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

PINPOINT TEST G240073p8 : BRAKE CANCEL SWITCH CIRCUIT TEST

G240073t32 : CHECK THE BRAKE CANCEL SWITCH CIRCUIT FOR OPEN

1. Disconnect the battery negative terminal.

Battery Disconnect and Connect 2. Disconnect the ECM connector PI01. 3. Reconnect the battery negative terminal.

Battery Connect (86.15.15) 4. Turn the ignition switch to the **ON** position. 5. Measure the voltage between the ECM connector PI01, pin 09 (U) and GROUND.

Is the voltage less than 12 volts?

-> Yes

GO to Pinpoint Test G240073t34.

-> **No**

GO to Pinpoint Test G240073t33.

G240073t33 : CHECK THE BRAKE CANCEL SWITCH FUNCTION

1. Press the **brake** pedal.

Does the voltage drop to zero with the brake pedal pressed?

-> **Yes**

No fault is indicated with the brake cancel switch or circuit. To continue the diagnostics, return to the Symptom Chart.

-> **No**

INSTALL a new brake cancel switch.

Speed Control Deactivator Switch (19.75.20) TEST the system for normal operation.

G240073t34 : CHECK THE VOLTAGE TO THE BRAKE CANCEL SWITCH

1. Disconnect the brake cancel switch connector SW08. 2. Measure the voltage between the brake cancel connector SW08, pin 01 (WG) and GROUND.

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the brake cancel switch connector SW08, pin 1 (WG) and splice ECS12. For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G240073t35.

G240073t35 : CHECK THE BRAKE CANCEL SWITCH CIRCUIT FOR OPEN CIRCUIT

1. Turn the ignition switch to the **OFF** position. 2. Measure the resistance between the ECM connector PI01, pin 09 (U) and brake cancel switch connector CR77, pin 02 (U).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the circuit between the ECM connector PI01, pin 09 (U) and the brake cancel switch connector CR77, pin 02 (U). For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

INSTALL a new brake cancel switch.

Speed Control Deactivator Switch (19.75.20) TEST the system for normal operation.

Speed Control - VIN Range: G45704->G99999

Principles of Operation

There are two types of speed (cruise) control fitted, adaptive cruise control (ACC) and non-adaptive cruise control.

For additional information on the operation of either system,
Speed Control - VIN Range: G45704->G99999

Inspection and verification

- 1 . Verify the customer concern.
- 2 . Confirm which, if any, warning lights and/or messages were displayed on the instrument cluster.

NOTE:

For information on the messages displayed, refer to the owner handbook.

- 3 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
Forward looking radar (FLR) sensor levelling	Fuses/Relays
Obstructions in the way of the FLR sensor	Damaged, Loose or Corroded Connector(s)
	Damage to Wiring Loom/Incorrect Location, Stretched or Taught

- 4 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 5 . If the cause is not visually evident use the Jaguar approved diagnostic system or a scan tool to retrieve the fault codes before proceeding to the DTC index or the symptom chart if no DTCs are set.

Forward looking radar (FLR) sensor levelling

An incorrectly aligned FLR sensor can cause incorrect system operation. Before starting any repair work on the ACC system, check the levelling of the FLR sensor. This is carried out in a similar way to the module levelling in previous systems.

Speed Control Module Alignment - VIN Range: H18680->H99999

Symptom Chart

Symptom	Possible source	Action
Speed control inhibited or disabled	<p>Default mode enabled</p> <p>Supply voltage to ACC module</p> <p>Supply voltage to FLR sensor</p> <p>Steering wheel speed control switch(es)</p> <p>Steering wheel speed control switch circuit</p> <p>Throttle sensors</p> <p>Brake cancel switch</p>	<p>Check message center for default message.</p> <p>For ACC module circuit tests, GO to Pinpoint Test G532451p8.</p> <p>For FLR sensor circuit tests, GO to Pinpoint Test G532451p8.</p> <p>For steering wheel speed control switch tests, GO to Pinpoint Test G532451p9.</p> <p>For steering wheel speed control switch circuit tests, GO to Pinpoint Test G532451p9.</p> <p>For 3.0 L engine throttle position sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999</p> <p>For 3.5 and 4.2 L engine throttle position sensor tests, Electronic Engine Controls - VIN Range: G45704->G99999</p> <p>For brake cancel switch tests, GO to Pinpoint Test G532451p10.</p>
Unable to regulate/adjust vehicle speed	Steering wheel switch malfunction	<p>For speed control switch circuit tests, GO to Pinpoint Test G532451p9.</p> <p>For speed control switch input signal tests, GO to Pinpoint Test G532451p9.</p>
Unable to cancel speed control from steering wheel	Steering wheel switch malfunction	<p>For speed control switch circuit tests, GO to Pinpoint Test G532451p9.</p> <p>For speed control switch input signal tests, GO to Pinpoint Test G532451p9.</p>
Unable to cancel speed control from brake pedal	Brake cancel switch malfunction	For brake cancel switch tests, GO to Pinpoint Test G532451p10.

Diagnostic trouble code (DTC) index



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00

NOTE:

If the control module/component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual (section B1.2), or determine if any prior approval program is in operation, prior to the installation of a new module.

NOTE:

When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places and with a current calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE:

Check and rectify basic faults before beginning diagnostic routines that involve pinpoint tests.

NOTE:

Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.

NOTE:

If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

DTC	Description	Possible Source	Action
C1291	ACC Module Overheated	Forward Looking Radar (FLR) sensor is too warm or too cold FLR sensor failure	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. CLEAR the DTC. TEST the system for correct operation. If the DTC returns, INSTALL a new FLR sensor.

C1292	ACC Blockage Detection	Forward Looking Radar (FLR) sensor is blocked	Remove any blockages (snow/leaves etc) from the FLR sensor. CLEAR the DTC. TEST the system for normal operation. If the DTC returns, INSTALL a new FLR sensor.
C1293	ACC Alignment Offset Angle Out of Range	<p>Sensor requires mechanical levelling</p> <p>Forward Looking Radar (FLR) sensor is in service alignment mode</p>	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Check FLR sensor levelling. (This is done in a similar way to control module alignment in earlier systems). Complete service alignment. Refer to the Jaguar approved diagnostic system.
C1294	ACC Active Speed Out of Range	<p>Speed related fault with the engine control module (ECM), transmission control module (TCM), dynamic suspension control module (DSCM), or instrument cluster modules</p> <p>ACC module failure</p>	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Carry out a full vehicle DTC check. Check the ECM, TCM, DSCM, or instrument cluster modules for stored codes. If no DTCs are indicated in the ECM, TCM, DSCM, or instrument cluster modules, INSTALL a new ACC module.
C1459	Adaptive Mode Switch - Circuit Failure	<p>Forward alert switch failure</p> <p>Forward alert switch to ACC module circuit short circuit to power</p> <p>Forward alert switch to ACC module circuit open circuit</p>	Refer to electrical circuit diagrams, notes and check the forward alert switch circuit for failure. For forward alert switch circuit tests, GO to Pinpoint Test G532451p1.
C1748	Switch input Circuit - Short to Ground	<p>Forward alert switch failure</p> <p>Forward alert switch to ACC module circuit short circuit to GROUND</p>	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to electrical circuit diagrams, notes and check the forward alert switch circuit for short to ground. For forward alert switch circuit tests, GO to Pinpoint Test G532451p2.

B2373	LED #1 Circuit - Short to Power	<p>Forward alert switch failure</p> <p>Forward alert switch LED to ACC module circuit short to power</p> <p>Forward alert switch LED to ACC module circuit open circuit</p>	Refer to electrical circuit diagrams, notes and check Forward alert switch circuit for short to power. For forward alert switch LED tests, GO to Pinpoint Test G532451p3.
C1920	Led #1 Circuit Failure	<p>Forward alert switch failure</p> <p>Forward alert switch LED to ACC module circuit short circuit to GROUND</p>	Refer to electrical circuit diagrams, notes and check Forward alert switch circuit for short to ground. For forward alert switch LED tests, GO to Pinpoint Test G532451p4.
C1935	Chime Circuit Failure	<p>Chime module to ACC module circuit short to power</p> <p>Chime module to ACC module circuit open circuit</p>	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to electrical circuit diagrams, notes and check chime module circuit for short to power or open circuit For adaptive speed control chime module circuit tests, GO to Pinpoint Test G532451p5.
B1342	ECU Is Faulted	ACC module failure	Suspect ACC module internal fault , check and replace as required, refer to the new module installation note at the top of the DTC Index
B2369	Chime OUTPUT Request Circuit - Short to Ground	Chime output circuit short to GROUND	Refer to electrical circuit diagrams, notes and check chime module circuit for short to ground. For adaptive speed control chime module circuit tests, GO to Pinpoint Test G532451p6.
B2477	Module Configuration Failure	ACC module is not correctly configured	Configure the ACC module. Refer to the Jaguar approved diagnostic system.
U0235	Lost Communication With Cruise Control Front Distance Range Sensor	<p>Forward Looking Radar (FLR) sensor</p> <p>FLR sensor CAN circuit</p>	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to electrical circuit diagrams, notes and

	(FDSM)		check CAN bus circuit for fault. For FLR sensor CAN circuit tests, GO to Pinpoint Test G532451p7.
U0433	Invalid Data Received From Cruise Control Front Distance Range Sensor	Forward Looking Radar (FLR) sensor failure	INSTALL a new FLR sensor.
U2023	Fault Received From External Node	CAN Bus /ACC module related fault with the ECM, TCM, DSCM, or instrument cluster modules ACC module internal CAN fault CAN network fault	Carry out a full vehicle DTC check. Check the ECM, TCM, DSCM, or instrument cluster modules for stored ACC related codes. For CAN circuit tests, Communications Network
U2501	Missing Message From Engine Management System For ACC	Speed control module - CAN Bus circuit fault	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Check engine management system module for stored fault codes. Refer to electrical circuit diagrams, notes and check CAN Bus circuit for fault. For CAN circuit tests, Communications Network
U2502	Missing Message From Transmission Control Module For ACC	Speed control module - CAN Bus circuit fault	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Check transmission control module for stored fault codes. Refer to electrical circuit diagrams, notes and check CAN Bus circuit for fault. For CAN circuit tests, Communications Network
U2503	Missing Message From Instrument Cluster For ACC	Speed control module - CAN Bus circuit fault	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Check instrument cluster for stored fault codes. Refer to electrical circuit diagrams, notes and check CAN Bus circuit for fault. For CAN circuit tests,

			Communications Network
U2504	Missing Message From ABS For ACC	Speed control module - CAN Bus circuit fault	Check anti-lock brake system control module for related stored fault codes. Refer to electrical circuit diagrams, notes and check CAN Bus circuit for fault. For CAN circuit tests, Communications Network
U2505	Missing Message From Smart Booster Controller For ACC	Speed control module - CAN Bus circuit fault	Check smart booster controller module for related stored fault codes. Refer to electrical circuit diagrams, notes and check CAN Bus circuit for fault. For CAN circuit tests, Communications Network
U2516	CAN Bus Fault network fault	CAN Bus (network) circuit fault	Refer to electrical circuit diagrams, notes and check CAN Bus circuit for fault. For CAN circuit tests, Communications Network
U2520	CAN Bus Fault IC missing	Instrument Cluster CAN Bus circuit short to power, open circuit, short circuit to ground	Refer to electrical circuit diagrams, notes and check CAN Bus circuit to instrument cluster for fault. For CAN circuit tests, Communications Network
U2521	CAN Bus Fault ABS missing	DSC (ABS) CAN circuit short to power, open circuit, short circuit to ground	Refer to electrical circuit diagrams, notes and check CAN Bus circuit to ABS module for fault. For CAN circuit tests, Communications Network
U2522	CAN Bus Fault TCM missing	TCM CAN circuit short to power, open circuit, short circuit to ground	Refer to electrical circuit diagrams, notes and check CAN Bus circuit to TCM module for fault. For CAN circuit tests, Communications Network
U2523	CAN Bus Fault ECM missing	ECM CAN circuit short to power, open circuit, short circuit to ground	Refer to electrical circuit diagrams, notes and check CAN Bus circuit to ECM module for fault. For CAN circuit tests, Communications Network
P0610	Control Module Vehicle Options Error	ACC module not configured ACC configured to the	Configure the system using the manufacturer approved diagnostic system.

		<p>wrong model year</p> <p>ACC module configured to the wrong fuel type</p> <p>Wrong brake system fitted</p>	
P2583	Cruise Control Front Distance Range Sensor - Single Sensor or Center	<p>FLR sensor</p> <p>FLR sensor CAN circuit</p>	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to electrical circuit diagrams, notes and check FLR circuit fault. For FLR sensor CAN circuit tests, GO to Pinpoint Test G532451p7.

Pinpoint Tests

PINPOINT TEST G532451p1 : FORWARD ALERT SWITCH CIRCUIT TESTS

G532451t1 : CHECK THE FORWARD ALERT SWITCH FOR OPEN CIRCUIT

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the ACC module connector IP78. 3. Disconnect the forward alert switch connector IP50. 4. Measure the resistance between the ACC module connector IP78, pin 20 (U) and forward alert switch connector IP50, pin 04 (U).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G532451t2.

G532451t2 : CHECK THE FORWARD ALERT SWITCH FOR SHORT CIRCUIT TO B+

1. Turn the ignition switch to the **ON** position. 2. Measure the voltage between the ACC module connector IP78, pin 20 (U) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short to B+. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new forward alert switch.

Speed Control Deactivator Switch (19.75.20) CLEAR the DTC. TEST the system for normal operation.

If the DTC is repeated, INSTALL a new ACC module.

Speed Control Module (19.75.26)

PINPOINT TEST G532451p2 : FORWARD ALERT SWITCH CIRCUIT TEST

G532451t3 : CHECK THE FORWARD ALERT SWITCH CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the ACC module connector IP78. 3. Disconnect the forward alert switch connector IP50. 4. Measure the resistance between the ACC module connector, IP78 pin 20 (U) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short to ground. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new forward alert switch.

Speed Control Deactivator Switch (19.75.20) CLEAR the DTC. TEST the system for normal operation.

If the DTC is repeated, INSTALL a new ACC module.

Speed Control Module (19.75.26)

PINPOINT TEST G532451p3 : FORWARD ALERT SWITCH LED CIRCUIT TESTS

G532451t4 : CHECK THE FORWARD ALERT SWITCH LED CIRCUIT FOR OPEN CIRCUIT

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the ACC module connector IP78. 3. Disconnect the forward alert switch connector IP50. 4. Measure the resistance between the ACC module connector IP78, pin 05 (R) and forward alert switch connector IP50, pin 07 (R).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G532451t5.

G532451t5 : CHECK THE FORWARD ALERT SWITCH LED CIRCUIT FOR SHORT CIRCUIT TO B+

1. Turn the ignition switch to the **ON** position. 2. Measure the voltage between the ACC module connector IP78, pin 05 (R) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short to B+. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new forward alert switch.

Speed Control Deactivator Switch (19.75.20) CLEAR the DTC. TEST the system for normal operation.

If the DTC is repeated, INSTALL a new ACC control module, not the forward looking sensor.

PINPOINT TEST G532451p4 : FORWARD ALERT SWITCH LED CIRCUIT TESTS

G532451t6 : CHECK THE FORWARD ALERT SWITCH LED CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the ACC module connector IP78. 3. Disconnect the forward alert switch connector IP50. 4. Measure the resistance between the ACC module connector IP78, pin 05 (R) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short to ground. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new forward alert switch.

Speed Control Deactivator Switch (19.75.20) CLEAR the DTC. TEST the system for normal operation.

If the DTC is repeated, INSTALL a new ACC control module, not the forward looking sensor.

PINPOINT TEST G532451p5 : CHIME CIRCUIT TESTS

G532451t7 : CHECK THE CHIME CIRCUIT FOR OPEN CIRCUIT

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the ACC module connector IP78. 3. Disconnect the chime module connector IP11. 4. Measure the resistance between the ACC module connector IP78, pin 06 (R) and chime module connector IP11, pin 03 (R).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the open circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G532451t8.

G532451t8 : CHECK THE CHIME CIRCUIT FOR SHORT CIRCUIT TO B+

1. Turn the ignition switch to the **ON** position. 2. Measure the voltage between the ACC module connector IP78, pin 06 (R) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short to B+. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new chime module. CLEAR the DTC. TEST the system for normal operation, If the DTC is repeated, INSTALL a new ACC module.

PINPOINT TEST G532451p6 : CHIME CIRCUIT TEST

G532451t9 : CHECK THE CHIME CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the ACC module connector IP78. 3. Disconnect the chime module connector IP11. 4. Measure the resistance between the ACC module connector IP78, pin 06 (R) and GROUND.

Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short to ground. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

INSTALL a new chime module. CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ACC module.

PINPOINT TEST G532451p7 : FLR SENSOR CAN CIRCUIT TESTS

G532451t10 : CHECK THE ACC MODULE TO FLR SENSOR CAN 'L' CIRCUIT FOR OPEN CIRCUIT

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the ACC module connector IP78. 3. Disconnect the FLR sensor connector EC23. 4. Measure the resistance between the ACC module connector IP78, pin 02 (U) and FLR sensor connector EC23, pin 03 (U).

Is the resistance greater than 5 ohms?

-> Yes

CHECK connector IP55 for security. REPAIR the open circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> No

GO to Pinpoint Test G532451t11.

G532451t11 : CHECK THE ACC MODULE TO FLR SENSOR CAN 'L' CIRCUIT FOR SHORT CIRCUIT TO B+

1. Turn the ignition switch to the **ON** position. 2. Measure the voltage between the ACC module connector IP78, pin 02 (U) and GROUND.

Is the voltage greater than 3 volts?

-> Yes

REPAIR the short to Power. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G532451t12.

G532451t12 : CHECK THE ACC MODULE TO FLR SENSOR CAN 'L' CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Turn the ignition switch to the **OFF** position. 2. Measure the resistance between the ACC module connector IP78, pin 02 (U) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G532451t13.

G532451t13 : CHECK THE ACC MODULE TO FLR SENSOR CAN 'H' CIRCUIT FOR OPEN CIRCUIT

1. Measure the resistance between the ACC module connector IP78, pin 03 (R) and FLR sensor connector EC23, pin 04 (R).

Is the resistance greater than 5 ohms?

-> **Yes**

CHECK connector IP55 for security. REPAIR the open circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G532451t14.

G532451t14 : CHECK THE ACC MODULE TO FLR SENSOR CAN 'H' CIRCUIT FOR SHORT CIRCUIT TO Power

1. Turn the ignition switch to the **ON** position. 2. Measure the voltage between the ACC module connector IP78, pin 03 (R) and GROUND.

Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short to Power. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G532451t15.

G532451t15 : CHECK THE ACC MODULE TO FLR SENSOR CAN 'H' CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Turn the ignition switch to the **OFF** position. 2. Measure the resistance between the ACC module connector IP78, pin 03 (R) and GROUND.

Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new FLR sensor. CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ACC control module.

PINPOINT TEST G532451p8 : ACC SYSTEM VOLTAGE TESTS

G532451t16 : CHECK THE IGNITION SUPPLY TO THE ACC MODULE

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the ACC module connector IP78. 3. Turn the ignition switch to the **ON** position. 4. Measure the voltage between the ACC connector IP78, pin 14 (WG) and GROUND.

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the ACC connector IP78, pin 14 (WG) and battery. This circuit includes the passenger junction fuse box, (fuse 02). For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G532451t17.

G532451t17 : CHECK THE BATTERY SUPPLY TO THE ACC MODULE

1. Measure the voltage between the ACC connector IP78, pin 15 (NW) and GROUND.

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the ACC module connector IP78, pin 15 (NW) and battery. This circuit includes the passenger junction fuse box, (fuse 27 and the switched system power relay). For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G532451t18.

G532451t18 : CHECK THE GROUND TO THE ACC MODULE

1. Turn the ignition switch to the **OFF** position. 2. Measure the resistance between the ACC connector IP78, pin 12 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the circuit between the ACC module connector IP78, pin 12 (B) and ground connection G31BS. Check the ground connection for contamination and security. For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G532451t19.

G532451t19 : CHECK THE IGNITION SUPPLY TO THE FLR SENSOR

1. Disconnect the FLR sensor connector EC23. 2. Turn the ignition switch to the **ON** position. 3. Measure the voltage between the FLR sensor connector EC23, pin 01 (WG) and GROUND.

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the FLR connector EC23, pin 01 (WG) and battery. For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G532451t20.

G532451t20 : CHECK THE BATTERY SUPPLY TO THE FLR SENSOR

1. Measure the voltage between the FLR sensor connector EC23, pin 05 (NW) and GROUND.

Is the voltage less than 10 volts?

-> **Yes**

REPAIR the circuit between the FLR sensor connector EC23, pin 05 (NW) and battery. For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G532451t21.

G532451t21 : CHECK THE GROUND TO THE FLR SENSOR

1. Turn the ignition switch to the **OFF** position. 2. Measure the resistance between the FLR sensor connector EC23, pin 02 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the circuit between the FLR sensor connector EC23, pin 02 (B) and ground connection G01AR. Check ground connection for contamination and security. For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

No fault is indicated with the ACC system supply voltages or grounds. To continue the diagnostics, return to the Symptom Chart.

PINPOINT TEST G532451p9 : SPEED CONTROL SWITCH CIRCUIT TESTS

G532451t22 : CHECK THE STEERING WHEEL SPEED CONTROL SWITCH CIRCUIT FOR OPEN CIRCUIT

1. Disconnect the battery negative terminal.

Battery Disconnect and Connect 2. Wait one minute for the system to become safe. 3. Disconnect the ECM connector, EC300 (petrol) or EC66 (diesel). 4. Measure the resistance between the ECM connector:

(Petrol) EC300, pin 35 (YG) and EC300, pin 30 (YR).

(Diesel) EC66, pin B4 (YG) and EC66, pin C4 (YR).

Is the resistance 4310 ohms?

-> **Yes**

GO to Pinpoint Test G532451t23.

-> **No**

GO to Pinpoint Test G532451t29.

G532451t23 : CHECK THE STEERING WHEEL SPEED CONTROL RESUME SWITCH CIRCUIT

1. Measure the resistance between the ECM connector:

(Petrol) EC300, pin 35 (YG) and EC300, pin 30 (YR).

(Diesel) EC66, pin B4 (YG) and EC66, pin C4 (YR). 2. Operate the **RESUME** switch.

Does the resistance switch between 4310 ohms and 2110 ohms when the switch is operated?

-> **Yes**

GO to Pinpoint Test G532451t24.

-> **No**

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G532451t24 : CHECK THE STEERING WHEEL SPEED CONTROL SET+ SWITCH CIRCUIT

1. Measure the resistance between the ECM connector:

(Petrol) EC300, pin 35 (YG) and EC300, pin 30 (YR).

(Diesel) EC66, pin B4 (YG) and EC66, pin C4 (YR). 2. Operate the **SET+** switch.

Does the resistance switch between 4310 ohms and 1110 ohms when the switch is operated?

-> **Yes**

GO to Pinpoint Test G532451t25.

-> **No**

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G532451t25 : CHECK THE STEERING WHEEL SPEED CONTROL HEADWAY- SWITCH CIRCUIT

1. Measure the resistance between the ECM connector:

(Petrol) EC300, pin 35 (YG) and EC300, pin 30 (YR).

(Diesel) EC66, pin B4 (YG) and EC66, pin C4 (YR). 2. Operate the **HEADWAY-** switch.

Does the resistance switch between 4310 ohms and 600 ohms when the switch is operated?

-> **Yes**

GO to Pinpoint Test G532451t26.

-> **No**

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G532451t26 : CHECK THE STEERING WHEEL SPEED CONTROL HEADWAY+ SWITCH CIRCUIT

1. Measure the resistance between the ECM connector:

(Petrol) EC300, pin 35 (YG) and EC300, pin 30 (YR).

(Diesel) EC66, pin B4 (YG) and EC66, pin C4 (YR). 2. Operate the **HEADWAY+** switch.

Does the resistance switch between 4310 ohms and 300 ohms when the switch is operated?

-> **Yes**

GO to Pinpoint Test G532451t27.

-> **No**

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G532451t27 : CHECK THE STEERING WHEEL SPEED CONTROL SET- SWITCH CIRCUIT

1. Measure the resistance between the ECM connector:

(Petrol) EC300, pin 35 (YG) and EC300, pin 30 (YR).

(Diesel) EC66, pin B4 (YG) and EC66, pin C4 (YR). 2. Operate the **SET-** switch.

Does the resistance switch between 4310 ohms and 120 ohms when the switch is operated?

-> **Yes**

GO to Pinpoint Test G532451t28.

-> **No**

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G532451t28 : CHECK THE STEERING WHEEL SPEED CONTROL CANCEL SWITCH CIRCUIT

1. Measure the resistance between the ECM connector:

(Petrol) EC300, pin 35 (YG) and EC300, pin 30 (YR).

(Diesel) EC66, pin B4 (YG) and EC66, pin C4 (YR). 2. Operate the **CANCEL** switch.

Does the resistance switch between 4310 ohms and zero ohms when the switch is operated?

-> **Yes**

No fault is indicated with the steering wheel speed control switches or circuit. To continue the diagnostics, return to the Symptom Chart.

-> **No**

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G532451t29 : CHECK THE STEERING WHEEL SPEED CONTROL SWITCH CIRCUIT FOR OPEN CIRCUIT

1. Disconnect the clockspring connector SW08. 2. Measure the resistance between the clockspring connector SW08, pin 08, component side and clockspring connector SW08, pin 06, component side.

Is the resistance 4310 ohms?

-> **Yes**

GO to Pinpoint Test G532451t31.

-> **No**

GO to Pinpoint Test G532451t30.

G532451t30 : CHECK THE STEERING WHEEL SPEED CONTROL SWITCH FOR OPEN CIRCUIT

1. Disconnect the steering wheel speed control switch. 2. Measure the resistance between the steering wheel speed control switch connector pins 01 and 02 component side.

Is the resistance 4310 ohms?

-> **Yes**

INSTALL a new clockspring.

Clockspring (86.65.92) TEST the system for normal operation.

-> **No**

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

G532451t31 : CHECK THE STEERING WHEEL SPEED CONTROL SWITCH CIRCUIT FOR OPEN CIRCUIT

1. Measure the resistance between the clockspring connector SW08, pin 08 (YR) and the ECM connector:

(Petrol) EC300, pin 30 (YR).

(Diesel) EC66, pin C4 (YR).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the circuit ECM connector to clockspring connector SW08, pin 08 (YR). For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> No

GO to Pinpoint Test G532451t32.

G532451t32 : CHECK THE STEERING WHEEL SPEED CONTROL SWITCH CIRCUIT FOR OPEN CIRCUIT

1. Measure the resistance between the clockspring connector SW08, pin 06 (YG) and the ECM connector:

(Petrol) EC300, pin 35 (YG).

(Diesel) EC66, pin B4 (YG).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the circuit ECM connector to clockspring connector SW08, pin 06 (YG). For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> No

INSTALL a new speed control switch assembly.

Speed Control Switch (19.75.25) TEST the system for normal operation.

PINPOINT TEST G532451p10 : BRAKE CANCEL SWITCH CIRCUIT TEST (PETROL VEHICLES)

G532451t38 : CHECK THE BRAKE CANCEL SWITCH FUNCTION, WITH THE BRAKE PEDAL RELEASED

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the brake cancel switch connector CR77. 3. Measure the resistance between the brake cancel switch connector CR77, pin 01 component side and the brake cancel switch connector CR77, pin 02 component side.

Is the resistance greater than 5 ohms?

-> Yes

INSTALL a new brake cancel switch.

Speed Control Deactivator Switch (19.75.20) TEST the system for normal operation.

-> No

GO to Pinpoint Test G532451t39.

G532451t39 : CHECK THE BRAKE CANCEL SWITCH FUNCTION, WITH THE BRAKE PEDAL DEPRESSED

1. Measure the resistance between the brake cancel switch connector CR77, pin 01 component side and the brake cancel switch connector CR77, pin 02 component side.

Is the resistance greater than 10,000 ohms?

-> Yes

GO to Pinpoint Test G532451t33.

-> No

INSTALL a new brake cancel switch.

Speed Control Deactivator Switch (19.75.20) TEST the system for normal operation.

G532451t33 : CHECK THE BRAKE CANCEL SWITCH GROUND CIRCUIT FOR OPEN CIRCUIT

1. Measure the resistance between the brake cancel switch connector CR77, pin 01 (B) and GROUND.

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the circuit between the brake cancel switch connector CR77, pin 01 (B) and GROUND. For

additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

GO to Pinpoint Test G532451t34.

G532451t34 : CHECK THE ECM TO BRAKE CANCEL SWITCH CIRCUIT FOR OPEN CIRCUIT

1. Disconnect the ECM connector, EC300. 2. Measure the resistance between the ECM connector EC300, pin 40 (U) and brake cancel switch connector CR77, pin 02 (U).

Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the circuit between the ECM connector EC300, pin 40 (U) and brake cancel switch connector CR77, pin 02 (U). For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> **No**

No fault is indicated with the brake cancel switch or circuit. To continue the diagnostics, return to the Symptom Chart.

PINPOINT TEST G532451p11 : BRAKE CANCEL SWITCH CIRCUIT TEST (DIESEL VEHICLES)

G532451t37 : CHECK THE BRAKE CANCEL SWITCH OUTPUT VOLTAGE

1. Turn the ignition switch to the **OFF** position. 2. Disconnect the ECM connector EC66. 3. Turn the ignition switch to the **ON** position. 4. Measure the voltage between the ECM connector EC66, pin E3 (U) and GROUND.

Is the voltage less than 12 volts?

-> **Yes**

GO to Pinpoint Test G532451t36.

-> **No**

GO to Pinpoint Test G532451t35.

G532451t35 : CHECK THE BRAKE CANCEL SWITCH FUNCTION

1. Press the **brake** pedal.

Does the voltage drop to zero with the brake pedal pressed?

-> Yes

No fault is indicated with the brake cancel switch or circuit. To continue the diagnostics, return to the Symptom Chart.

-> No

INSTALL a new brake cancel switch.

Speed Control Deactivator Switch (19.75.20) TEST the system for normal operation.

G532451t36 : CHECK THE VOLTAGE TO THE BRAKE CANCEL SWITCH

1. Disconnect the brake cancel switch connector CR77. 2. Measure the voltage between the brake cancel connector CR77, pin 01 (WG) and GROUND.

Is the voltage less than 10 volts?

-> Yes

REPAIR the circuit between the brake cancel switch connector CR77, pin 1 (WG) and splice ECS12. For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> No

GO to Pinpoint Test G532451t40.

G532451t40 : CHECK THE BRAKE CANCEL SWITCH TO ECM CIRCUIT FOR OPEN CIRCUIT

1. Turn the ignition switch to the **OFF** position. 2. Measure the resistance between the ECM connector EC66, pin E3 (U) and brake cancel switch connector CR77, pin 02 (U).

Is the resistance greater than 5 ohms?

-> Yes

REPAIR the circuit between the ECM connector EC66, pin E3 (U) and the brake cancel switch connector CR77, pin 02 (U). For additional information, refer to the wiring diagrams. TEST the system for normal operation.

-> No

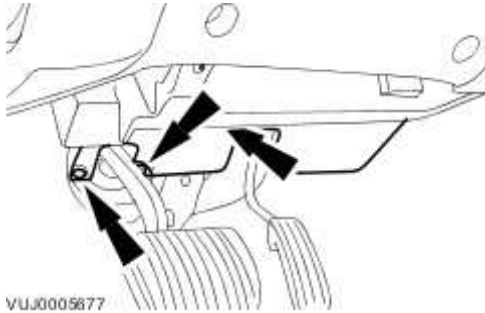
INSTALL a new brake cancel switch.

Speed Control Deactivator Switch (19.75.20) TEST the system for normal operation.

Speed Control Deactivator Switch (19.75.20)

Removal

- 1 . Remove the driver side instrument panel lower panel.

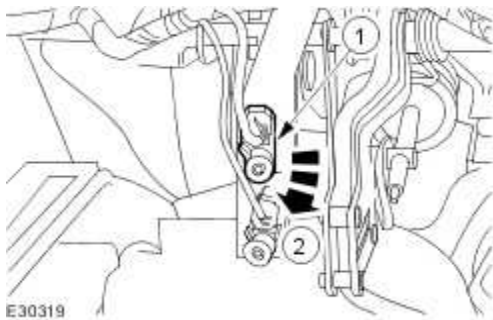


- 2 . Reposition the driver seat to its maximum rearward position.

- 3 . Remove the speed control deactivator switch.

- 1) Disconnect the speed control deactivator switch electrical connector.

- 2) Remove the speed control deactivator switch.



Installation


- 1 To install, reverse the removal procedure.

▶ Operate the brake pedal to allow the speed control deactivator switch to remain in the fully extended position during installation.

▶ Releasing and then pulling back on the pedal until the pedal reaches the stop in the brake booster, will adjust the speed control de-activator switch plunger to the required setting.

Speed Control Module (19.75.26)

Removal

- 1  **CAUTION:** Electronic modules are sensitive to static electrical charges. If exposed to these charges, damage may result.

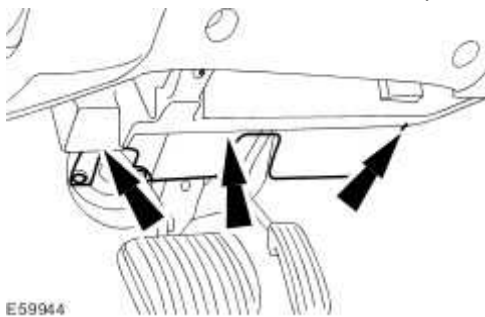
NOTE:

Make sure the audio unit keycode is available before disconnecting the battery ground cable.

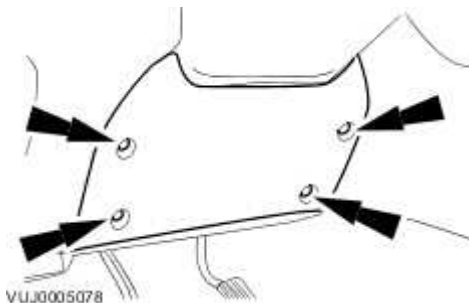
Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

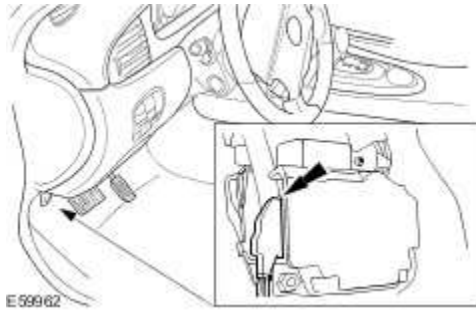
- 2 . Remove the driver side instrument panel lower trim.



- 3 . Remove the instrument panel trim.

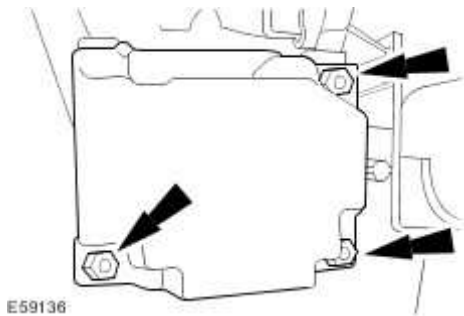


- 4 . Disconnect the speed control module electrical connector.



5 . Remove the speed control module.

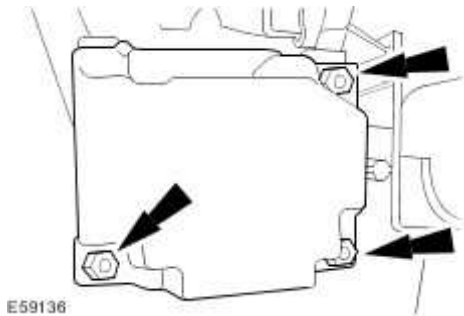
▶ Remove the speed control module retaining nuts.



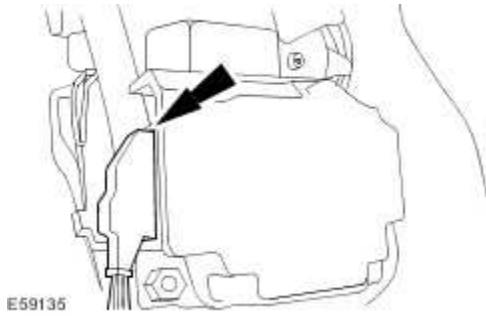
Installation

1 . Install the speed control module.

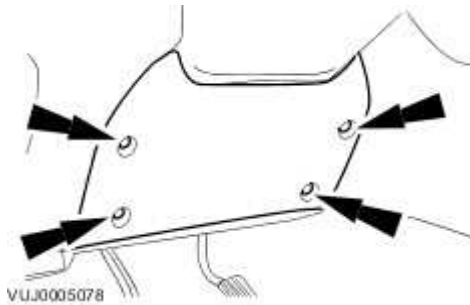
▶ Tighten to 5 Nm.



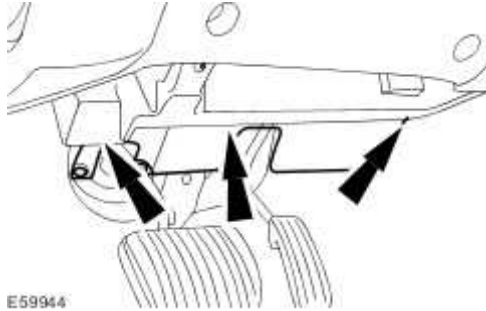
2 . Connect the speed control module electrical connector.



3 . Install the instrument panel trim.



4 . Install the driver side instrument panel lower trim.



5 . Connect the battery ground cable.

For additional information, refer to Battery Connect (86.15.15)

6 . Using the approved Jaguar diagnostic system configure the speed control module.

Speed Control Sensor

Removal

All vehicles

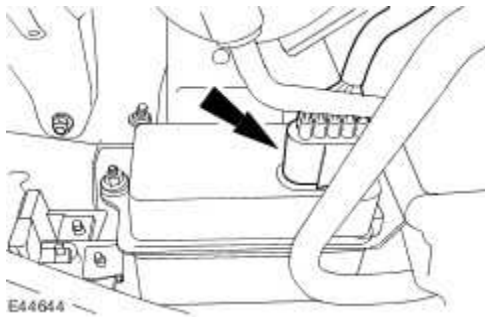
- 1 . Disconnect the battery ground cable.

For additional information, refer to Battery Disconnect and Connect

- 2 . Remove the radiator splash shield.

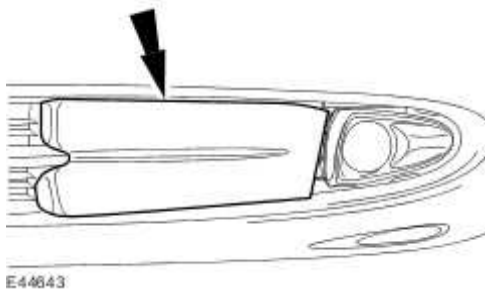
For additional information, refer to Radiator Splash Shield (76.22.90)

- 3 . Disconnect the speed control sensor electrical connector.




Vehicles built up to VIN:H18680

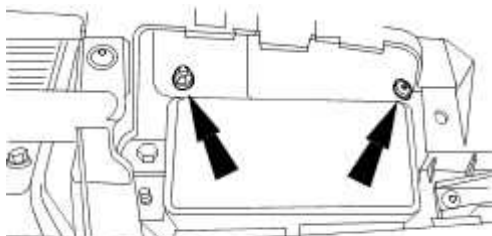
- 4 . Remove the left-hand front bumper access cover.



All vehicles

- 5 . Remove the speed control sensor.

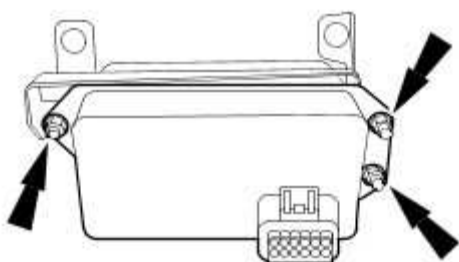
 Remove the bolts.



E44645

6 . Remove the speed control sensor retaining bracket.

▶ Remove the nuts.



E44649

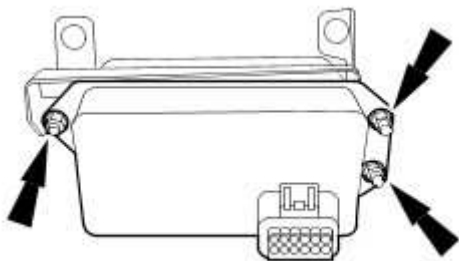
Installation

All vehicles

1 . Install the speed control sensor retaining bracket.

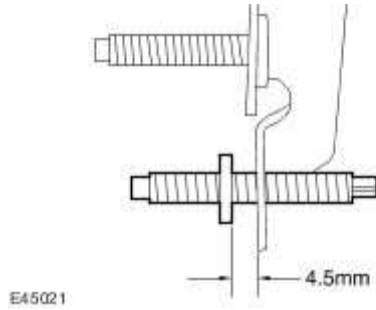
▶ Install the nuts.

▶ Tighten to 5 Nm.



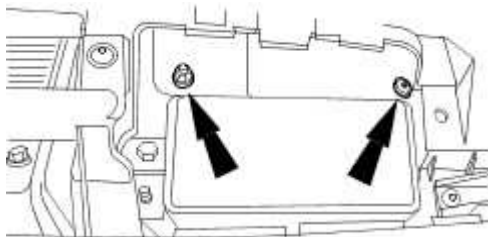
E44649

- 2 Adjust the speed control sensor leveling bolt shoulder to mounting bracket clearance to 4.5 mm.

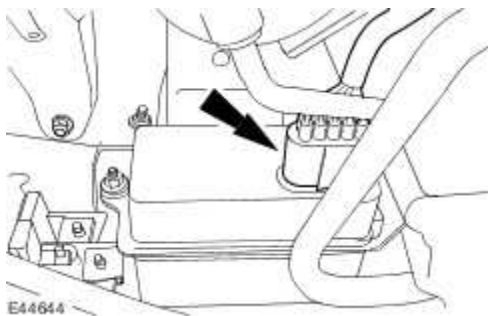


- 3 Install the speed control sensor.

▶ Tighten to 5 Nm.



- 4 Connect the speed control sensor electrical connector.



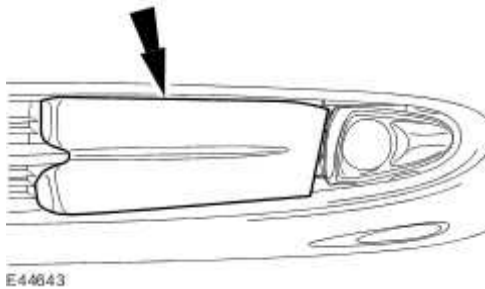
- 5 Connect the battery ground cable.
For additional information, refer to Battery Connect (86.15.15)

- 6 Check and adjust the speed control sensor leveling.

- . For additional information, refer to Speed Control Module Alignment - VIN Range: G00442->H18679

Vehicles built up to VIN:H18680

- 7 . Install the left-hand front bumper access cover.



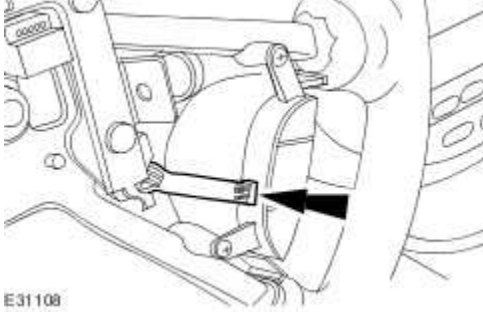
All vehicles

- 8 . Install the radiator splash shield.
For additional information, refer to Radiator Splash Shield (76.22.90)
- 9 Initialize the system. For additional information, refer to the Jaguar approved diagnostic
. system.

Speed Control Switch (19.75.25)

Removal

- 1 . Remove the driver airbag module. For additional information refer to <<501-20b>>
- 2 . Disconnect the speed control switch electrical connector.



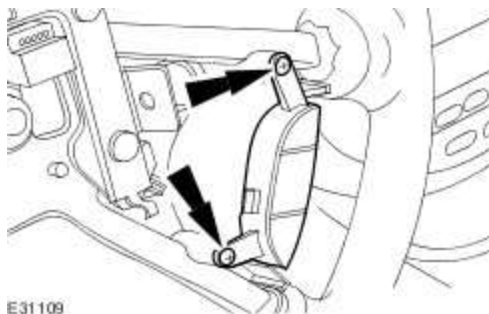
- 3 . Remove the speed control switch



Installation

- 1 . To install, reverse the removal procedure.

► Tighten to 2 Nm.



E31109