Specifications

General Specifications

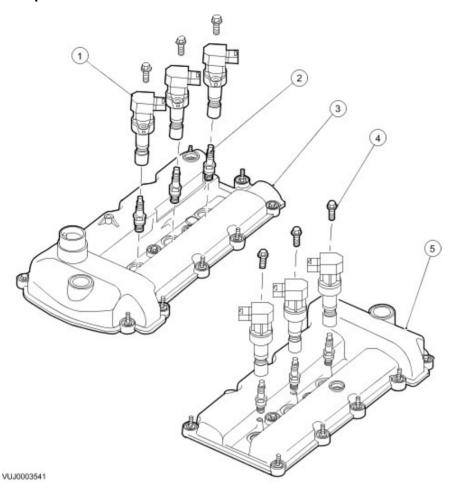
Item	Specification
Firing Order	1,4,2,5,3,6
Spark Plug Gap mm (in)	1.3-1.45 (0.051-0.057)
Spark Plug Type	XW4E-12405
Silicone Dielectric Compound D7AZ-19A331-A (Spark Plug Connector)	ESE-M1C171-A
High Temperature Nickel Anti-Seize Lubricant F6AZ-9L494-AA (Spark Plug Thread)	ESE-M12A4-A

Torque Specifications

Description	Nm	lb-ft
Spark plugs	15	11
Ignition coil retaining bolts	6	4

Engine Ignition

Component Locations



Item	Part Number	Description
1	-	Ignition Coil
2	-	Spark Plug
3	-	RH Bank
4	-	Ignition Coil Retaining Bolt
5	-	LH Bank

In order for the correct firing order to be observed it should be noted that the correct cylinder numbering is, when viewed from the rear of the engine, the right-hand cylinder bank is numbered 5,3,1 and the left-hand cylinder bank is numbered 6,4,2.

The ignition system consists of an ignition coil for each individual cylinder located on each individual spark plug. This allows the ignition timing to be adjusted more rapidly and independently.

The crankshaft position (CKP) sensor signal is the basis for ignition timing calculations. The alternating voltage signal from the CKP 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 by 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 and electronic transmission control inputs.

This ignition system allows the customer to drive the vehicle home if an ignition coil or ignition coil wiring harness failure occurs. In the event of a wiring harness failure between the ECM and the ignition coil, the ignition coil will fail instead of its fuse. This will allow the remaining ignition coils to continue to function.

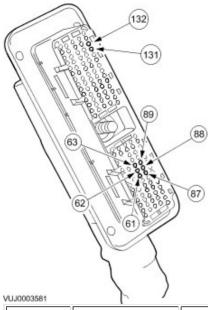
Engine Ignition - 2.0L

- 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 . The DTC summaries are generated to support the Jaguar approved diagnostic system, but also provide the basis for diagnosis of OBD related concerns using a suitable generic scan tool, in conjunction with the electrical guides. Until the DTC summaries and electrical guides are available, the engine ignition system can only be accurately diagnosed using the Jaguar approved diagnostic system. For additional information, refer to Dealer technical support.

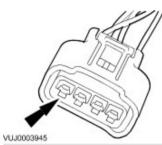
Engine Ignition - 2.5L/3.0L

- 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.

DTC	Condition	Possible Source	Action
• P0300		 Poor cylinder compression. Damaged or worn piston rings. Inlet/exhaust valve stuck open/closed. Worn camshaft. Damaged cylinder head gasket. Spark plug fouled/damaged, incorrect gap. 	<<303-01>>
P0301P0302P0303P0304P0305P0306	Random misfire detected. Misfire at cylinders 1 to 6	 Fuel delivery pressure high/low. Faulty injector inoperative/leaking. Fuel injector continuously open. Fuel contamination. Fuel injector circuit fault. 	<<303-04>>
		 Damaged ignition coil. Damaged electrical harness/connection. Damaged spark plug. 	GO to Pinpoint Test G92415p1.
	Ignition coils 1A, 2A or 3A primary circuit malfunctions.	 Ignition coil open/short circuit. Ignition coil insulation breakdown. Damaged harness. Connector pins bent or corroded. Ignition circuit ground fault. Damaged engine control module (ECM). 	GO to Pinpoint Test G92415p1.
P0352P0354P0356	lgnition coils 1B, 2B or 3B primary circuit malfunctions.	 Ignition coil open/short circuit. Ignition coil insulation breakdown. Damaged harness. Connector pins bent or corroded. Ignition circuit ground fault. Damaged ECM. 	GO to Pinpoint Test G92415p1.
P1367	lgnition amplifier group 1 fault. (Cylinders 1, 3, and 5).	 Ignition coil open/short circuit. Ignition coil insulation breakdown. Damaged harness. Connector pins bent or corroded. Ignition circuit ground fault. Damaged ECM. 	GO to Pinpoint Test G92415p1.
P1368	lgnition amplifier group 2 fault. (Cylinders 2, 4, and 6).	 Ignition coil open/short circuit. Ignition coil insulation breakdown. Damaged harness. Connector pins bent or corroded. Ignition circuit ground fault. Damaged ECM. 	GO to Pinpoint Test G92415p1.



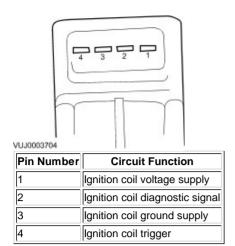
Pin Number	Circuit Function	Circuit Color
61	1B ignition coil trigger	Green/Blue
62	2B ignition coil trigger	Green/white
63	3B ignition coil trigger	Green/red
87	1A ignition coil trigger	Green/Blue
88	2A ignition coil trigger	Green/white
89	3A ignition coil trigger	Green/red



* 000000010		
Pin Number	Circuit Function	Circuit Color
1	Ignition coil voltage supply	Red/white
2	Ignition coil diagnostic signal	Yellow/green
3	Ignition coil ground supply	Black
4	Ignition coil trigger	1A - Green/blue, 2A - Green/white, 3A - Green/red



Pin Number	Circuit Function	Circuit Color
1	Ignition coil voltage supply	Red/white
2	Ignition coil diagnostic signal	Yellow/green
3	Ignition coil ground supply	Black
4	Ignition coil trigger	1B - Green/blue, 2B - Green/white, 3B - Green/red



PINPOINT TEST G92415p1 : Ignition Coils — P0351, P0352, P0353, P0354, P0355, P0356, P1367, P1368

G92415t1: CHECK COIL FUNCTION BY SUBSTITUTION

- 1. Swap suspect coil for 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

GO to Pinpoint Test G92415t2.

-> No

CLEAR the DTC. TEST the system for normal operation.

G92415t2: CHECK THE IGNITION COIL SUPPLY VOLTAGE CIRCUIT

- 1. Disconnect the relevant A bank ignition coil electrical connector(s). 2. Turn the ignition switch to the ON position. 3. Measure the voltage between:
 - Cyl A1. EN051 pin 1, (RW) and GROUND.
 - Cyl A2. EN052 pin 1, (RW) and GROUND.
 - Cyl A3. EN053 pin 1, (RW) and GROUND.
- 4. Disconnect the relevant B bank ignition coil electrical connector(s). 5. Measure the voltage between:
 - Cyl B1. EN054 pin 1, (RW) and GROUND.
 - Cyl B2. EN055 pin 1, (RW) and GROUND.
 - Cyl B3. EN056 pin 1, (RW) and GROUND.
 - Is the voltage greater than 10.5 Volts?

-> Yes

GO to Pinpoint Test G92415t3.

-> No

REPAIR the relevant ignition coil supply voltage circuit. For additional information, refer to wiring digrams. CLEAR the DTCs. TEST the system for normal operation.

G92415t3: CHECK THE IGNITION COIL GROUND CIRCUIT

- 1. Switch the ignition to the OFF position. 2. Disconnect the relevant A bank ignition coil electrical connector(s). 3. Measure the resistance between:
 - Cyl A1. EN051 pin 3, (B) and GROUND.
 - Cyl A2. EN052 pin 3, (B) and GROUND.
 - Cyl A3. EN053 pin 3, (B) and GROUND.
- 4. Disconnect the relevant B bank ignition coil electrical connector(s). 5. Measure the resistance between:
 - Cyl B1. EN054 pin 3, (B) and GROUND.
 - Cyl B2. EN055 pin 3, (B) and GROUND.
 - Cyl B3. EN056 pin 3, (B) and GROUND.
 - Is the resistance less than 5 ohms?

-> Yes

GO to Pinpoint Test G92415t4.

-> No

REPAIR the relevant ignition coil ground circuit. For additional information, refer to wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.

G92415t4: CHECK THE CONTINUITY OF THE IGNITION COIL TRIGGER SUPPLY CIRCUIT

- 1. Disconnect the ECM electrical connector EN016. 2. Check the continuity of the ignition coil trigger supply circuit between the relevant ignition coil electrical connector(s) and the ECM electrical connector:
 - Cyl A1. EN051 pin 4, (GU) and EN016 pin 87, (GU)
 - Cyl A2. EN052 pin 4, (GW) and EN016 pin 88, (GW)
 - Cyl A3. EN053 pin 4, (GR) and EN016 pin 89, (GR)
 - Cyl B1. EN054 pin 4, (GU) and EN016 pin 61, (GU)
 - Cyl B2. EN055 pin 4, (GW) and EN016 pin 62, (GW)
 - Cyl B3. EN056 pin 4, (GR) and EN016 pin 63, (GR)
 - Is the resistance less than 5 ohms?

-> Yes

GO to Pinpoint Test G92415t5.

-> No

REPAIR the ignition coil trigger supply circuit between the relevant ignition coil electrical connector(s) and the ECM electrical connector. CLEAR the DTCs. TEST the system for normal operation.

G92415t5: CHECK THE CONTINUITY BETWEEN THE IGNITION COIL AND THE ECM

- 1. Check the continuity of the ignition coil diagnostic signal circuit, between the ignition coil electrical connector(s) and the ECM electrical connector:
 - Cyl A1. EN051 pin 2, (YG) and EN016 pin 131, (YG)
 - Cyl A2. EN052 pin 2, (YG) and EN016 pin 131, (YG)
 - Cyl A3. EN053 pin 2, (YG) and EN016 pin 131, (YG)
 - Cyl B1. EN054 pin 2, (YG) and EN016 pin 132, (YG)
 - Cyl B2. EN055 pin 2, (YG) and EN016 pin 132, (YG)
 - Cyl B3. EN056 pin 2, (YG) and EN016 pin 132, (YG)
 - Is the resistance less than 5 Ohms?

-> Yes

INSTALL a new ECM. For additional information refer to <<303-14>> Before replacing a ECM, contact Dealer technical support. CLEAR the DTCs. TEST the system for normal operation.

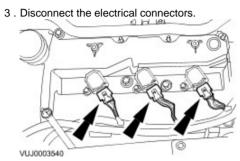
-> No

REPAIR the circuit between the ignition coil electrical connector(s) and the ECM electrical connector. CLEAR the DTCs. TEST the system for normal operation.

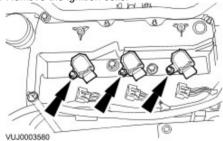
Ignition Coil-On-Plug LH (18.20.44)

Removal

- 1 . Disconnect the battery ground cable. For additional information, refer to <<414-01>>.
- 2 . Remove the air cleaner. For additional information, refer to <<303-12>>.

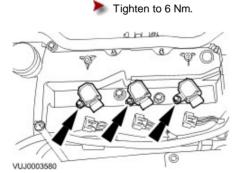


4 . Remove the ignition coils.



Installation

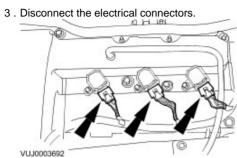
1 . To install, reverse the removal procedure.



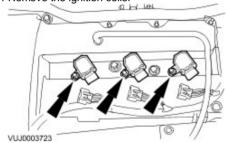
Ignition Coil-On-Plug RH (18.20.43)

Removal

- 1 . Disconnect the battery ground cable. For additional information, refer to <<414-01>>.
- 2 . Remove the intake manifold. For additional information, refer to <<303-01>>.

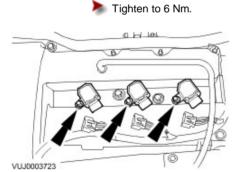


4 . Remove the ignition coils.



Installation

1 . To install, reverse the removal procedure.

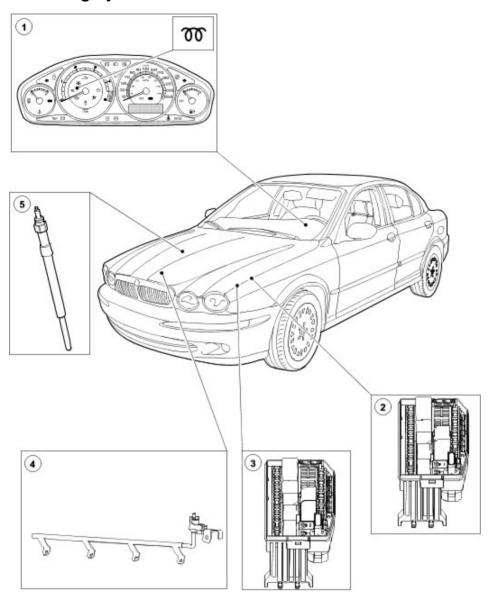


Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Glow plug	13	10	-
Glow plug electrical connector retaining nut	2	-	18
Main wiring harness to glow plug wiring harness nut	4	-	35
Glow plug terminal block retaining screw	5	-	44

Glow Plug System



E44084

Item	Part Number	Description
1	-	Glow plug indicator lamp
2	-	Glow plug fuse
3	-	Glow plug relay
4	-	Glow plug wire
5		Glow plug

The glow plugs are located in the side of the cylinder head and aid engine starting and efficiency. The glow plugs and the glow plug indicator lamp are controlled by the engine control module (ECM).

The glow plugs preheat the combustion chambers, which aids cold starting. During the preheat stage, the ECM receives an engine temperature signal from the cylinder head temperature (CHT) sensor and this determines the preheat time. The lower the temperature, the longer the preheat time. There is a maximum preheat time of 8 seconds at -20° C (-4° F)or lower. At temperatures above 80° C (176° F) there is no preheat phase.

Once the engine has started, the glow plugs enter an after-glow phase. The after-glow phase helps to improve idling and reduce hydrocarbon emissions through more efficient combustion just after starting. The after-glow phase only operates at engine speeds below 2500 RPM, above that, the after-glow phase is interrupted to increase the durability of the glow plugs. There is a maximum after-glow time of 30 seconds at -20° C (-4° F) or lower. At temperatures above 50°C (122° F) there is no after-glow phase.

Glow Plug System

Principle of operation

As common rail diesel engines have better cold-starting characteristics than traditional diesel engines, the glow plugs have two functions on this engine:

Pre-heat stage

In this stage, the glow plugs function as normal, preheating the combustion chambers to aid cold starting.

After-glow stage

At engine speeds below 2,500 rpm, and at temperatures below 50 degrees C (122 degrees F), the glow plugs continue to heat the cylinders to improve idling and reduce emissions.

Warning light

The glow plug warning light on this vehicle not only informs the driver that the glow plugs are operating, but also as a malfunction indicator lamp (MIL) for the engine management system. For additional information, Glow Plug System

Inspection and Verification

- 1. Verify the customer concern.
- 2. Visually inspect for obvious signs of electrical damage.

Electrical

- Fuse 22, front power distr bution box (60 Amp)
- Fuse 18, front power distr bution box (10 Amp)
- Glow plug relay (R10, front power distribution box)
- Engine management control relay (R7, front power distribution box)
- Wiring harness
- Electrical connector(s)
- Glow plug(s)
- Engine control module (ECM)

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 scan tool 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:

As well as carrying out its normal function the glow plug indicator also acts as an engine check lamp which will flash continuously when a hard diagnostic trouble code (DTC) is detected by the ECM. Soft DTCs are also stored by the ECM but will only be identified if the system is checked for DTCs using the Jaguar approved diagnostic system or a scan tool.

NOTE:

If a DTC is detected, all DTCs must be cleared after the concern is repaired. Failure to clear all DTCs may cause driveability concerns.

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 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.

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

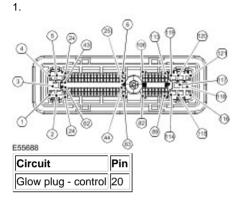
Diagnostic trouble code (DTC) index

DTC	Condition	Possible source	Action
IP0380	Glow plug heater circuit	Glow plug heater circuit: relay driver open circuit, short circuit	For glow plug circuit tests, GO to Pinpoint Test G348566p1.

Pinpoint Tests

PINPOINT TEST G348566p1 : GLOW PLUG CIRCUIT TESTS

G348566t1: CHECK THE GLOW PLUG CIRCUIT(S) FOR SHORT CIRCUIT TO POWER



Circuit	Pin
Glow plug relay - control	02
Permanent 12 volt supply	03
ECM relay controlled 12 volt supply	01
Glow plug relay - output	05

2. Key off. 3. Glow plug fuse connector disconnected. 4. Key on, engine off. 5. Measure the resistance between:

Glow plug relay connector	Vehicle battery
Glow plug - control - Pin 02	Positive post

• Is the resistance greater than 10 ohms?

-> Yes

GO to Pinpoint Test G348566t3.

-> No

GO to Pinpoint Test G348566t2.

G348566t2 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE HARNESS OR THE GLOW PLUGS

1. Glow plug assembly connector disconnected. 2. Measure the resistance between:

Glow plug relay connector	Vehicle battery
Glow plug - control - Pin 02	Positive post

• Is the resistance greater than 10 ohms?

-> Yes

Harness is OK. Suspect: - Glow plug assembly.

Glow Plugs

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams.

G348566t3: CHECK THE GLOW PLUG CIRCUIT CONTINUITY

1. Measure the resistance between:

Glow plug relay connector	Vehicle battery
Glow plug - control - Pin 02	Negative post

• Is the resistance between 0.5 ohm - 10 ohms?

-> Yes

GO to Pinpoint Test G348566t6.

-> No

GO to Pinpoint Test G348566t4.

G348566t4: CHECK THE GLOW PLUG CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Glow plug assembly connector disconnected. 2. Measure the resistance between:

Glow plug relay connector	Vehicle battery
Glow plug - control - Pin 02	Negative post

• Is the resistance greater than 10 ohms?

-> Yes

GO to Pinpoint Test G348566t5.

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams.

G348566t5: CHECK THE GLOW PLUG CIRCUIT(S) FOR OPEN CIRCUIT IN THE HARNESS

1. Measure the resistance between:

Glow plug relay connector	Glow plug relay connector
Glow plug - control - 15S-RD15 - Pin 01	Glow plug - control - Pin 02

• Is the resistance less than 10 ohms?

-> Yes

Suspect: - Glow plug assembly
Glow Plugs - Glow plug assembly GROUND

-> No

REPAIR the open circuit. For additional information, refer to the wiring diagrams.

G348566t6: CHECK THE GLOW PLUG CONTROL LINE 'ON' STATE

1. Scan tool connected. 2. Access and control the PID. 3. Activate the glow plugs. 4. Measure the voltage between:

Glow plug relay connector	Vehicle battery
Glow plug relay - output - Pin 01	Negative post

• Is the voltage between 9 volts - 15 volts?

-> Yes

GO to Pinpoint Test G348566t12.

-> No

GO to Pinpoint Test G348566t7.

G348566t7: CHECK THE GLOW PLUG CONTROL LINE FOR SHORT CIRCUIT TO GROUND

1. Key off. 2. Glow plug relay connector disconnected. 3. Key on, engine off. 4. Measure the resistance between:

Glow plug relay connector	Vehicle battery
Glow plug relay - output - Pin 01	Negative post

• Is the resistance greater than 10 ohms?

-> Yes

GO to Pinpoint Test G348566t8.

-> No

INSTALL a new front power distribution box assembly.

G348566t8: CHECK THE GLOW PLUG CONTROL LINE FOR CONTINUITY

1. Measure the resistance between:

Glow plug relay connector	Glow plug relay connector
Glow plug relay - output - Pin 01 Glow plug relay - output - Pin 05	

• Is the resistance less than 10 ohms?

-> Yes

GO to Pinpoint Test G348566t9.

-> No

REPAIR the open circuit. For additional information, refer to the wiring diagrams.

G348566t9: CHECK SUPPLIES TO THE GLOW PLUG RELAY

1. Measure the voltage between:

Glow plug relay connector	Vehicle battery
ECM relay controlled 12 volt supply - Pin 01	Negative post
Permanent 12 volt supply - Pin 03	Negative post

• Are the voltages between 9 volts - 15 volts?

-> Yes

GO to Pinpoint Test G348566t10.

-> No

No supply to the glow plug relay circuit. Check and repair the circuit as necessary.

G348566t10: CHECK THE ECM CONTROL LINE 'ON' STATE

1. Scan tool connected. 2. Access and control the glow plug control PID. 3. Activate the glow plugs. 4. Measure the resistance between:

Glow plug relay connector	Vehicle battery
Glow plug relay - control - Pin 02	Negative post

• Is the resistance less than 10 ohms?

-> Yes

Suspect: - Glow plug relay connector - Glow plug relay fault

-> No

GO to Pinpoint Test G348566t11.

G348566t11: CHECK THE ECM CONTROL LINE FOR SHORT CIRCUIT TO POWER

1. Measure the resistance between:

Glow plug relay connector	Vehicle battery
Glow plug relay - control - Pin 02	Positive post

• Is the resistance greater than 10 ohms?

-> Yes

GO to Pinpoint Test G348566t17.

-> No

GO to Pinpoint Test G348566t16.

G348566t12: CHECK THE GLOW PLUG CONTROL LINE 'OFF' STATE

1. Scan tool connected. 2. Access and control the glow plug control PID. 3. De-activate the glow plugs. 4. Measure the resistance between:

Glow plug relay connector	Vehicle battery
Glow plug relay - output - Pin 01	Positive post

• Is the resistance greater 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): - Glow plug fuse connector - Glow plug fuse fault

-> No

GO to Pinpoint Test G348566t13.

G348566t13 : CHECK THE GLOW PLUG CIRCUIT FOR SHORT CIRCUIT TO POWER IN THE HARNESS

1. Key off. 2. Glow plug relay connector disconnected. 3. Key on, engine off. 4. Measure the resistance between:

Glow plug relay connector	Vehicle battery
Glow plug relay - output - Pin 01	Positive post

• Is the resistance greater than 10 ohms?

-> Yes

GO to Pinpoint Test G348566t14.

-> No

INSTALL a new front power distribution box assembly.

G348566t14: CHECK THE ECM CONTROL LINE FOR A SHORT CIRCUIT TO GROUND

1. Measure the resistance between:

Glow plug relay connector	Vehicle battery
Glow plug relay - control - Pin 02	Negative post

• Is the resistance greater than 10 ohms?

-> Yes

Suspect: - Glow plug relay fault

-> No

GO to Pinpoint Test G348566t15.

G348566t15 : CHECK WHETHER THE SHORT CIRCUIT TO GROUND IS IN THE ECM HARNESS OR ECU

1. Key off. 2. ECM connector disconnected. 3. Key on, engine off. 4. Measure the resistance between:

• Is the resistance greater than 10 ohms?

-> Yes

Harness is OK. Suspect: - ECM fault

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams.

G348566t16 : CHECK WHETHER THE SHORT CIRCUIT TO POWER IS IN THE ECM HARNESS OR ECU

1. Key off. 2. ECM connector disconnected. 3. Key on, engine off. 4. Measure the resistance between:

Glow plug relay connector	Vehicle battery
Glow plug relay - control - Pin 02	Positive post

• Is the resistance greater than 10 ohms?

-> Vac

Harness is OK. Suspect: - ECM fault

-> No

REPAIR the short circuit. For additional information, refer to the wiring diagrams.

G348566t17: CHECK THE ECM CONTROL LINE FOR CONTINUITY

1. Key off. 2. ECM connector disconnected. 3. Measure the resistance between:

Glow plug relay connector	Vehicle battery		
Glow plug relay - control - Pin 02	Glow plug - control - Pin 20		

• Is the resistance less than 10 ohms?

-> Yes

Suspect : - ECM connector fault -ECM fault

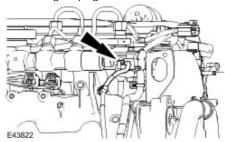
-> No

REPAIR the open circuit. For additional information, refer to the wiring diagrams.

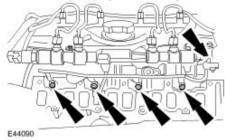
Glow Plugs

Removal

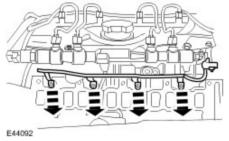
- Disconnect the battery ground cable.
 For additional information, refer to Battery Disconnect and Connect
- 2 . Detach the glow plug wire electrical connector.



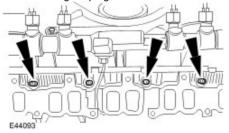
- 3 . Remove the intake manifold. For additional information, refer to Intake Manifold (30.15.01)
- 4 . Remove the glow plug wire retaining nuts.



5 . Remove the glow plug wire.

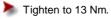


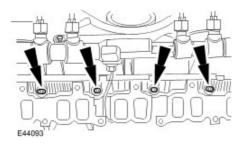
6 . Remove the glow plugs.



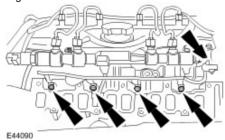
Installation

1 . To install, reverse the removal procedure.

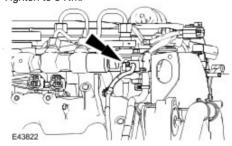




2 . Tighten to 2 Nm.



3 . Tighten to 5 Nm.



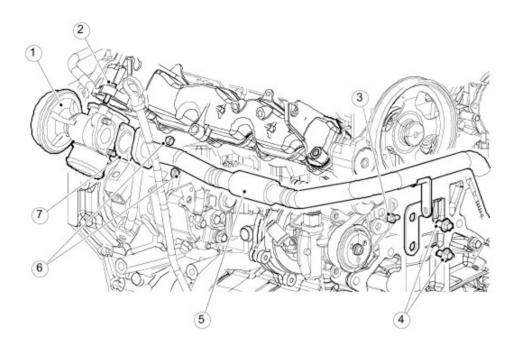
4 . Connect the battery ground cable. For additional information, refer to <u>Battery Connect (86.15.15)</u>

Specifications

Torque Specifications

Description	Nm	lb-ft	lb-in
Exhaust gas recirculation (EGR) valve to intake manifold retaining bolts	10	-	89
EGR valve tube to EGR valve retaining nuts	10	-	89
EGR valve tube to EGR valve retaining studs	11	8	-
EGR cooler to EGR valve tube mounting bracket retaining bolts	10	-	89
EGR cooler to EGR valve tube retaining bolts	10	-	89
Manifold absolute pressure (MAP) sensor retaining bolt	4	-	35

Engine Emission Control



VUE0032383

Item	Part Number	Description	
1	-	EGR valve	
2	-	EGR valve to intake manifold retaining bolt	
3	-	EGR cooler to EGR valve tube mounting bracket upper retaining bolt	
4	-	EGR cooler to EGR valve tube mounting bracket lower retaining bolts	
5	-	EGR cooler to EGR valve tube	
6	-	EGR cooler to EGR valve tube to EGR valve retaining nuts	
7	-	EGR cooler to EGR valve tube to EGR valve gasket	

Engine Emission Control

Overview

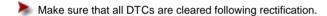
For information on the description and operation of the emission control system: Engine Emission Control

Inspection and verification

- 1. Verify the customer concern.
- 2. Visually inspect for obvious mechanical or electrical faults.

Mechanical	Electrical	
 Engine breather hoses Exhaust gas recirculation (EGR) pipes (check for cracks) EGR valve EGR cooler 	 Fuse(s) Wiring harness Loose or corroded electrical connector(s) EGR 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 . Use the approved diagnostic system or a scan tool to retrieve any diagnostic trouble codes (DTCs) before moving onto the symptom chart or DTC index.



Symptom chart

Symptom (specific)	Possible cause	Action	
Difficult to start			
Poor/Erratic idle	9	Check the EGR valve and circuits. Refer to the electrical guides. Check the	
Lack of power when accelerating	(EGR) valve(s) stuck open	mechanical condition of the EGR valves. Rectify as necessary.	
Engine stops/stalls	 Exhaust gas recirculation (EGR) valve(s) stuck open Breather system disconnected/restricted/blocked 	Check the EGR valve and circuits. Refer to the electrical guides. Check the	
Excessive fuel consumption Excessive black	Exhaust gas recirculation	mechanical condition of the EGR valves. Check the engine breather system. Check for DTCs indicating an EGR valve, throttle or sensor fault. Rectify as necessary.	
smoke	EGR not operatingBreather system		
Excessive emissions	restricted/blocked		
Excessive blow-by	Breather system restricted/blocked	Check the engine breather system. Rectify as necessary.	
Engine oil leaks	Breather system restricted/blocked	Check the engine breather system. Rectify as necessary.	

DTC index

NOTE:

For a full list of ECM DTCs: Electronic Engine Controls

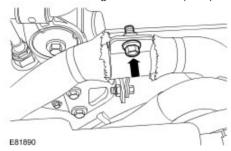
DTC	Condition	Possible source	Action
	Exhaust gas recirculation (EGR) insufficient flow detected	 Damaged, blocked or leaking pipes Disconnected hose between the air intake (after the mass air flow sensor) and the turbocharger inlet EGR valve stuck closed If P0405 is also set 	Check the intake air path hoses and pipework. Rectify as necessary. If P0405 is also set, check the EGR valve and rectify as necessary. Clear the DTCs and drive the vehicle at a steady state at 30 mph (48 Km/h) (1,500 - 1,800 rpm) for more than 20 minutes to confirm the repair.
P0402	Exhaust gas recirculation (EGR) excessive flow detected	● EGR valve stuck open	Check the EGR valve and rectify as necessary. Clear the DTCs and drive the vehicle at a steady state at 30 mph (48 Km/h) (1,500 - 1,800 rpm) for more than 20 minutes to confirm the repair.
	Exhaust gas recirculation (EGR) valve control circuit malfunction	 EGR valve control circuit: high resistance There has been a high number of unplugged connectors in service EGR valve control circuit: short circuit to ground EGR valve control circuit: short circuit to power 	Refer to the approved diagnostic system for a guided diagnostic routine. Note that this code does not indicate a fault in the EGR valve nor the ECM, but possibly in the connectors to these components. Check the connectors and circuits. Refer to the electrical guides. Also note that the EGR system will often set groups of codes rather than a single code. Check out P0403 first. Clear the DTCs and drive the vehicle at a steady state at 30 mph (48 Km/h) (1,500 - 1,800 rpm) for more than 20 minutes to confirm the repair.
P0404	Exhaust gas recirculation (EGR) valve control circuit range/performance	Excessive soot build-up on the EGR valve seat	Refer to the approved diagnostic system for a guided diagnostic routine. Install a new EGR valve if necessary, clear the DTCs, test for normal operation.
P0405	Exhaust gas recirculation (EGR) sensor A circuit low		Refer to the approved diagnostic system for a guided diagnostic routine. Note that this code may be set with P0401, indicating a faulty EGR valve. Check the connections and circuits first. Refer to the electrical guides. Check the hoses and connections and the operation of the vacuum regulator before replacing a valve. Clear the DTCs, test for normal operation.
	Exhaust gas recirculation (EGR) sensor A circuit high	 EGR valve stuck open 	Refer to the approved diagnostic system for a guided diagnostic routine. Note that this code may be set with P0402, indicating a faulty EGR valve. Check the connections and circuits first. Refer to the electrical guides. Check the EGR valve. If it is stuck open, install a new valve. Clear the DTCs, test for normal operation.
P0409	Exhaust gas recirculation (EGR) sensor A circuit	 EGR valve connector fault EGR valve to ECM circuit: high resistance EGR valve to ECM circuit: short circuit to ground EGR valve to ECM circuit: short circuit to power 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the EGR valve connections and circuits first. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
P0486	Exhaust gas recirculation (EGR) sensor B circuit	 EGR valve to ECM 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the EGR valve connections and circuits first. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Exhaust gas recirculation (EGR) throttle position control circuit	 EGR circuit: high resistance EGR circuit: short circuit to ground 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the EGR valve connections and circuits first. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.

	Exhaust gas recirculation (EGR) throttle position control range/performance	 EGR circuit: high resistance EGR circuit: short circuit to ground 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the EGR valve connections and circuits first. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Right-hand bank exhaust gas temperature sensor circuit range/performance, sensor 1	 Exhaust gas temperature sensor circuit: short circuit to ground Exhaust gas temperature sensor circuit: open circuit Exhaust gas temperature sensor circuit: short circuit to power Exhaust gas temperature sensor circuit: short circuit to power Exhaust gas temperature sensor fault 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Right-hand bank exhaust gas temperature sensor circuit intermittent, sensor 1	 Exhaust gas temperature sensor circuit: intermittent high resistance Exhaust gas temperature sensor fault 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Right-hand bank exhaust gas temperature sensor circuit intermittent, sensor 2	 Exhaust gas temperature sensor circuit: intermittent high resistance Exhaust gas temperature sensor fault 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
P2452	Diesel particulate filter (DPF) pressure sensor A circuit range/performance	 DPF pressure sensor (delta pressure sensor) hose fault DPF pressure sensor (delta pressure sensor)fault 	Check the DPF pressure sensor (delta pressure sensor)and circuits. Refer to the electrical guides. Rectify as necessary.
	Diesel particulate filter (DPF) pressure sensor A circuit range/performance	 DPF pressure sensor (delta pressure sensor) hose fault DPF pressure sensor (delta pressure sensor)fault 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the condition and fitment of the DPF pressure sensor (delta pressure sensor) and hoses. Rectify as necessary.

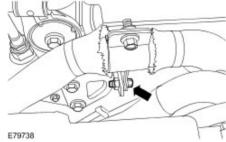
Exhaust Gas Recirculation (EGR) Cooler to EGR Valve Tube

Removal

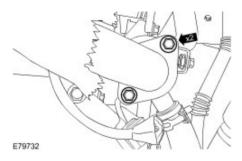
- Remove the air cleaner.
 For additional information, refer to <u>Air Cleaner (19.10.05)</u>
- 2 . Loosen the exhaust gas recirculation (EGR) cooler to EGR valve tube mounting bracket upper retaining bolt.



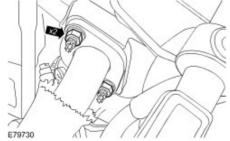
3 . Remove the EGR cooler to EGR valve tube mounting bracket lower retaining bolt.



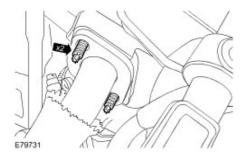
- 4 . Remove the EGR valve tube to EGR cooler retaining bolts.
 - Remove and discard the gasket.



 ${\bf 5}$. Remove the EGR valve tube to EGR valve retaining nuts.



- 6 . Remove the EGR valve tube to EGR valve retaining studs.
 - Remove and discard the gasket.



7 . Remove the EGR cooler to EGR valve tube.



Installation

CAUTION: The tightening sequence of the EGR cooler to EGR valve tube retaining nuts and bolts is critical. Follow the exact order of tightening shown in the installation procedure. Failure to follow this instruction may result in damage to the vehicle.

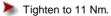


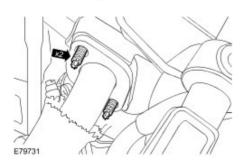


2 . **NOTE**:

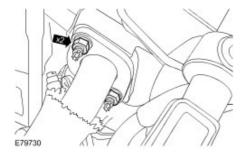
Install a new EGR valve tube to EGR valve gasket.

Install the EGR valve tube to EGR valve retaining studs.





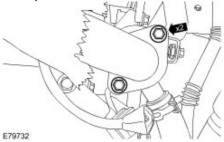
 ${\bf 3}$. Loosely install the EGR valve tube to EGR valve retaining nuts.



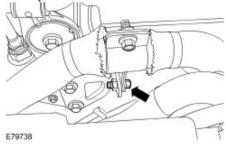
4 . **NOTE**:

Install a new EGR valve tube to EGR cooler gasket.

Loosely install the EGR valve tube to EGR cooler retaining bolts.

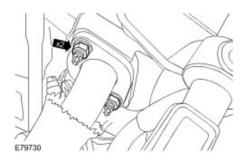


5 . Loosely install the EGR cooler to EGR valve tube mounting bracket lower retaining bolt.



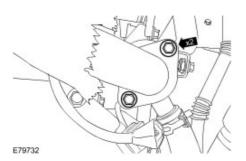
6 . Tighten the EGR valve tube to EGR valve retaining nuts.





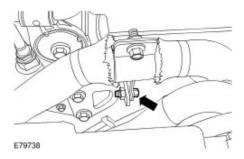
 ${\bf 7}$. Tighten the EGR valve tube to EGR cooler retaining bolts.

Tighten to 10 Nm.



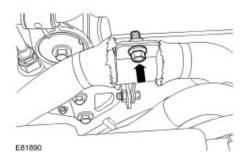
8 . Tighten the EGR cooler to EGR valve tube mounting bracket lower retaining bolt.

Tighten to 10 Nm.



9 . Tighten the EGR cooler to EGR valve tube mounting bracket upper retaining bolt.

Tighten to 10 Nm.



10 . Install the air cleaner.

For additional information, refer to Air Cleaner (19.10.05)

Exhaust Gas Recirculation (EGR) Cooler

Special Service Tools



Remover/Installer, Cooling Hose Clamp 303-397 (24-003)

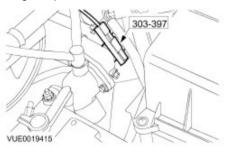
Removal

Drain the cooling system.
 For additional information, refer to
 For additional information, refer to <u>Cooling System Draining</u>, <u>Filling and Bleeding</u>

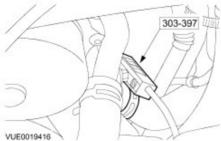
2 . Remove the catalytic converter. For additional information, refer to For additional information, refer to

Remove the air cleaner outlet pipe.
 For additional information, refer to
 For additional information, refer to <u>Air Cleaner Outlet Pipe (19.10.31)</u>

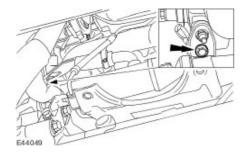
4. Using the special tool, disconnect the EGR cooler coolant hose from the thermostat housing.



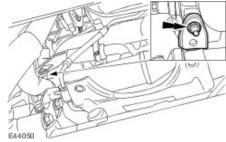
 ${\bf 5}$. Using the special tool, disconnect the coolant hose from the EGR cooler.



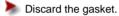
- 6 . Raise the vehicle.
- 7 . Remove the EGR cooler mount bracket retaining bolt.

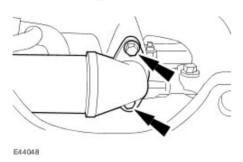


8 . Remove the EGR cooler mount bracket.

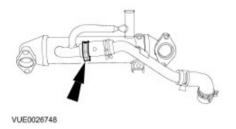


9 . Remove the EGR cooler.



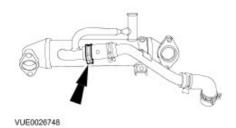


10 . Remove the coolant hose from the EGR cooler.



Installation

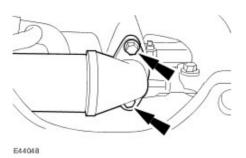
1 . Install the coolant hose to the EGR cooler.



Install a new EGR cooler gasket.

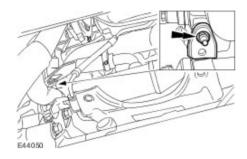
Install the EGR cooler.

Tighten to 37 Nm.



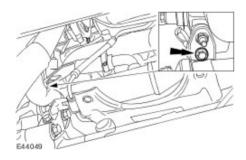
3 . Install the EGR cooler mount bracket.

Tighten to 10 Nm.

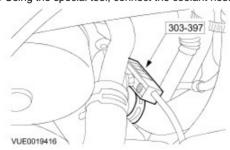


4 . Install the EGR cooler mount bracket retaining bolt.

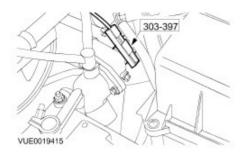
Tighten to 10 Nm.



- 5 . Lower the vehicle.
- 6 . Using the special tool, connect the coolant hose to the EGR cooler.



 ${\bf 7}$. Using the special tool, connect the EGR cooler coolant hose to the thermostat housing.



8 . Install the air cleaner outlet pipe.
For additional information, refer to
For additional information, refer to <u>Air Cleaner Outlet Pipe (19.10.31)</u>

9 . Install the catalytic converter. For additional information, refer to For additional information, refer to

Carry out the cooling system filling and bleeding procedure.
 For additional information, refer to
 For additional information, refer to Cooling System Draining, Filling and Bleeding

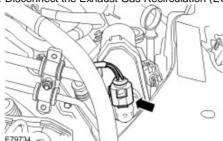
Exhaust Gas Recirculation (EGR) Valve (17.45.01)

Removal

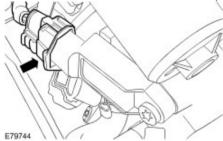
Remove the air cleaner.

For additional information, refer to <u>Air Cleaner (19.10.05)</u>

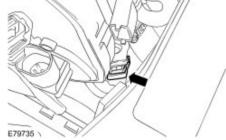




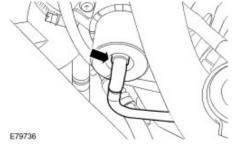
3 . Disconnect the Manifold Absolute Pressure (MAP) sensor electrical connector.



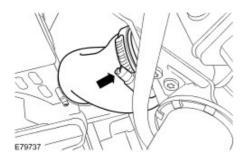
 ${\bf 4}$. Disconnect the throttle plate position sensor electrical connector.



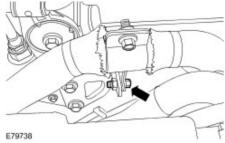
5 . Disconnect the vacuum hose.



6 . Detach the charge air cooler hose.



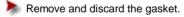
7 . Loosen the EGR cooler to EGR valve tube mounting bracket lower retaining bolt.

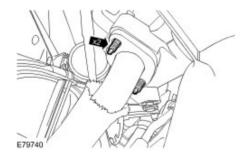


 ${\bf 8}$. Remove the EGR valve tube to EGR valve retaining nuts.



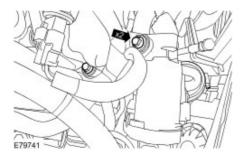
 ${\bf 9}$. Remove the EGR valve tube to EGR valve retaining studs.



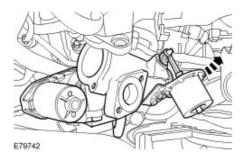


10 . Remove the EGR valve to inlet manifold retaining bolts.





11 . Remove the EGR valve.



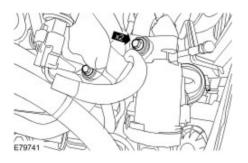
Installation

1 . **NOTE:**

Install a new EGR valve O-ring seal.

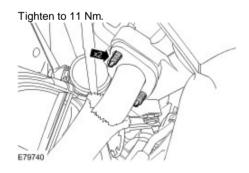
To install, reverse the removal procedure.

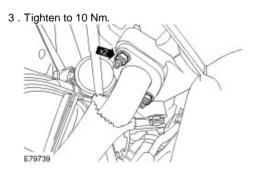




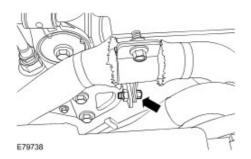
2 . **NOTE:**

Install a new EGR valve gasket.

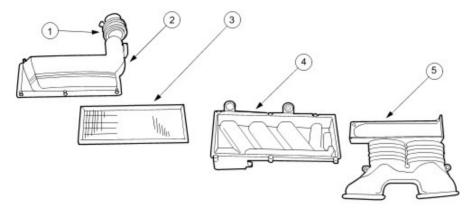




4 . Tighten to 10 Nm.



Intake Air Distribution and Filtering



VUJ0002799

Item	Part Number	Description
1	_	Air cleaner outlet pipe
2	_	Air cleaner cover
3	_	Air cleaner element
4	_	Air cleaner
5	_	Air cleaner intake pipe

Intake Air Distribution and Filtering

Inspection and Verification

- 1. Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical damage.

Visual Inspection Chart

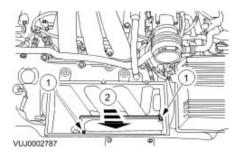
Mechanical

- 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.

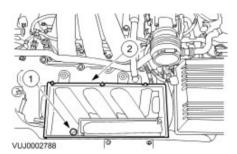
Air Cleaner (19.10.05)

Removal

- 1 . Remove the air cleaner element. For additional information, refer to the procedure in this section: For additional information, refer to
- 2. Detach the air cleaner intake pipe.
 - 1) Remove the air cleaner intake pipe retaining screws.
 - 2) Detach the air cleaner intake pipe.



- 3. Remove the air cleaner.
 - 1) Detach the air cleaner from the retaining grommet.
 - 2) Remove the air cleaner.



Installation

1 . **NOTE**:

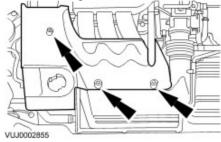
When installing the air cleaner, make sure that the locating peg is installed correctly into the retaining bracket grommet.

To install, reverse the removal procedure.

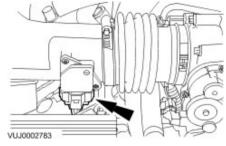
Air Cleaner Element (19.10.08)

Removal

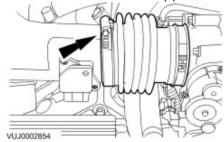
1 . Remove the engine cover.



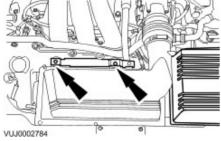
2 . Disconnect the mass airflow sensor electrical connector.



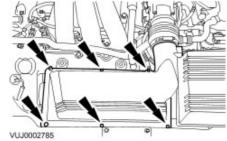
3 . Disconnect the air cleaner outlet pipe.



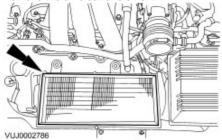
4 . Remove the engine cover mounting plate.



5 . Remove the air cleaner cover.



6 . Remove the air cleaner element.



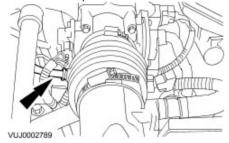
Installation

1 . To install, reverse the removal procedure.

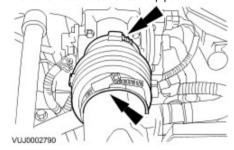
Air Cleaner Outlet Pipe (19.10.31)

Removal

1 . Disconnect the positive crankcase ventilation hose.



2 . Remove the air cleaner outlet pipe.



Installation

1 . To install, reverse the removal procedure.

Intake Air Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi -

Torque Specifications

Description	Nm	lb-ft	lb-in
Charge air cooler retaining bolts	7	-	62
Charge air cooler outlet hose	4	-	35
Charge air cooler intake hose	4	-	35
Power steering fluid cooler retaining bolts	7	-	62

Intake Air Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Intake Air Distribution and Filtering Description and Operation

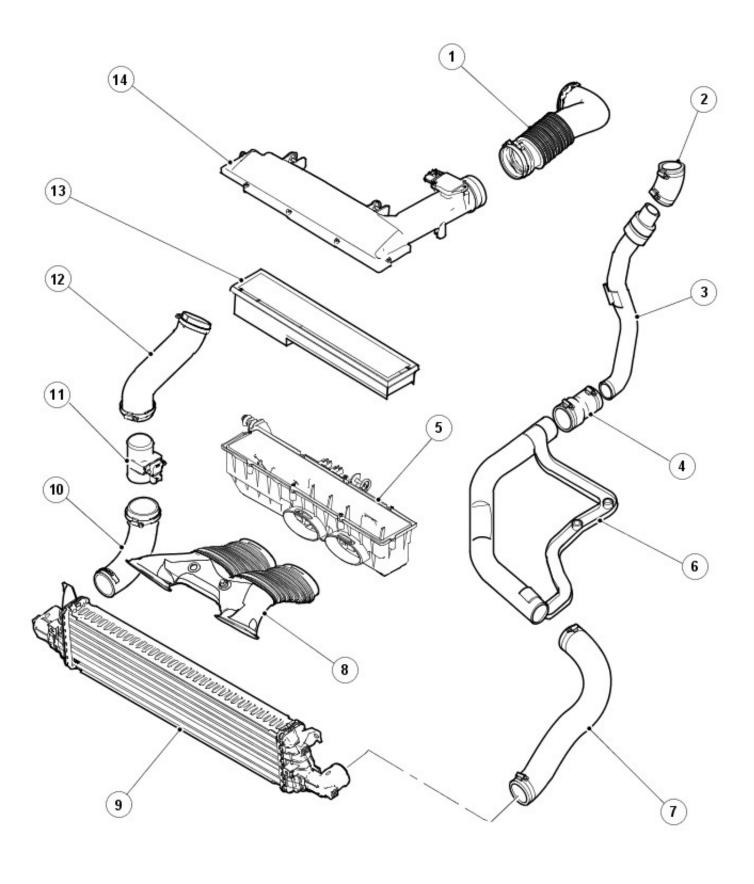
Vehicles with 2.0L diesel engine 14 (13 (12) 3 (11) 5 (10) 4 9 8 6 7

E44052

Item	Part Number	Description		
1	-	Air cleaner outlet pipe		
2	-	Turbo to turbo outlet pipe connecting hose		
3	-	Turbo outlet pipe		

4	_	Turbo outlet pipe to charge air cooler intake pipe connecting hose
5	-	Air cleaner
6	-	Charge air cooler intake pipe
7	-	Charge air cooler intake hose
8	-	Air cleaner intake pipe
9	-	Charge air cooler
10	-	Charge air cooler outlet hose
11	-	Thermal manifold absolute pressure (TMAP) sensor
12	-	Intake manifold inlet hose
13	-	Air cleaner element
14	-	Air cleaner cover

Vehicles with 2.2L diesel engine



E67313

Item	Part Number	Description		
1	-	Air cleaner outlet pipe		
2	-	Turbo to turbo outlet pipe connecting hose		
3	-	Turbo outlet pipe		

4	-	Turbo outlet pipe to charge air cooler intake pipe connecting hose
5	-	Air cleaner
6	-	Charge air cooler intake pipe
7	-	Charge air cooler intake hose
8	-	Air cleaner intake pipe
9	-	Charge air cooler
10	-	Charge air cooler outlet hose
11	-	Thermal manifold absolute pressure (TMAP) sensor
12	-	Intake manifold inlet hose
13	-	Air cleaner element
14	-	Air cleaner cover

Intake Air Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Intake Air Distribution and Filtering

Diagnosis and Testing

Inspection and Verification

- 1. **1.** Verify the customer concern.
- 2. **2.** Visually inspect for obvious signs of mechanical damage.

Visual Inspection Chart

Mechanical

- Check the air cleaner housing for restriction/blockage
- Check the air cleaner element for restriction/blockage
- Check the charge air cooler for 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.

Pinpoint tests

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.

	EST A : CHECK FOR RESTRICTION IN AIR INTAKE			
TEST	DETAILS/RESULTS/ACTIONS			
CONDITIONS				
A1: CHECK FO	OR AIR FLOW THROUGH INTAKE SYSTEM			
	Inspect the air intake pipes between the air cleaner intake and the charge air cooler inlet (pay particular attention to the joints between the metal and rubber pipes).			
	2 Disconnect the air intake pipe at the charge air cooler inlet and the turbocharger outlet.			
	3 Using a suitable length of hose blow gently through the pipe.			
	Is there an unrestricted flow of air through the hose? Yes CO to A2			
	GO to A2. No			
	Remove the pipe and remove the cause of the restriction/blockage. Reassemble the removed parts and test the vehicle for normal operation.			
A2: CHECK FO	OR AIR FLOW TO THE TURBOCHARGER			
	1 Disconnect the air intake pipe between the air cleaner and the turbocharger inlet.			
	2 Check the pipe for restriction/blockage (this is a large-bore pipe, and can be checked visually)			
	Is there an unrestricted flow of air through the hose?			
	Yes			
	GO to A3.			
	No Charles and the Charles and			
	Clear the restriction/blockage. Reassemble the removed parts and test the vehicle for normal operation.			
A 2. CHECK E	OR AIR FLOW TO THE CHARGE AIR COOLER			
AS: CHECK FO	1 Remove the radiator splash shield.			
	2 Disconnect the intake pipe from between the charge air cooler and the intake manifold.			
	3 Using a suitable length of hose, blow gently through the pipe.			
	Is there an unrestricted flow of air through the pipe? Yes			
	GO to A4.			
	No No			
	Clear the restriction/blockage. Reassemble the removed parts and test the vehicle for normal			
	operation.			
A4: CHECK FO	OR AIR FLOW THROUGH THE CHARGE AIR COOLER			
	1 Using a suitable length of hose, blow through the charge air cooler and monitor the flow.			
	Is there an unrestricted flow of air through the charge air cooler? Yes			
	GO to A5. No			
	INSTALL a new charge air cooler. REFER to: Charge Air Cooler - 2.2L Duratorq-TDCi (110kW/150PS) - Puma			

Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
A5: CHECK FOR AIR FLOW THROUGH THE TURBOCHARGER
1 Using a suitable length of hose, blow through the turbocharger and monitor the flow.
Is there an unrestricted flow of air through the turbocharger?
Yes
No restriction found in the air intake. Check for other possible causes for the customer concern.
No
Remove and inspect the turbocharger. REFER to Section 303-04A Fuel Charging and Controls /
303-04B Fuel Charging and Controls / 303-04C Fuel Charging and Controls - Turbocharger

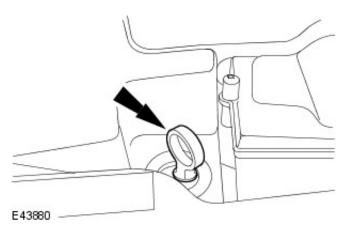
Intake Air Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Air Cleaner

Removal and Installation

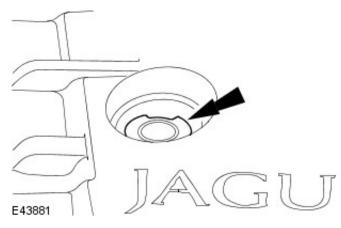
Removal

All vehicles

1. Remove the oil level indicator.

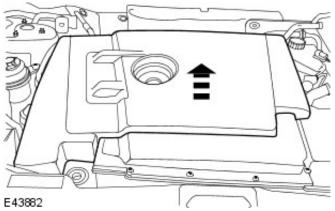


2. Remove the oil filler cap.

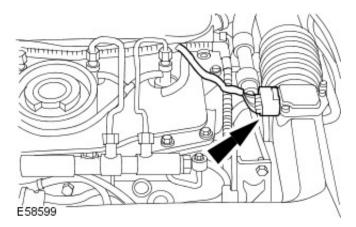


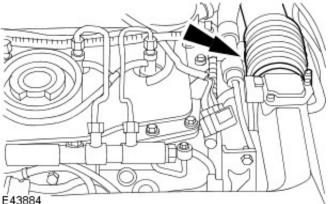
3. NOTE: Install the oil filler cap and oil level indicator to prevent foreign material entering the valve cover.

Remove the engine cover.



4. Disconnect the mass air flow (MAF) sensor electrical connector.

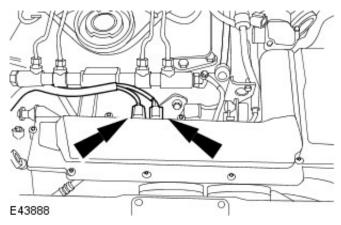




5. Detach the air cleaner outlet pipe.

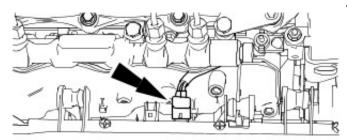
Vehicles built up to VIN:E43868

6. Disconnect the electrical connectors.

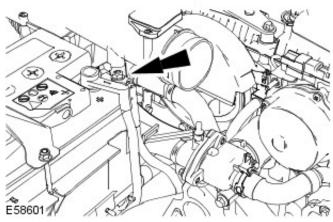


Vehicles built from VIN:E43869

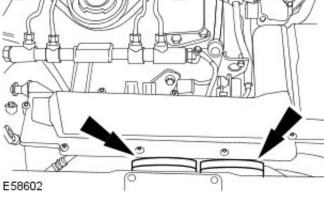
7. Disconnect the electrical connector.



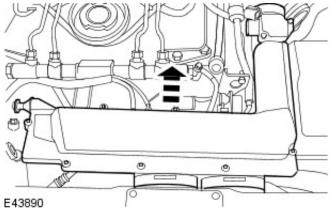
8. Detach the vacuum pipe from the air cleaner.



9. Detach the air cleaner intake pipe.



10. Remove the air cleaner.



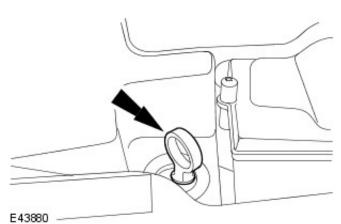
Installation

1. To install, reverse the removal procedure.

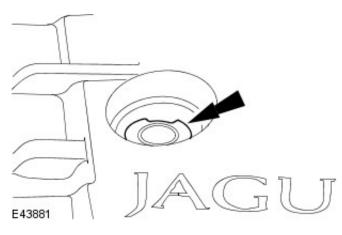
Intake Air Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Air Cleaner Element

Removal and Installation

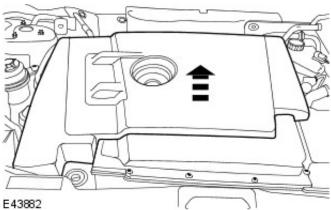
Removal



1. Remove the oil level indicator.

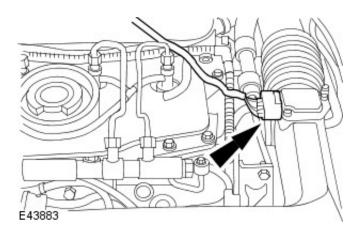


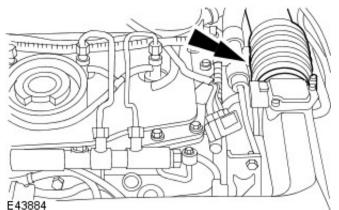
2. Remove the oil filler cap.



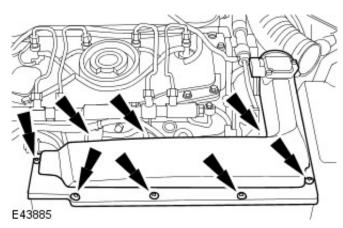
3. Remove the engine cover.

4. Disconnect the mass air flow (MAF) sensor electrical connector.

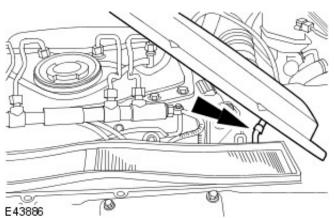




5. Detach the air cleaner outlet pipe.

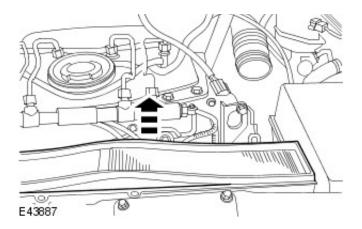


6. Detach the air cleaner cover.



- 7. Remove the air cleaner cover.
 - Disconnect the breather pipe.

8. Remove the air cleaner element.



Installation

1. To install, reverse the removal procedure.

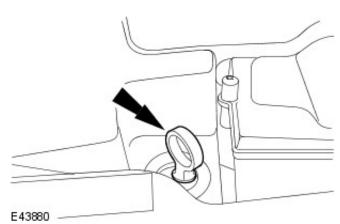
Intake Air Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Air Cleaner Outlet Pipe

Removal and Installation

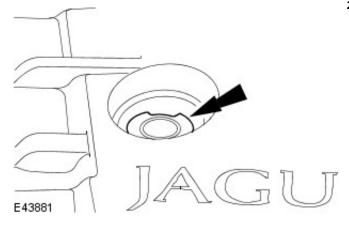
Removal

All vehicles

1. Remove the oil level indicator.

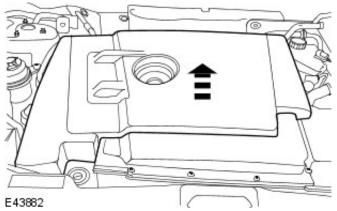


2. Remove the oil filler cap.



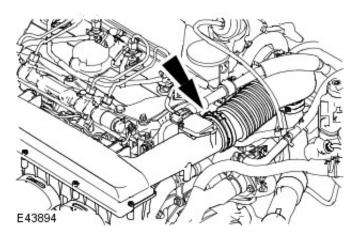
3. NOTE: Install the oil filler cap and oil level indicator to prevent foreign material entering the valve cover.

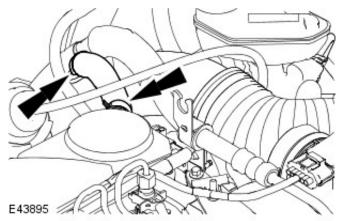
Remove the engine cover.



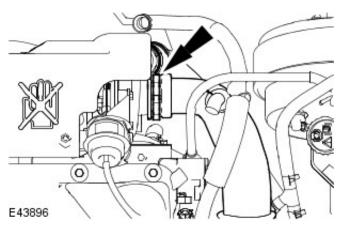
Vehicles built up to VIN:E43868

4. Detach the air cleaner outlet pipe.





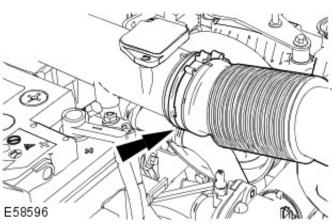
- **5.** Remove the positive crankcase ventilation hose.
 - Remove and discard the positive crankcase ventilation hose retaining clips.



- 6. Remove the air cleaner outlet pipe.
 - Remove and discard the air cleaner outlet pipe retaining clip.

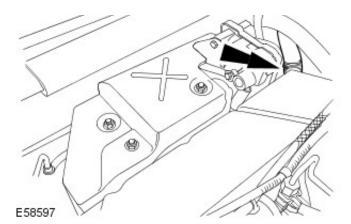
Vehicles built from VIN: E43869

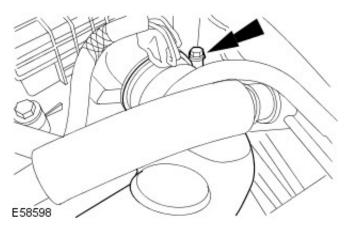
7. Detach the air cleaner outlet pipe.



- **8.** Remove the positive crankcase ventilation hose.
 - Remove and discard the positive crankcase ventilation







- 9. Remove the air cleaner outlet pipe.
 - Remove and discard the air cleaner outlet pipe retaining clip.

Installation

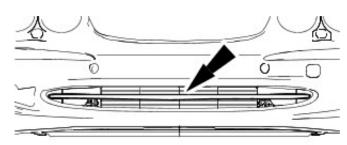
- **1.** NOTE: Install new positive crankcase ventilation hose retaining clips.
- NOTE: Install a new air cleaner outlet pipe retaining clip.
 To install, reverse the removal procedure.

Intake Air Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Charge Air Cooler2.0L Duratorq-TDCi

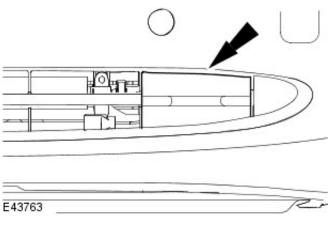
Removal and Installation

Removal

- Remove the radiator splash shield.
 For additional information, refer to: <u>Radiator Splash Shield</u> (501-02 Front End Body Panels, Removal and Installation).
- 2. Remove the air splitter grille.



E43762



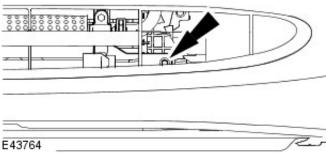
3. NOTE: Left-hand shown, right-hand similar.

Remove the air splitter grille finish panel.

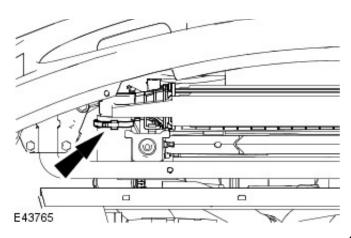


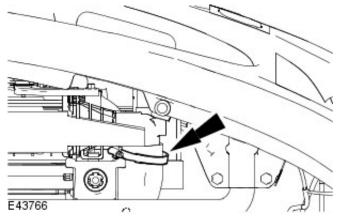
4. NOTE: Left-hand shown, right-hand similar.

Detach the power steering fluid cooler.

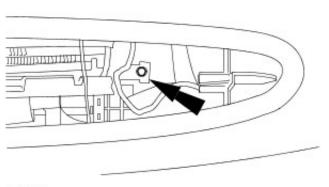


5. Detach the charge air cooler outlet hose from the charge air cooler.





6. Detach the charge air cooler intake hose from the charge air cooler.

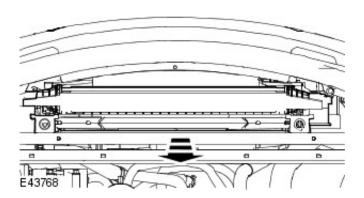


7. NOTE: Left-hand shown, right-hand similar.

Remove the charge air cooler retaining bolt.



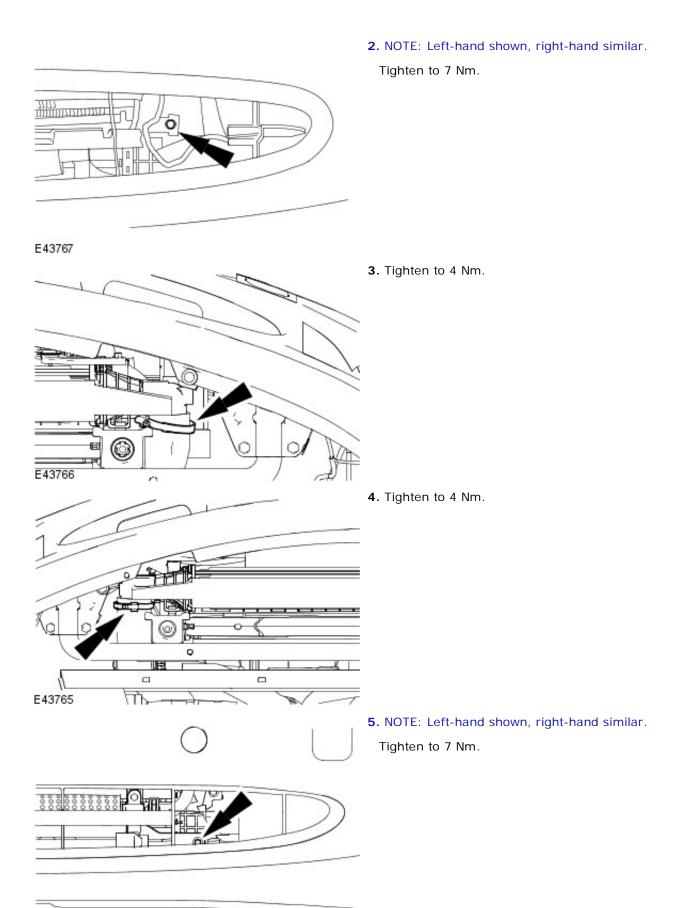
8. Remove the charge air cooler.



Installation

1. NOTE: Make sure the charge air cooler hoses are not split or cracked and are free of grease and contaminants.

To install, reverse the removal procedure.



E43764

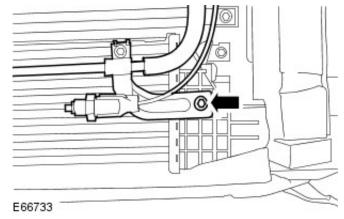
Intake Air Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Charge Air Cooler2.2L Duratorq-TDCi (110kW/150PS) - Puma

Removal and Installation

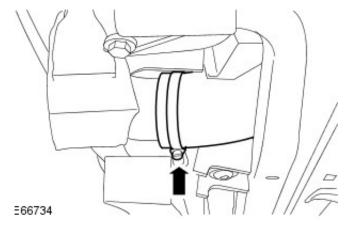
Removal

- Remove the front bumper cover.
 For additional information, refer to: <u>Front Bumper Cover</u> (501-19 Bumpers, Removal and Installation).
- 2. NOTE: Left-hand shown, right-hand similar.

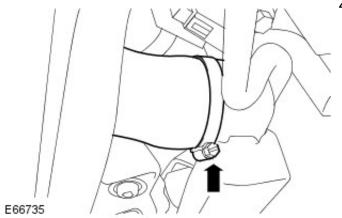
Detach the power steering fluid cooler.



3. Detach the charge air cooler outlet hose from the charge air cooler.

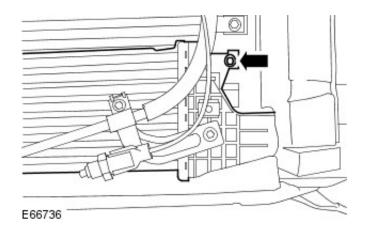


4. Detach the charge air cooler intake hose from the charge air cooler.



5. NOTE: Left-hand shown, right-hand similar.

Remove the charge air cooler.



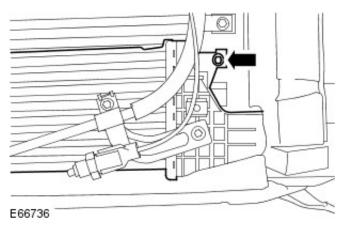
Installation

1. NOTE: Make sure the charge air cooler hoses are not split or cracked and are free of grease and contaminants.

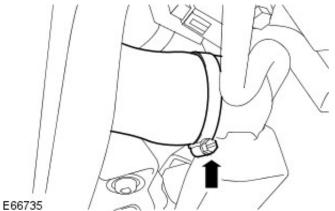
To install, reverse the removal procedure.

2. NOTE: Left-hand shown, right-hand similar.

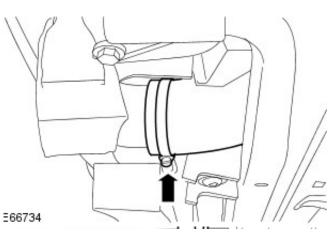
Tighten to 7 Nm.

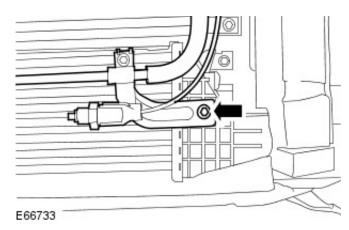


3. Tighten to 4 Nm.



4. Tighten to 4 Nm.





5. NOTE: Left-hand shown, right-hand similar.

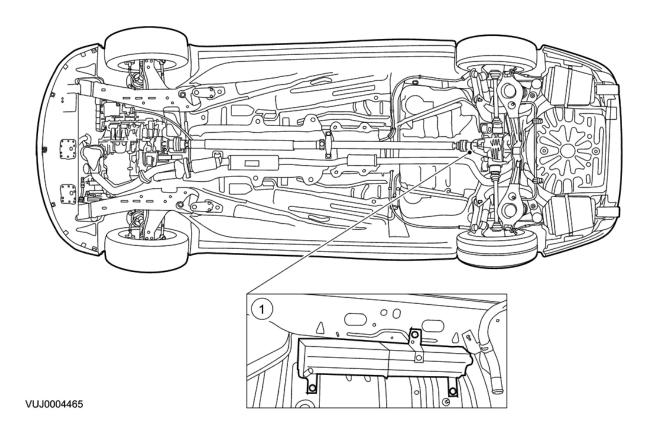
Tighten to 7 Nm.

Evaporative Emissions -

Torque Specifications

Description	Nm	lb-ft	lb-in
Evaporative emission canister retaining nuts and bolts	5	-	44
Accelerator cable retaining bracket retaining bolts - vehicles with 2.0L engine			80
Fuel tank support strap retaining bolts	25	18	-
Fuel tank filler pipe to fuel tank hose retaining clip	3	-	27

Evaporative Emissions



Item	Description
1	Evaporative emission canister

The evaporative emission fuel vapor management system consists of an evaporative emission canister and an EVAP canister purge valve. A combination of plastic pipes and rubber hoses connect the canister to the fuel tank and the EVAP canister purge valve to the intake manifold.

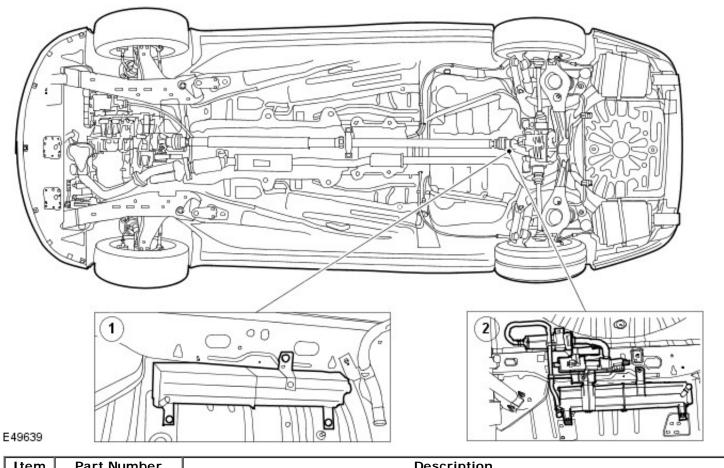
In addition, the fuel vapor management system uses a canister vent solenoid and a fuel tank pressure sensor which are used during the engine management system on board diagnostic routines.

When the EVAP canister purge valve is closed, the fuel tank is vented into the canister through the fuel tank roll-over valve. The canister absorbs the fuel vapor and prevents the release of hydrocarbons into the atmosphere. When the vapor management valve is cycled, 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 - Evaporative Emissions

Description and Operation



Item	Part Number	Description		
1	_	Evaporative emission canister - non federal market vehicles		
2	_	Evaporative emission canister - federal market vehicles		

[•] NOTE: 2.5L and 3.0L shown, 2.0L similar.

The evaporative emission fuel vapor management system consists of an evaporative emission canister and a canister purge valve. A combination of rigid and flexible low permeation hoses connect the fuel tank to the evaporative emission canister and canister purge valve intake manifold.

To satisfy LEV2 emission requirements, the fuel vapor management system uses a solenoid controlled canister close valve and a fuel tank pressure sensor which are used during the engine management system on-board diagnostic routines.

When the canister purge valve is closed, the fuel tank vapor is vented into the canister through the fuel tank roll-over valves. The canister absorbs the fuel vapor and prevents the release of hydrocarbons into the atmosphere. When the vapor management valve is cycled, 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. This air/fuel mixture ratio is controlled by the engine management system.

The evaporative emission fuel vapor management system is controlled by the engine control module (ECM) according to calibrated data tables.

Evaporative Emissions - Evaporative Emissions 2.0L NA V6 - AJV6

Diagnosis and Testing

- 1. 1. Visually inspect for obvious signs of mechanical or electrical damage, blown fuses, etc.
- 2. **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. 4. The DTC summaries are generated to support the Jaguar approved diagnostic system, but also provide the basis for diagnosis of OBD related concerns using a suitable generic scan tool, in conjunction with the electrical guides. Until the DTC summaries and electrical guides are available, the evaporative emissions system can only be accurately diagnosed using the Jaguar approved diagnostic system. For additional information, refer to Dealer technical support.

Evaporative Emissions - Evaporative Emissions 2.5 L NA V6 - AJV6/3.0 L NA V6 - AJ27

Diagnosis and Testing

Preliminary Inspection

- 1. 1. Visually inspect for obvious signs of mechanical or electrical damage, blown fuses, etc.
- 2. **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. **3.** If the concern is not visually evident, verify the symptom and proceed with diagnosis, using the Jaguar approved diagnostic system, where available.
- 4. **4.** Where K-Line equipment is available, it should be used as an aid to diagnosis.

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, GDS510 instrument, 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 quarter 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. (Minimum three clicks).
 - 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 quarter 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 midpoint).
 - 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 engine control module (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 Kilometres 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 Kilometres 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 initialise. (Vapor concentration cannot be measured using the Jaguar approved diagnostic equipment). When the test has initialised (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 Kilometres 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 initialised (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 initialised (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 GDS510

- Avoiding high engine loads, drive the vehicle steadily between 64 and 97 Kilometres per hour. (40 and 60 miles per hour)
- When the test has initialised, using the GDS510, monitor the Evaporative valve duty cycle, CCV status, and the FTPS. (The GDS510 will give an indication when the test is active).
- When the test has initialised (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 GDS510

- Continue driving the vehicle steadily between 64 and 97 Kilometres 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 initialised, using the GDS510, monitor the Evaporative valve duty cycle, CCV status, and the FTPS. (The GDS510 will give an indication when the test is active).
- When the test has initialised (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 GDS510, 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 adaptions.
- 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 adaptions)

If the vehicle battery is disconnected, all adaptions 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 adaptions.

There are four areas or sites that need to be relearnt.

- 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.

The vehicle speed is for guidance only. DO NOT use the vehicle speed as the target to set adaptions.

"Green" ECM drive cycle chart. Site 1

Engine/transmission software level	3.0L Man Z65 on	3.0L Auto Z65 on	2.5L Man Z 65 on	2.5L Auto Z65 on
GEAR	N	P/N	N	P/N
ENGINE SPEED	Idle	Idle	Idle	Idle
VEHICLE SPEED (GUIDE ONLY)	OMPH	OMPH	OMPH	OMPH

"Green" ECM drive cycle chart. Site 2

Engine/transmission software level	3.0L Man Z 65 on	3.0L Auto Z65 on	2.5L Man Z65 on	2.5L Auto Z65 on
GEAR	3rd	3rd	3rd	3rd
ENGINE SPEED	2000RPM	1750RPM	2000RPM	1750RPM
VEHICLE SPEED (GUIDE ONLY)	45KPH (28MPH)	39KPH (24MPH)	47KPH (29MPH)	37KPH (23MPH)

"Green" ECM drive cycle chart. Site 3

Engine/transmission software level	3.0L Man Z65 on	3.0L Auto Z 65 on	2.5L Man Z65 on	2.5L Auto Z65 on
GEAR	4th	4th	4th	4th
ENGINE SPEED	2250RPM	2000RPM	2250RPM	2250RPM
VEHICLE SPEED (GUIDE ONLY)	68KPH (42MPH)	64KPH (40MPH)	72KPH (45MPH)	69KPH (43MPH)

"Green" ECM drive cycle chart. Site 4

Engine/transmission software level	3.0L Man Z65 on	3.0L Auto Z65 on	2.5L Man Z 65 on	2.5L Auto Z65 on
GEAR	4th	4th	4th	4th
ENGINE SPEED	2750RPM	2500RPM	2750RPM	2750RPM
VEHICLE SPEED (GUIDE ONLY)	84KPH (52MPH)	80KPH (50MPH)	87KPH (54MPH)	87KPH (54MPH)

Bring the vehicle to rest, allow to idle for one minute.



WARNING: The following tests may involve parts which are hot.

If sufficient adaptions have occurred, the Evaporative valve should now be operating. This can be verified manually by either touching or listening to the valve. By touching the Evaporative valve, it should be possible to feel the valve switching. Listening to the Evaporative valve is best done using a workshop stethoscope, through which it should be possible to hear the valve operating.

Diagnostic Trouble Code Charts

Diagnostic Trouble Code Chart

Diagnostic Trouble Code	Description	Possible Source	Action
P0441	Evaporative purge valve flow check.	Evaporative purge valve.Hose and connections.	GO to Pinpoint Test <u>A.</u> .
P0442	Leak detected. 40 thou.	 Hoses and connections. Fuel tank filler cap. Carbon canister. Canister close valve. 	GO to Pinpoint Test <u>B.</u> .
P0443	Evaporative purge valve leaking.	Evaporative purge valve.	GO to Pinpoint Test <u>C.</u> .
P0444	Evaporative purge valve circuit open.	Evaporative purge valve or circuit.	GO to Pinpoint Test <u>D.</u> .
P0445	Evaporative purge valve circuit shorted.	Evaporative purge valve or circuit.	GO to Pinpoint Test <u>E.</u> .
P0446	Canister close valve stuck closed.	Filter box.Hoses and connections.CCV.	GO to Pinpoint Test <u>F.</u> .

		Fuel tank vapor port.Carbon canister.	
P0447	Canister close valve circuit open circuit.	CCV or circuit.	GO to Pinpoint Test <u>G.</u> .
P0448	Canister close valve circuit shorted.	CCV or circuit.	GO to Pinpoint Test <u>H.</u> .
P0450	Fuel tank Pressure Sensor malfunction	FTPS.	GO to Pinpoint Test <u>I.</u> .
P0452	FTPS low input.	FTPS or circuit.	GO to Pinpoint Test <u>J.</u> .
P0453	FTPS high input.	FTPS or circuit.	GO to Pinpoint Test <u>J.</u> .
P0455	Gross leak.	 Fuel tank and lines. Fuel filler cap. Carbon Canister. Evaporative purge valve stuck closed. CCV. Blockage in vapor lines from engine to fuel tank. 	GO to Pinpoint Test <u>K.</u> .
P0456	Leak detected. 20 thou.	 Fuel tank and lines. Fuel filler cap. Carbon Canister. CCV. 	GO to Pinpoint Test <u>L.</u> .

Pinpoint Tests

	EST A : P0441. EVAPORATIVE PURGE VALVE FLOW CHECK. VALVE STUCK CLOSED			
TEST	DETAILS/RESULTS/ACTIONS			
CONDITIONS				
A1: CHECK E	VAPORATIVE 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 stethoscop			
	it will be possible to hear the valve operating).			
	Is the valve operating?			
	Yes			
	GO to A2.			
	No			
	CHECK for DTC P0444, P0445. Conduct "green" ECM drive cycle. For additional information, see			
	"diagnostic drive cycles" above.			
A2: CHECK F	OR VACUUM AT EVAPORATIVE PURGE VALVE			
	1 CHECK for vacuum at the valve.			
	Is a vacuum present?			
	Yes			
	Possible intermittent fault. CLEAR the DTC. Carry out a flow check monitor drive cycle. RECHEC			
	DTCs. For additional information, see "diagnostic drive cycles" above.			
	No			
	<u>GO to A3</u> .			
A3: CHECK F	OR BLOCKAGES IN THE SYSTEM			
	1 CHECK for blockages in the intake manifold drilling, and the pipe from the intake manifold to the			
	Evaporative purge valve.			
	Was a blockage found?			
	Yes			
	Rectify the blockage. CLEAR the DTC. Carry out a flow check monitor drive cycle. For additional			
	information, see "diagnostic drive cycles" above.			
	No			
	INSTALL a new Evaporative purge valve.			
	REFER to Evaporative Emission Canister Purge Valve in this section.			
	CLEAR the DTC. Carry out a flow check monitor drive cycle. RECHECK DTCs. For additional			
	information, see "diagnostic drive cycles" above.			

TEST	DETAILS/RESULTS/ACTIONS
BLIAGHE CKAL	UEL FILLER CAP FITMENT AND CONDITION OF PIPES AND CONNECTORS
	1 Make sure that the fuel filler cap is correctly installed and tightened. (Minimum 3 clicks).
	2 Check the condition of all accessible pipes and connectors in the vapor line.
	Are all pipes and connectors in good condition?
	Yes
	Suspect concern with fuel tank assembly or carbon canister assembly.
1	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.

PINPOINT T	PINPOINT TEST C : P0443. EVAPORATIVE PURGE VALVE LEAKING	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
C1: CHECK EV	C1: CHECK EVAPORATIVE PURGE VALVE INTEGRITY	
	1 Disconnect the outlet pipe from the Evaporative purge valve. (From valve to manifold).	
	2 Apply a vacuum to the valve outlet pipe.	
	Does the valve hold vacuum?	
	Yes	
	Possible intermittent fault. CLEAR the DTC. Carry out a full Evap system monitor drive cycle.	
	RECHECK DTCs. For additional information, see "diagnostic drive cycles" above.	
	No	
	INSTALL a new Evaporative purge valve.	
	REFER to Evaporative Emission Canister Purge Valve in this section.	
	CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. RECHECK DTCs. For	
	additional information, see "diagnostic drive cycles" above.	

	· · · · · · · · · · · · · · · · · · ·
DINIDOINT T	EST D : P0444. EVAPORATIVE PURGE VALVE CIRCUIT OPEN CIRCUIT
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
D1: CHECK S	UPPLY VOLTAGE TO EVAPORATIVE PURGE VALVE
	1 Disconnect Evaporative purge valve electrical connector, JB170.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage at JB170, pin 1 (GU).
	Is the voltage greater than 10 volts?
	Yes
	GO to D2.
	No DEDATE II I I I I I I I I I I I I I I I I I
	REPAIR the circuit between Evaporative purge valve electrical connector, JB170, pin 1 (GU) and the EMS control relay. For additional information, refer to wiring diagrams. CLEAR the DTC. Turn
	the ignition switch to the ON position. Leave switched on for minimum 30 seconds. RECHECK
	DTCs. For additional information, see "diagnostic drive cycles" above.
D2: CHECK T	HE EVAPORATIVE PURGE VALVE SIGNAL WIRE FOR CONTINUITY
	1 Disconnect the ECM electrical connector, EN16.
	2 Measure the resistance between EN16, pin 66 (UY) and JB170, pin 2 (UY).
	Is the resistance less than 5 ohms?
	Yes
	GO to D3.
	No
	REPAIR the circuit between EN16, pin 66 (UY) and JB170, pin 2 (UY). CLEAR the DTC. Turn the ignition switch to the ON position. Leave switched on for minimum 30 seconds. RECHECK DTCs.
	For additional information, see "diagnostic drive cycles" above.
D3: CHECK T	HE EVAPORATIVE PURGE VALVE SIGNAL WIRE FOR SHORT TO GROUND
	1 Measure the resistance between JB170, pin 2 (UY) and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR the short to ground. For additional information, refer to wiring diagrams. CLEAR the DTC.
	Turn the ignition switch to the ON position. Leave switched on for minimum 30 seconds. RECHECK
	DTCs. For additional information, see "diagnostic drive cycles" above.
	No GO to D4.
DA: CHECK T	HE EVAPORATIVE PURGE VALVE SIGNAL WIRE FOR SHORT TO BATTERY
DT. CITECK I	1 Connect the ECM electrical connector, EN16.
	2 Turn the ignition switch to the ON position.
	3 CHECK for a voltage at JB170, pin 2 (UY).
	orizon for a voltage at 35170, pin 2 (01).

Is the voltage greater than 1 volt?
Yes
REPAIR the short to battery. For additional information, refer to wiring diagrams. CLEAR the DTC.
Turn the ignition switch to the ON position. Leave switched on for minimum 30 seconds. RECHECK
DTCs. For additional information, see "diagnostic drive cycles" above.
No
5: CHECK THE EVAPORATIVE PURGE VALVE RESISTANCE
1 CHECK the resistance between pins 1 and 2 of the Evaporative purge valve.
Is the resistance 30 to 34 ohms at 20°C (68°F)?
Yes
INSTALL a new ECM. REFER to Section 303-14A Electronic Engine Controls / 303-14B Electronic
Engine Controls. Before replacing a ECM, contact Dealer technical support.
No No
INSTALL a new Evaporative purge valve.
REFER to Evaporative Emission Canister Purge Valve in this section.
CLEAR the DTC. Turn the ignition switch to the ON position. Leave switched on for minimum 30
seconds. RECHECK DTCs. For additional information, see "diagnostic drive cycles" above.

PINPOINT T	PINPOINT TEST E : P0445. EVAPORATIVE PURGE VALVE CIRCUIT SHORTED	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
E1: CHECK EV	APORATIVE PURGE VALVE SIGNAL WIRE FOR SHORT TO GROUND	
	1 Disconnect Evaporative purge valve electrical connector JB170.	
	2 Disconnect ECM electrical connector, EN16.	
	3 Measure the resistance between JB170, pin 2 (UY) and ground.	
	Is the resistance less than 10,000 ohms?	
	Yes	
	REPAIR the short to ground. For additional information, refer to wiring diagrams. CLEAR the DTC. Turn the ignition switch to the ON position. Leave switched on for minimum 30 seconds. RECHECK DTCs. For additional information, see "diagnostic drive cycles" above.	
	No	
	NO short found. A short in the Evaporative purge valve supply circuit may result in a blown fuse 36, PDFB. See initial checks. CLEAR the DTC. Turn the ignition switch to the ON position. Leave switched on for minimum 30 seconds. RECHECK DTCs. For additional information, see "diagnostic drive cycles" above.	

PINPOINT T	EST F : P0446. CANISTER CLOSE VALVE STUCK CLOSED
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
F1: CHECK FC	OR FLOW THROUGH SYSTEM
 NOTE: Deper refuelling. 	nding on the severity of the blockage, it is possible that some difficulty has been experienced during
	1 Disconnect the vapor line from Evaporative purge valve inlet port and apply low pressure.
	 CHECK for free flow of air through the following, paying attention to kinked or flattened pipes. Filter. Interconnecting pipe. (Filter to CCV). CCV. Interconnecting pipe. (CCV to carbon canister). Carbon canister. Interconnecting pipe. (Carbon canister to fuel tank). Fuel tank vapor port.
	Is there a restriction? Yes RECTIFY as necessary. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle, RECHECK DTCs. For additional information, see "diagnostic drive cycles" above. No CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle, RECHECK DTCs. For additional information, see "diagnostic drive cycles" above.

PINPOINT TEST G: P0447. CANISTER CLOSE VALVE CIRCUIT OPEN CIRCUIT	
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
G1: CHECK SUPPLY VOLTAGE TO CCV	
	1 Disconnect canister close valve electrical connector, FT5.

	,	
	3	There the theition system to the iAN resition.
	ls t	he voltage greater than 10 volts?
	Yes	
		GO to G2.
	No	
		REPAIR the circuit between FT5, pin 1 (GU) and the EMS control relay. For additional information,
		refer to wiring diagrams. CLEAR the DTC. Turn the ignition switch to the ON position. Leave
		switched on for minimum 30 seconds. RECHECK DTCs. For additional information, see "diagnostic
OO OUEOK T	<u> </u>	drive cycles" above.
G2: CHECK I	1	CCV SIGNAL WIRE FOR CONTINUITY.
	1	Disconnect the ECM electrical connector, EN16.
	2	Measure the resistance between EN16, pin 67 (O) and FT5, pin 2 (O).
		he resistance less than 5 ohms?
	Yes	
	No	GO to G4.
	INO	REPAIR the circuit between EN16, pin 67 (O) and FT5, pin 2 (O). For additional information, refer
		to wiring diagrams. CLEAR the DTC. Turn the ignition switch to the ON position. Leave switched on
		for minimum 30 seconds. RECHECK DTCs. For additional information, see "diagnostic drive cycles"
		above.
G3: CHECK T	HE (CCV SIGNAL WIRE FOR SHORT TO BATTERY
	1	Turn the ignition switch to the ON position.
	2	CHECK for a voltage at FT5, pin 2 (0).
	_	he voltage greater than 1 volt?
	Yes	
		REPAIR the short to battery. For additional information, refer to wiring diagrams. CLEAR the DTC.
		Turn the ignition switch to the ON position. Leave switched on for minimum 30 seconds. RECHECK
		DTCs. For additional information, see "diagnostic drive cycles" above.
	No	
		<u>GO to G4</u> .
G4: CHECK T	HE (CCV RESISTANCE
	1	CHECK the resistance between pins 1 and 2 of the CCV.
		he resistance 25 to 30 Ohms at 20°C (68°F)?
	Yes	
		INSTALL a new ECM. REFER to Section 303-14A Electronic Engine Controls / 303-14B Electronic
	<u>L</u> .	Engine Controls. Before replacing a ECM, contact Dealer technical support.
	No	INICTALL a new COV CLEAD the DTC Turn the bretter south to the CN resistant to
		INSTALL a new CCV. CLEAR the DTC. Turn the ignition switch to the ON position. Leave switched
		on for minimum 30 seconds. RECHECK DTCs. For additional information, see "diagnostic drive cycles" above.
		cycles above.

PINPOINT TEST H : P0448. CCV CIRCUIT SHORTED.	
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
H1: CHECK CC	V SIGNAL WIRE FOR SHORT TO GROUND.
	1 Disconnect CCV electrical connector, FT5.
	2 Disconnect ECM electrical connector, EN16.
	3 Measure the resistance between FT5, pin 2 (O) and ground.
	s the resistance less than 10,000 Ohms?
	Yes
	REPAIR the short to ground. For additional information, refer to wiring diagrams. CLEAR the DTC. Turn the ignition switch to the ON position. Leave switched on for minimum 30 seconds. RECHECK DTCs. For additional information, see "diagnostic drive cycles" above.
	NO short found. A short in the CCV supply circuit may result in a blown fuse 36, PDFB. See initial checks.

PINPOINT TEST I: P0450. FUEL TANK PRESSURE SENSOR MALFUNCTION.

• NOTE: Prior to commencing this test, REFER to Section <u>303-14A Electronic Engine Controls</u> / <u>303-14B Electronic Engine Controls</u>. Electronic Engine Controls, Diagnosis and Testing, sensor supply and ground circuits.

• NOTE: Access to the FTP sensor involves the removal of the fuel tank. To reduce the amount of work necessary, a slave harness and sensor could be used. This can be connected at the access port beneath the rear seat. Tests can then be carried out via the slave harness and sensor. If system operation is normal with the slave harness and sensor, the fault lies in the vehicle's harness or sensor.

TEST
CONDITIONS

DETAILS/RESULTS/ACTIONS

11: CHE	CK EVAPORATIVE PURGE VALVE IS OPERATING.
	1 Disconnect electrical connector CA005. (Beneath rear seat).
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between pins 4 and 6 of CA005.
	Is the voltage 2.9 - 3.7 volts?
	Yes
	GO to 12. Reconnect CA005.
	No stps
	INSTALL a new FTPS.
	REFER to Section 310-01 Fuel Tank and Lines.
	Reconnect CA005. CLEAR the DTC. Turn the ignition switch to the ON position. Leave switched on
	for minimum 30 seconds. RECHECK DTCs. For additional information, see "diagnostic drive cycles" above.
LO. CLIE	
12: CHE	CK SIGNAL VOLTAGE AT FTPS.
	1 Run the engine for two minutes, and until fully warm.
	2 Make sure Evaporative purge valve is operating.
	3 Steadily increase engine speed to 3000 RPM.
	4 Measure the voltage between pins 4 and 6 of CA005.
	Does the voltage reduce?
	Yes
	Possible intermittent fault. RECHECK DTCs, For additional information, see "diagnostic drive
	cycles" above. Contact Dealer technical support.
	No
	INSTALL a new FTPS.
	REFER to Section 310-01 Fuel Tank and Lines.
	CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. RECHECK DTCs. For
	additional information, see "diagnostic drive cycles" above.

PINPOINT TEST J : P0452, 00453. FUEL TANK PRESSURE SENSOR LOW/HIGH INPUT.

- NOTE: Prior to commencing this test, REFER to Section <u>303-14A Electronic Engine Controls</u> / <u>303-14B Electronic Engine Controls</u>. Electronic Engine Controls, Diagnosis and Testing, sensor supply and ground circuits.
- NOTE: Access to the FTP sensor involves the removal of the fuel tank. To reduce the amount of work necessary, a
 slave harness and sensor could be used. This could be connected at the access port beneath the rear seat. Tests can
 then be carried out via the slave harness and sensor. If system operation is normal with the slave harness and
 sensor, the fault lies in the vehicle's harness or sensor.

I	a out via the slave namess and sensor. It system operation is normal with the slave namess and	
sensor, the fau	ult lies in the vehicle's harness or sensor.	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
	PS SIGNAL WIRE FOR CONTINUITY UP TO CONNECTOR CA5.	
	1 Disconnect ECM electrical connector, EN16.	
	2 Disconnect FTPS electrical connector, CA5.	
	3 Check for continuity between EN16, pin 104 (RG) and CA5, pin 4 (RG).	
	 This test will not check the continuity of the harness from CA5 to FT1. If the circuit is continuous to CA5, the fuel tank must be removed and the harness and sensor continuity checked. 	
	Is the circuit continuous?	
	Yes	
	INSTALL a new FTPS, (and/or harness, CA5 to FT1). CLEAR the DTC. Turn the ignition switch to the ON position. Leave switched on for minimum 30 seconds. RECHECK DTCs. For additional information, see "diagnostic drive cycles" above. If the DTC is repeated, INSTALL a new ECM. REFER to Section 303-14A Electronic Engine Controls . Before replacing a ECM, contact Dealer technical support.	
	REPAIR the circuit between EN16, pin 104 (RG) and CA5, pin 4 (RG). CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. For additional information, see "diagnostic drive cycles" above. RECHECK DTCs.	
J2: CHECK FTPS SUPPLY WIRE FOR SHORT TO GROUND UP TO CONNECTOR CA5		
	1 Measure the resistance between CA5, pin 5 (OY) and GROUND.	
	 This test will not check the integrity of the harness from CA5 to FT1. If the circuit is sound to CA5, the fuel tank must be removed and the harness and sensor continuity checked. 	
	Is the resistance less than 10,000 ohms?	

REPAIR the short to GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. Turn the ignition switch to the ON position. Leave switched on for minimum 30 seconds.

RECHECK DTCs. For additional information, see "diagnostic drive cycles" above.

Yes

No

	4 Campact FCM alactrical compactor FN1/
	1 Connect ECM electrical connector, EN16.
	2 Measure the resistance between CA5, pin 4 (RG) and GROUND.
	 This test will not check the integrity of the harness from CA5 to FT1. If the circuit is sound to CA5, the fuel tank must be removed and the harness and sensor continuity checked.
	Is the resistance less than 10,000 ohms?
	REPAIR the short to GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. Turn the ignition switch to the ON position. Leave switched on for minimum 30 seconds. RECHECK DTCs. For additional information, see "diagnostic drive cycles" above. No
	GO to J4.
4: CHECK F	TPS SIGNAL WIRE FOR SHORT TO BATTERY, UP TO CONNECTOR CA5
	1 Turn the ignition switch to the ON position.
	2 Check for a voltage at CA5, pin 4 (RG).
	This test will not check the integrity of the harness from CA5 to FT1. If the circuit is sound to CA5, the fuel tank must be removed and the harness and sensor continuity checked.
	Is the voltage greater than 1 volt?
	Yes REPAIR the short to battery. For additional information, refer to wiring diagrams. CLEAR the DTC Turn the ignition switch to the ON position. Leave switched on for minimum 30 seconds. RECHEC DTCs. For additional information, see "diagnostic drive cycles" above.
	No GO to J5.
5: CHECK F	TPS GROUND WIRE FOR SHORT TO BATTERY, UP TO CONNECTOR CA5
	1 Turn the ignition switch to the ON position.
	2 Check for a voltage at CA5, pin 6 (BG).
	Is the voltage greater than 1 volt?
	Yes REPAIR the short to battery. For additional information, refer to wiring diagrams. CLEAR the DTC Carry out a full Evaporative system monitor drive cycle, RECHECK DTCs. For additional information, see "diagnostic drive cycles" above. No
	GO to J2.
6: CHECK F	TPS SUPPLY WIRE FOR SHORT TO BATTERY UP TO CONNECTOR CA5
	1 Connect ECM electrical connector, EN16.
	2 Turn the ignition switch to the ON position.
	3 Check for a voltage at CA5, pin 5 (OY).
	 This test will not check the integrity of the harness from CA5 to FT1. If the circuit is sound to CA5, the fuel tank must be removed and the harness and sensor continuity checked.
	Is the voltage greater than 5 volts?
	Yes REPAIR the short to battery. For additional information, refer to wiring diagrams. CLEAR the DTC Carry out a full Evaporative system monitor drive cycle, RECHECK DTCs. For additional information, see "diagnostic drive cycles" above.
	INSTALL a new FTPS, (and/or harness, CA5 to FT1). REFER to Section 310-01 Fuel Tank and Lines. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle, RECHECK DTCs. For additional information, see "diagnostic drive cycles" above. If the DTC is repeated, INSTALL a ne ECM. REFER to Section 303-14A Electronic Engine Controls / 303-14B Electronic Engine Controls

TEST	DETAILS/RESULTS/ACTIONS		
CONDITIONS			
K1: CHECK FU	JEL FILLER CAP FITMENT AND CONDITION OF PIPES AND CONNECTORS.		
	1 Make sure that the fuel filler cap is correctly installed and tightened. (Minimum 3 clicks).		
	2 Check the condition of all accessible pipes and connectors in the vapor line.		
	Are all pipes and connectors in good condition?		
	Yes		
ĺ			

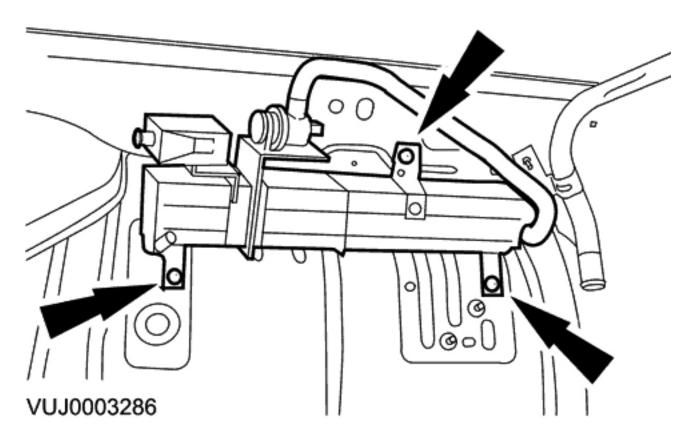
	Suspect concern with - 1. Blockage in vapor line. (Engine to fuel tank).2. Evaporative purge valve stuck closed.3. Fuel tank assembly.4. Carbon canister assembly.
No	REPAIR as necessary. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle, RECHECK DTCs. For additional information, see "diagnostic drive cycles" above.

PINPOINT T	EST L : P0456. LEAK DETECTED. 20 THOU.			
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS			
L1: CHECK FU	JEL FILLER CAP FITMENT AND CONDITION OF PIPES AND CONNECTORS.			
	1 Make sure that the fuel filler cap is correctly installed and tightened. (Minimum 3 clicks).			
	2 Check the condition of all accessible pipes and connectors in the vapor line.			
	Are all pipes and connectors in good condition?			
	Yes			
	Suspect concern with fuel tank assembly or carbon canister assembly.			
	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.			

Evaporative Emission Canister 17.15.13

Removal

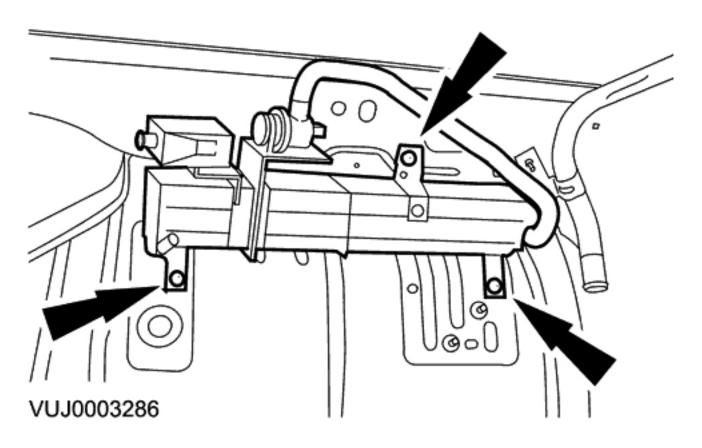
1. Remove the fuel tank. For additional information, refer to <<310-01>>.



2. Remove the evapourative emission canister.

Installation

1. To install, reverse the removal procedure.

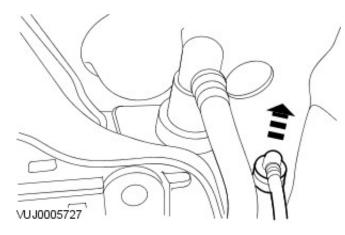


2. Tighten to 45 lb-in.

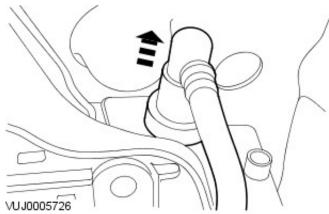
Evaporative Emissions - Evaporative Emission Canister 2.0L NA V6 - AJV6Removal and Installation

Removal

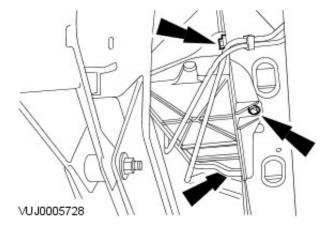
- 1. Raise and support the vehicle. For additional information, refer to: Lifting (100-02 Jacking and Lifting, Description and Operation).
- 2. Disconnect the evaporative emission canister pipe.



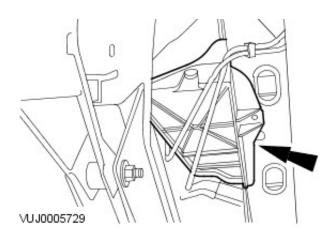
3. Disconnect the evaporative emission canister pipe.

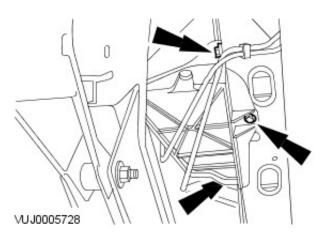


4. Remove the evaporative emission canister retaining bolts.



5. Remove the evaporative emission canister.



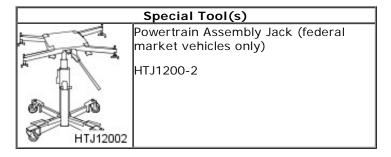


Installation

- **1.** To install, reverse the removal procedure.
 - Tighten to 5 Nm.

Evaporative Emissions - Evaporative Emission Canister 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Removal and Installation



Removal

• WARNINGS:

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.

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.

Due to the heavy weight, make sure that the fuel tank is securely attached to the powertrain assembly jack when installing.

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.

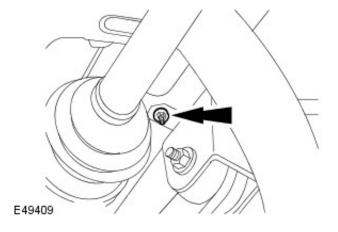
- NOTE: Non federal market vehicles, refer to steps 1 to 3.
- NOTE: Federal market vehicles, refer to steps 4 to 22.
 - 1. NOTE: Non federal market vehicles only.

Remove the fuel tank.

For additional information, refer to: Fuel Tank - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (310-01 Fuel Tank and Lines, Removal and Installation).

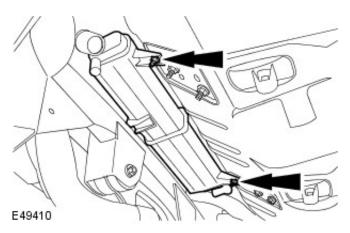
2. NOTE: Non federal market vehicles only.

Remove the evaporative emission canister rear retaining nut.



3. NOTE: Non federal market vehicles only.

Remove the evaporative emission canister.



Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

5. NOTE: Federal market vehicles only.

Remove the fuel filler cap.

6. NOTE: Federal market vehicles only.

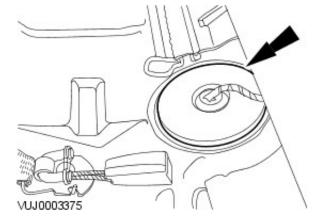
De-pressurize the fuel system.
For additional information, refer to: <u>Fuel System Pressure Release</u> (310-00 Fuel System - General Information, General Procedures).

7. NOTE: Federal market vehicles only.

Remove the rear seat cushion. For additional information, refer to: Rear Seat Cushion (501-10 Seating, Removal and Installation).

8. NOTE: Federal market vehicles only.

Detach the wiring harness grommet.



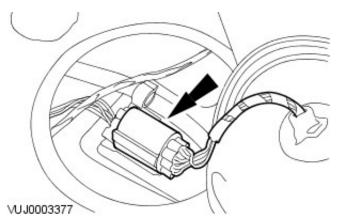
VUJ0003376

9. NOTE: Federal market vehicles only.

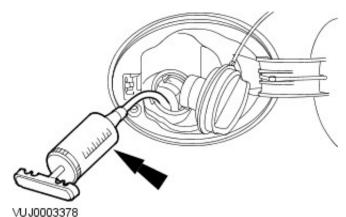
Detach the electrical connector.

10. NOTE: Federal market vehicles only.





Using a suitable suction device drain the fuel tank filler pipe.



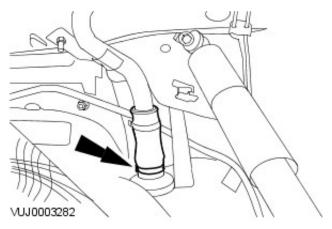
12. NOTE: Federal market vehicles only.

Remove the rear subframe.

For additional information, refer to: Rear Subframe (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

- 13. NOTE: Federal market vehicles only.
- NOTE: Note the orientation of the fuel tank filler pipe to fuel tank hose retaining clip before loosening.

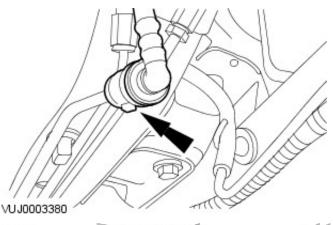
Detach the fuel tank filler pipe hose from the fuel tank.

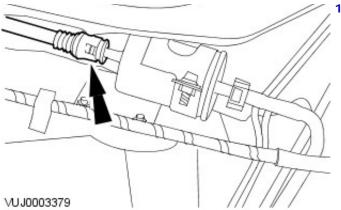


14. NOTE: Federal market vehicles only.

Disconnect the evaporative emission canister purge hose quick release coupling.

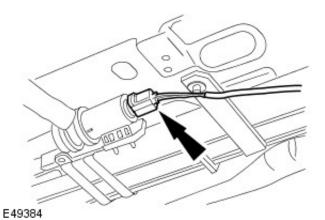
For additional information, refer to: <u>Quick Release Coupling</u> - <u>Push Connect</u> (310-00 Fuel System - General Information, General Procedures).





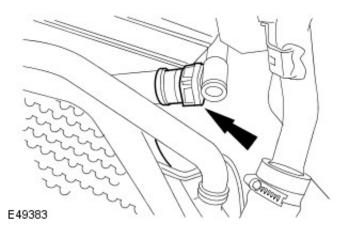
Disconnect the fuel filter line quick release coupling. For additional information, refer to: Quick Release Coupling - Push Connect (310-00 Fuel System - General Information, General Procedures).

• Install blanking plugs to the male and female connectors.



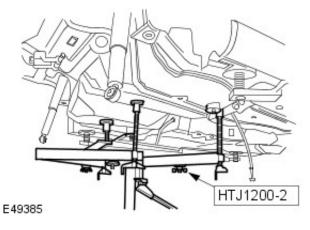
16. NOTE: Federal market vehicles only.

Disconnect the evaporative emission canister close valve electrical connector.



17. NOTE: Federal market vehicles only.

Disconnect the evaporative emission canister hose from the evaporative emission canister.

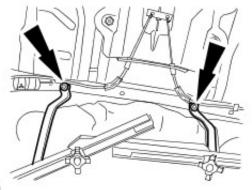


18. NOTE: Federal market vehicles only.

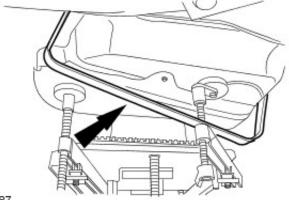
Using the special tool, support the fuel tank.

19. NOTE: Federal market vehicles only.

Remove the fuel tank support straps retaining bolts.



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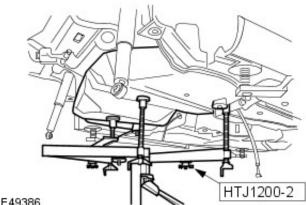


20. NOTE: Federal market vehicles only.

• NOTE: Right-hand shown, left-hand similar.

Remove the fuel tank support straps.





E49386 HTJ1200-2

21. WARNING: The fuel tank cannot be drained in vehicle. Due to the heavy weight, make sure that the fuel tank is securely attached to the powertrain assembly jack when removing. Failure to follow this instruction may result in personal injury.

• NOTE: Federal market vehicles only.

Using the special tool, remove the fuel tank.

- Detach the fuel filler pipe hose from the fuel tank.
- Install blanking plugs to the fuel tank and fuel filler pipe hose.

22. NOTE: Federal market vehicles only.

Remove the evaporative emission canister.

Installation

• WARNINGS:



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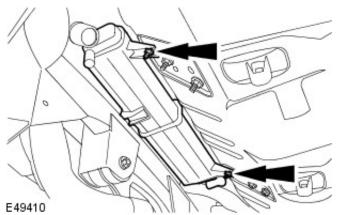
components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

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.

Due to the heavy weight, make sure that the fuel tank is securely attached to the powertrain assembly jack when installing.

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.

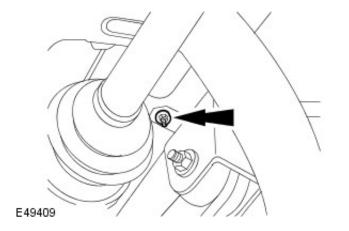
- NOTE: Non federal vehicles, refer to steps 1 to 3.
- NOTE: Federal vehicles, refer to steps 1 to 21.



1. NOTE: Non federal market vehicles only.

Install the evaporative emission canister.

• Tighten to 5 Nm.



2. NOTE: Non federal market vehicles only.

Install the evaporative emission canister rear retaining nut.

• Tighten to 5 Nm.

3. NOTE: Non federal market vehicles only.

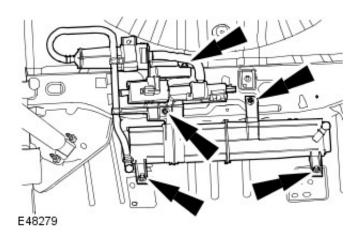
Install the fuel tank.

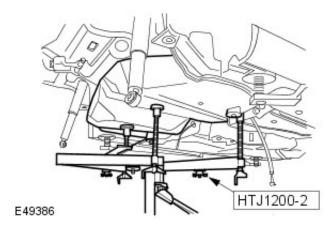
For additional information, refer to: Fuel Tank - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (310-01 Fuel Tank and Lines, Removal and Installation).

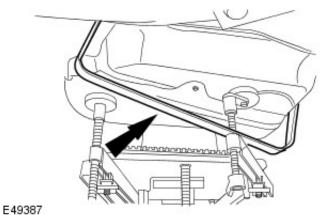
4. NOTE: Federal market vehicles only.

Install the evaporative emission canister.

• Tighten to 5 Nm.







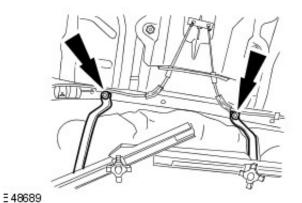
5. WARNING: The fuel tank cannot be drained in vehicle. Due to the heavy weight, make sure that the fuel tank is securely attached to the powertrain assembly jack when removing. Failure to follow this instruction may result in personal injury.

- NOTE: Federal market vehicles only.
- NOTE: Remove the blanking plugs from the fuel tank and fuel filler pipe hose.

Using the special tool, install the fuel tank.

- Attach the fuel filler pipe hose to the fuel tank.
- 6. NOTE: Federal market vehicles only.
- NOTE: Right-hand shown, left-hand similar.

Install the fuel tank support straps.



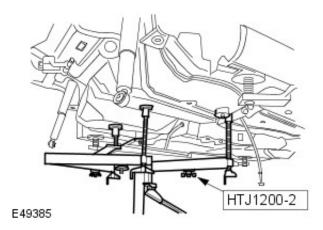
7. NOTE: Federal market vehicles only.

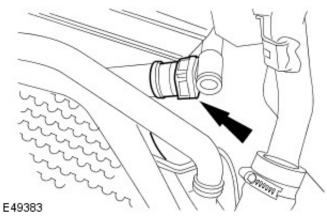
Install the fuel tank support straps retaining bolts.

• Tighten to 25 Nm.

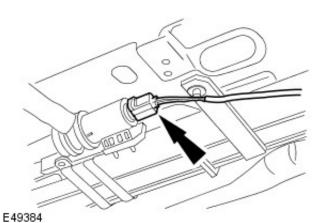
8. NOTE: Federal market vehicles only.

Remove the special tool.





Connect the evaporative emission canister hose to the evaporative emission canister.



10. NOTE: Federal market vehicles only.

Connect the evaporative emission canister close valve electrical connector.



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11. NOTE: Federal market vehicles only.

• NOTE: Remove the blanking plugs.

Connect the fuel filter line quick release coupling. For additional information, refer to: <u>Quick Release Coupling - Push Connect</u> (310-00 Fuel System - General Information, General Procedures).

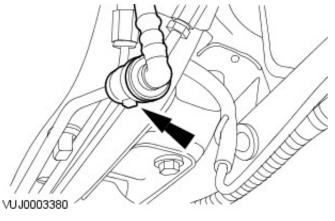
Install blanking plugs to the male and female connectors.

12. NOTE: Federal market vehicles only.

Connect the evaporative emission canister purge hose quick release coupling.

For additional information, refer to: <u>Quick Release Coupling</u> - <u>Push Connect</u> (310-00 Fuel System - General Information,







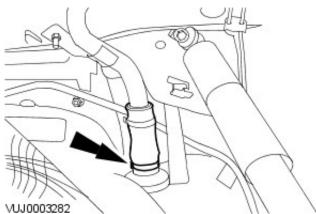
Tighten the fuel tank filler pipe to fuel tank hose retaining

• NOTE: Make sure the fuel tank filler pipe to fuel tank hose

ip.

• Tighten to 3 Nm.

retaining clip is correctly orientated.



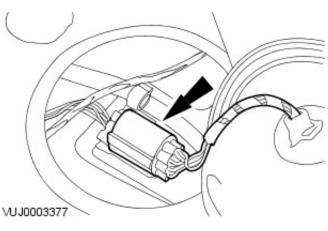
14. NOTE: Federal market vehicles only.

Install the rear subframe.

For additional information, refer to: Rear Subframe (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

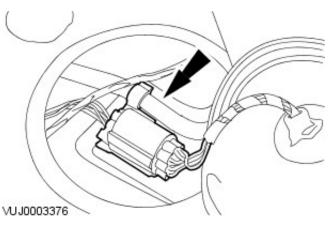
15. NOTE: Federal market vehicles only.

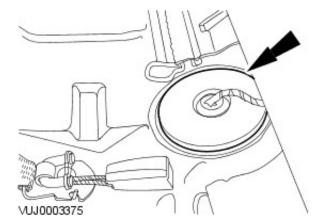
Connect the electrical connector.



16. NOTE: Federal market vehicles only.

Attach the electrical connector.





Attach the wiring harness grommet.

18. NOTE: Federal market vehicles only.

Install the rear seat cushion.

For additional information, refer to: Rear Seat Cushion (501-10 Seating, Removal and Installation).

19. NOTE: Federal market vehicles only.

Fill the fuel tank with the fuel drained from the fuel filler pipe.

20. NOTE: Federal market vehicles only.

Install the fuel filler cap.

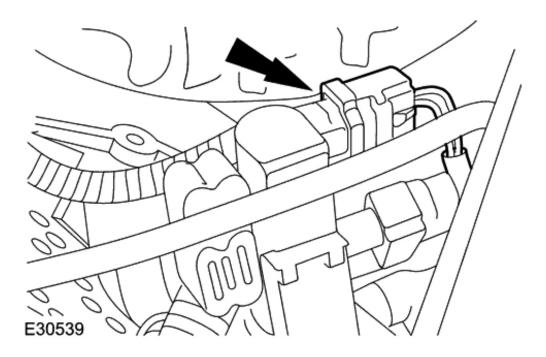
21. NOTE: Federal market vehicles only.

Connect the battery ground cable.

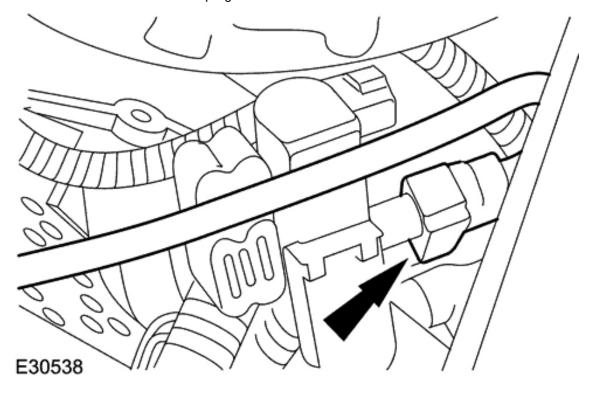
For additional information, refer to: <u>Battery Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

Evaporative Emission Canister Purge Valve 17.15.30

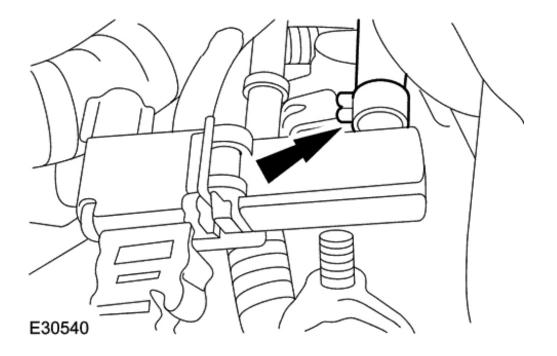
Removal



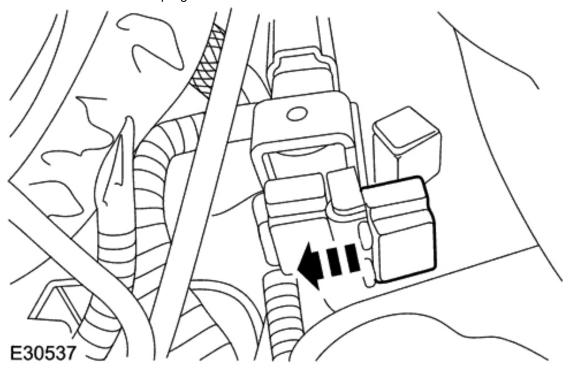
1. Disconnect the canister purge valve electrical connector and vacuum hose.



2. Disconnect the canister purge valve upper vacuum hose.



3. Remove the canister purge valve lower vacuum hose.



4. Remove the canister purge valve.

Installation

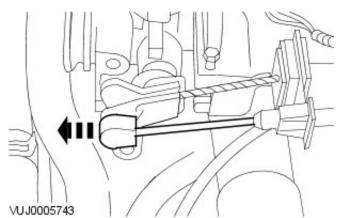
1. To install, reverse the removal procedure.

Evaporative Emissions - Evaporative Emission Canister Purge ValveRemoval and Installation

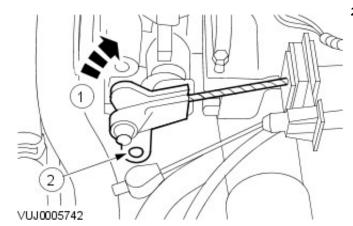
Removal

Vehicles with 2.0L engine

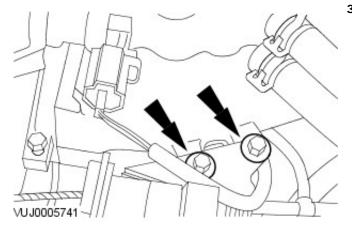
1. Detach the speed control cable.



- 2. Detach the accelerator cable.
 - 1. Reposition the accelerator lever to the fully open position.
 - 2. Detach the accelerator cable.

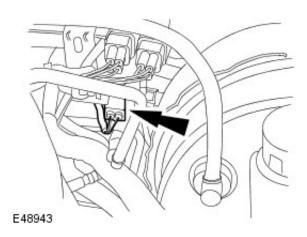


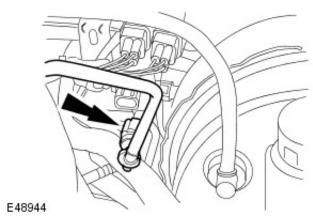
3. Detach the accelerator cable retaining bracket.



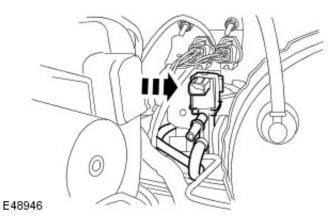
All vehicles

4. Disconnect the evaporative emission canister purge valve electrical connector.

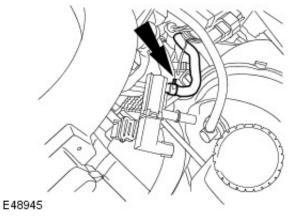




5. Disconnect the upper fuel vapour hose from the evaporative emission canister purge valve.



6. Detach the evaporative emission canister purge valve from the retaining bracket.



- **7.** Remove the evaporative emission canister purge valve.
 - Disconnect the lower fuel vapour hose from the evaporative emission canister purge valve.

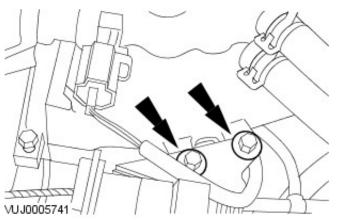
Installation

All vehicles

1. To install, reverse the removal procedure.

Vehicles with 2.0L engine

2. Tighten to 9 Nm.



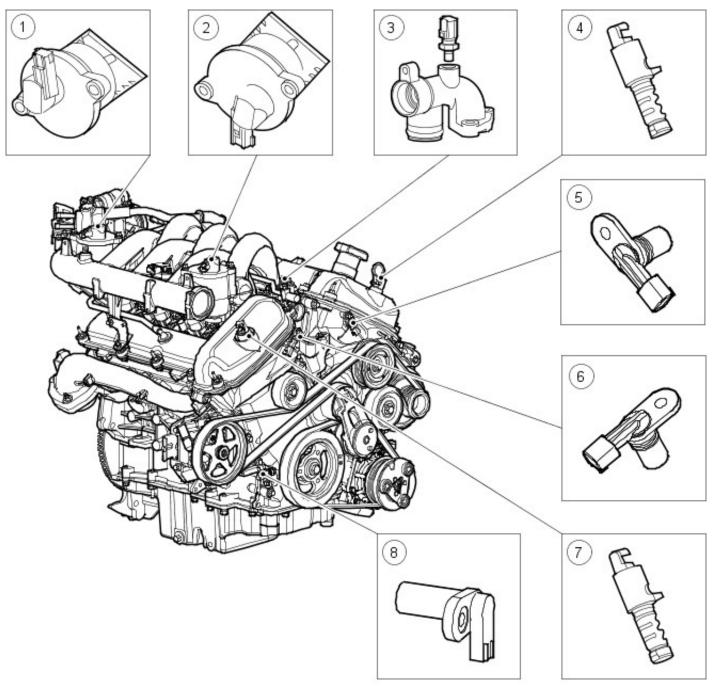
Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 -

Torque Specifications

Description	Nm	lb-ft	lb-in
Camshaft position sensor retaining bolt	7	-	62
Heated oxygen sensor	40	30	-
Catalyst monitor sensor	40	30	-
Crankshaft position sensor retaining bolt	10	7	-
Knock sensor retaining bolt	25	18	-
Variable camshaft timing oil control solenoid retaining bolt	10	7	-
Oil temperature sensor	15	11	-
Engine control module (ECM) retaining nut	10	7	-
ECM electrical connector retaining bolt	10	7	-
Engine block coolant inlet pipe retaining bolts	25	18	-
Water pump coolant outlet pipe retaining bolts	10	7	-
Throttle position sensor retaining screws	7	-	62

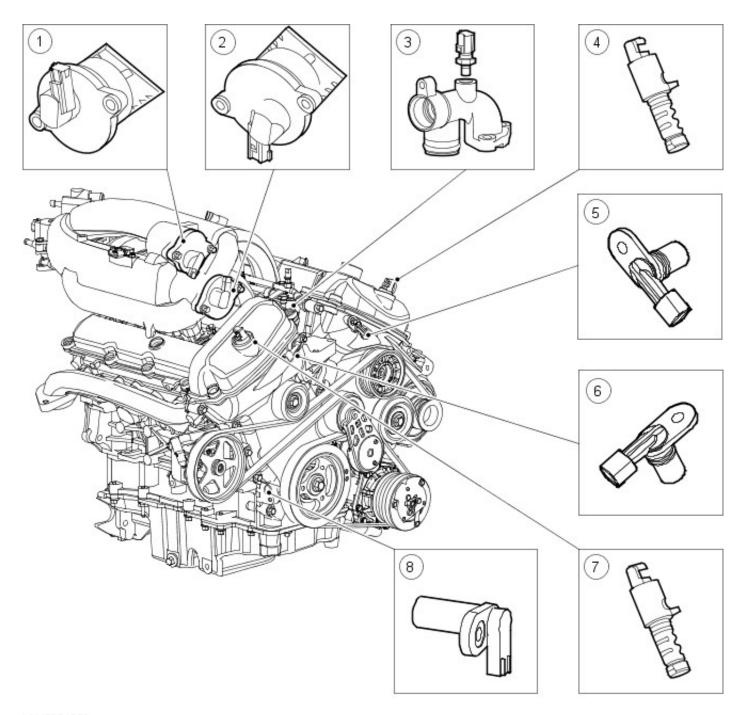
Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Electronic Engine Controls Description and Operation

2.0L Engine



E 30812

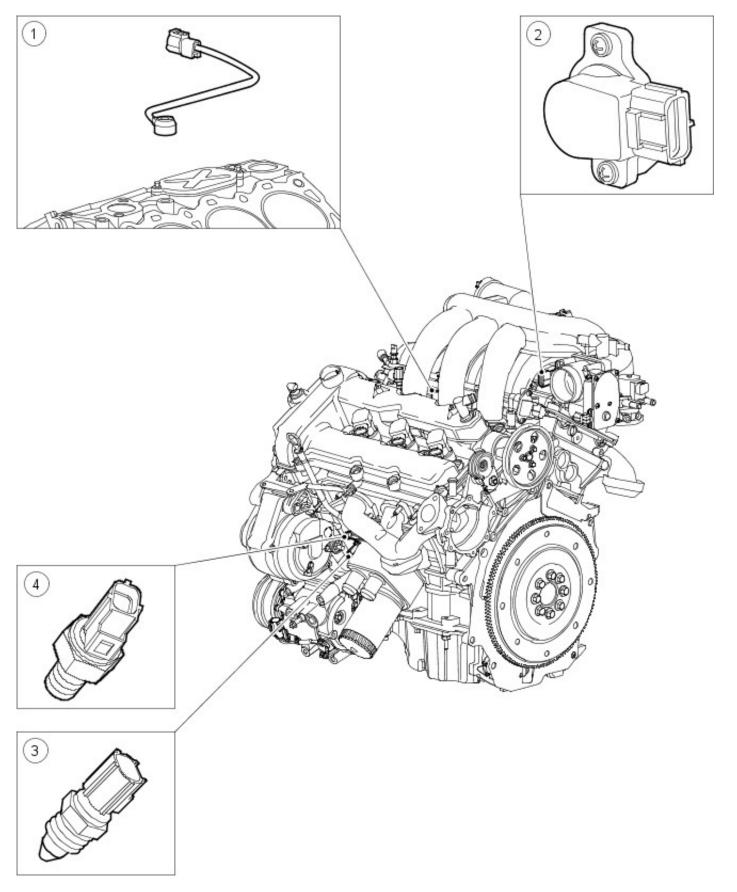
Item	Part Number	Part Number Description	
1	_	Intake Manifold Tuning (IMT) Valve - upper	
2	_	Intake Manifold Tuning (IMT) Valve - lower	
3	_	Engine Coolant Temperature (ECT) Sensor	
4	_	Variable Camshaft Timing Oil Control Solenoid LH	
5	_	Camshaft Position (CMP) Sensor LH	
6	_	Camshaft Position (CMP) Sensor RH	
7	_	Variable Camshaft Timing Oil Control Solenoid RH	
8	<u> </u>	Crankshaft Position (CKP) Sensor	



VUJ0004252

Item	Part Number	Description	
1	_	Intake Manifold Tuning (IMT) Valve - upper	
2	_	Intake Manifold Tuning (IMT) Valve - lower	
3	_	Engine Coolant Temperature (ECT) Sensor	
4	_	Variable Camshaft Timing Oil Control Solenoid LH	
5	_	Camshaft Position (CMP) Sensor LH	
6	_	Camshaft Position (CMP) Sensor RH	
7	<u> </u>	Variable Camshaft Timing Oil Control Solenoid RH	
8	<u>-</u>	Crankshaft Position (CKP) Sensor	

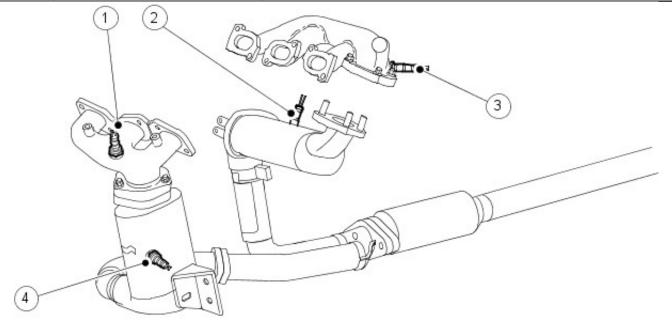
2.0L, 2.5L and 3.0L Engine



VUJ0004253

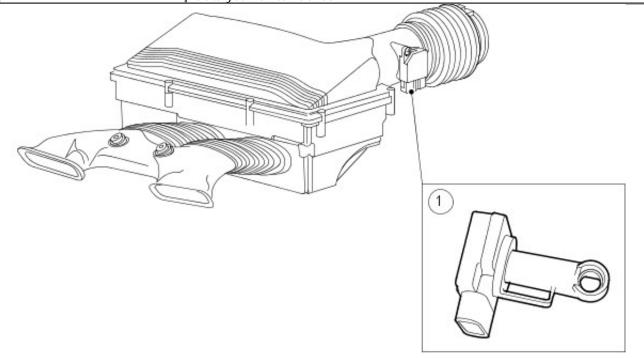
Item	Part Number	Description
1	_	Knock Sensor (KS)
2	_	Throttle Position (TP) Sensor
3	_	Oil Temperature Sensor





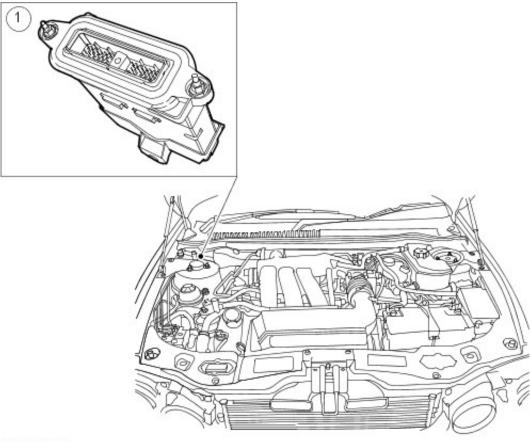
VUJ0004254

Item	Part Number	Description
1	_	Heated Oxygen Sensor (HO2S) LH
2	_	Catalyst Monitor Sensor RH
3	_	Heated Oxygen Sensor (HO2S) RH
4	_	Catalyst Monitor Sensor LH



VUJ0004255

Item	Part Number	Description
1	_	Mass Air flow (MAF) Sensor



VUJ0004256

Item	Part Number	Description
1	_	Engine Control Module (ECM)

Engine Control Module (ECM)

The electronic engine control system consists of a engine control module (ECM) 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 IMT valves work in conjunction with the throttle body. The upper IMT valve opens between 3,000 and 6,000 rpm while the lower IMT valve opens between 5,000 and 6,000 rpm.

Knock Sensor (KS)

The knock sensor (KS) detects 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 MAF sensor 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.

Throttle Position (TP) Sensor

The ECM monitors the angle of the throttle plate 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 which is increases with 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 - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Electronic Engine Controls2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492

Diagnosis and Testing

- 1. 1. Verify the customer concern by operating the system.
- 2. 2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
 Engine oil level Cooling system coolant level Fuel Contamination Throttle body 	 Fuses (9, 31, 32, 37) Wiring harness Electrical connector(s) Sensor(s) Engine control module (ECM)

- 3. **3.** Verify the following systems are working correctly:
- Air intake system
- Cooling system
- Charging system
- Fuel charging system
- 4. **4.** If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- If the concern 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 (DTCs) Index
 Chart.
- 6. **6.** Make sure that a power supply is present to the ECM from fuse 32 of the engine compartment fuse box before carrying out diagnostic work on the electronic engine control system.

Diagnostic Trouble Code (DTC) Index

DTC	Description	Possible Source	Action
P0116, P0117, P0118, P0125	Concern with engine coolant temperature (ECT) sensor.	 ECT sensor. ECT sensor circuit(s). Low/contaminated coolant. Thermostat failure. Overheating. 	GO to Pinpoint Test <u>A.</u>
P0128	Concern with engine temperature, set by ECT sensor inputs.	Thermostat.ECT sensor.ECT sensor circuit(s).	Mechanical check of thermostat.GO to Pinpoint Test <u>A.</u>
P0335, P0336	Concern with crankshaft position (CKP) sensor.	 CKP sensor. CKP sensor circuit(s). CKP sensor air gap. CKP sensor debris. 	GO to Pinpoint Test <u>B.</u>
	Concern with right- hand bank camshaft position (CMP) sensor.	 CMP sensor. CMP sensor circuit(s). CMP sensor air gap. CMP sensor debris. 	GO to Pinpoint Test <u>C.</u>
	Concern with left-hand bank camshaft position (CMP) sensor.	CMP sensor.CMP sensor circuit(s).CMP sensor air	GO to Pinpoint Test <u>D.</u>

		gap. ◆ CMP sensor debris.	
P0031, P0032	Concern with right- hand bank heated oxygen sensor (HO2S 1/1) heater.	 H02S 1/1 failure. H02S 1/1 circuit(s). Fuse 38. 	GO to Pinpoint Test <u>E.</u>
P0181, P0182, P0183	Concern with fuel temperature sensor.	 Fuel temperature sensor. Fuel temperature sensor circuit(s). 	GO to Pinpoint Test <u>F.</u>
P0327, P0328, P0332, P0333, P1648	Concern with knock sensor (KS).	 KS. KS circuit(s). Poor contact with cylinder block. ECM failure. 	GO to Pinpoint Test <u>G.</u>
	Concern with oil temperature sensor.	Oil temperature sensor.Oil temperature sensor circuit(s).	GO to Pinpoint Test <u>H.</u>
P0131, P0132	Concern with right- hand bank heated oxygen sensor (HO2S 1/1).	HO2S 1/1.HO2S 1/1 circuit(s).	GO to Pinpoint Test <u>I.</u>
P0133	Concern with right- hand bank heated oxygen sensor (HO2S 1/1). Slow response	 Engine misfire. H02S 1/1 disconnected. H02S 1/1 mechanical damage. H02S 1/1 to ECM wiring fault. H02S 1/1 short circuit to ground. H02S 1/1 wiring shield open circuit. H02S 1/1 heater circuit fault. Exhaust leak. Low exhaust temperature. Injector flow partially blocked. Catalyst efficiency decrease. H02S 1/1 failure. 	GO to Pinpoint Test I. Refer to pinpoint tests for components listed, REFER to: Exhaust System (309-00 Exhaust System, Diagnosis and Testing) / Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P1646	Concern with right- hand bank heated oxygen sensor (HO2S 1/1).	 H02S 1/1 heater failure. H02S 1/1 sensing circuit, short circuit to ground. H02S 1/1 sensing circuit, short circuit to high voltage. H02S 1/1 sensing circuit, open circuit. ECM failure. 	GO to Pinpoint Test <u>I.</u> Refer to pinpoint tests for components listed.
P0137, P0138	Concern with right- hand bank catalyst monitor sensor (H02S 1/2).	 H02S 1/2. H02S 1/2 circuit(s). Fuse 38. 	GO to Pinpoint Test <u>J.</u>

D04.46			
P0140	Concern with right- hand bank catalyst monitor sensor (H02S 1/2).	Exhaust leak.Low exhaust temperature.	Inspect exhaust system, REFER to: Exhaust System (309-00 Exhaust System, Diagnosis and Testing).
	Concern with left-hand bank heated oxygen sensor (HO2S 2/1).	HO2S 2/1.HO2S 2/1 circuit(s).	GO to Pinpoint Test <u>K.</u>
P0153	Concern with left-hand bank heated oxygen sensor (HO2S 2/1). Slow response	 Engine misfire. H02S 2/1 disconnected. H02S 2/1 mechanical damage. H02S 2/1 to ECM wiring fault. H02S 2/1 short circuit to ground. H02S 2/1 wiring shield open circuit. H02S 2/1 heater circuit fault. Exhaust leak. Low exhaust temperature. Injector flow partially blocked. Catalyst efficiency decrease. H02S 2/1 failure. 	GO to Pinpoint Test K. Refer to pinpoint tests for components listed, REFER to: Exhaust System (309-00 Exhaust System, Diagnosis and Testing) / Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P1647	Concern with left-hand bank heated oxygen sensor (HO2S 2/1).	 H02S 2/1 heater failure. H02S 2/1 sensing circuit, short circuit to ground. H02S 2/1 sensing circuit, short circuit to high voltage. H02S 2/1 sensing circuit, open circuit. ECM failure. 	GO to Pinpoint Test <u>K.</u> Refer to pinpoint tests for components listed.
	Concern with left-hand bank catalyst monitor sensor (HO2S 2/2).	 HO2S 2/2. HO2S 2/2 sensor circuit(s). Fuse 42. 	GO to Pinpoint Test <u>L.</u>
P0160	Concern with left-hand bank catalyst monitor sensor (HO2S 2/2).	Exhaust leak.Low exhaust temperature.	Inspect exhaust system, REFER to: <u>Exhaust System</u> (309-00 Exhaust System, Diagnosis and Testing).
P0420	Concern with right- hand bank catalytic converter system. (Efficiency below threshold)	 HO2 sensor disconnected. HO2 sensor to ECM wiring fault. HO2 sensor heater to ECM wiring fault. HO2 sensor heater failure. Upstream HO2 sensor failure. Downstream HO2 sensor failure. HO2 sensor failure. 	Refer to pinpoint tests for components listed. Visually inspect catalytic converters.

			Catalytic converter failure.	
P0430		Concern with left-hand bank catalytic converter system (Efficiency below threshold).	 HO2 sensor disconnected. HO2 sensor to ECM wiring fault. HO2 sensor heater to ECM wiring fault. HO2 sensor heater failure. Upstream HO2 sensor failure. Downstream HO2 sensor failure. HO2 sensor failure. Catalytic converter failure. 	Refer to pinpoint tests for components listed. Visuall inspect catalytic converters, REFER to: Exhaust System (309-00 Exhaust System Diagnosis and Testing).
P0101,		Concern with mass air flow (MAF) sensor.	 MAF sensor circuit(s). Blocked air filter. Air intake leak. Engine breather 	GO to Pinpoint Test M. Visually inspect components listed, REFER to: Intake Air Distribution and Filtering (303-12A Intake Air Distribution and Filtering - 2.5L NA V6 AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnos and Testing) / Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04 Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P0103,		Concern with mass air flow (MAF) sensor.	MAF sensor.MAF sensor circuit(s).	GO to Pinpoint Test <u>M.</u>
P0111		Concern with the intake air temperature (IAT) sensor.	Blocked air filter.Air intake leak.	GO to Pinpoint Test N. Visually inspect components listed. REFER to: Intake Air Distribution and Filtering (303-12A Intake Air Distribution and Filtering - 2.5L NA VAJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnos and Testing).
P0112,		Concern with the intake air temperature (IAT) sensor.	 Intake air temperature (IAT) sensor. Intake air temperature (IAT)sensor circuit. 	GO to Pinpoint Test <u>N.</u>
P0051,	P0052	Concern with the left- hand bank heated oxygen sensor (HO2S 2/1) heater.	HO2S 2/1.HO2S 2/1 circuit.Fuse 42.	GO to Pinpoint Test <u>O.</u>
P1606		Concern with ECM relay.	ECM.ECM relay.ECM relay circuit(s).Fuse 31.	GO to Pinpoint Test <u>P.</u>
P0105, P1107,	P1108	Concern with MAP sensor.	MAP sensor.MAP sensor circuits.	GO to Pinpoint Test <u>Q.</u>
	P0108	barometric (HAC) sensor.	the ECM.	GO to Pinpoint Test <u>Q.</u> INSTALL a new ECM, for additional information, refer to dealer technical support.
P0010,	P1384	Concern with VVT	VVT solenoid and	GO to Pinpoint Test R. REFER to: Variable Camshaft

	circuit, right-hand bank.	Oil flow.	Liming (VCT) Oil Control Solenoid (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Concern with VVT circuit, left-hand bank.	circuit. ◆ Oil flow.	GO to Pinpoint Test <u>S. REFER to: Variable Camshaft Timing (VCT) Oil Control Solenoid</u> (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
P1251, P1631, P1657, P1658	Concern with throttle motor relay.	Throttle motor relay. Throttle motor relay circuit.	GO to Pinpoint Test <u>T.</u> Check Fuse 18.
P1549	Concern with IMT Valve 1 circuit.	IMT valve. IMT valve circuit.	GO to Pinpoint Test <u>U.</u>
P1532	Concern with IMT Valve 2 circuit.	IMT valve. IMT valve circuit.	GO to Pinpoint Test <u>V.</u>
P1582	"Flight Recorder" data stored.	This code does not indicate a failure of a component or system.	GO to Pinpoint Test <u>W.</u>
P1240, P1241, P1242	Concern with sensor power supply.	 ECM. Power supply circuits. Sensors within the circuit. 	GO to Pinpoint Test <u>X.</u>
P1243	Concern with sensor ground circuit.	 ECM. Sensor ground circuits. Sensors within the circuit. 	GO to Pinpoint Test <u>Y.</u>
	Concern with accelerator pedal position sensor; Track 1.	APP sensor.APP sensor circuits.	GO to Pinpoint Test <u>Z.</u>
P1215, P1216, P1344	Concern with accelerator pedal position sensor; Track 3.	APP sensor.APP sensor circuits.	GO to Pinpoint Test <u>AA.</u>
P0480	Concern with radiator cooling fan module drive.	 Cooling fan module. Cooling fan module circuits. 	GO to Pinpoint Test <u>AB.</u>
P0646, P0647	Concern with air conditioning clutch relay drive.	 Air conditioning clutch relay. Air conditioning clutch relay circuits. 	GO to Pinpoint Test <u>AC.</u>
P1516, P1517	Concern with P/N switch starting/driving malfunctions.	 CJFB. Ignition relay. TR sensor. Inertia switch and circuits. 	GO to Pinpoint Test <u>AD.</u>
P1245, P1246	Concern with engine crank signal, high/low voltage.	 Starter relay. ECM. Ignition switch. Associated circuits. 	GO to Pinpoint Test <u>AE.</u>
P1260	Security input malfunction.	GEM.Ignition key.PATS circuits.CAN network.	Reprogramme key, check CAN network, REFER to: <u>Communications Network - VIN Range:</u> <u>E96603->J28492</u> (418-00 Module Communications Network, Diagnosis and Testing).
		Air intake	

P0506	Idle RPM lower 45 - 5 - 6 expected.	restriction. • Accessory drive overload. (defective/seized component). • Throttle valve stuck closed. • Throttle body failure.	REFER to: '
P0507	Idle RPM higher than expected.	 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 of ground. RESUME switch failure (stuck ON). 	REFER to: Speed Control - 2.5L NA V6 - AJV6/3.0 V6 - AJ27 (310-03 Speed Control, Diagnosis and Testing).
P0603, P1611, P1633, P1634, P1656	powertrain control module (ECM).	ECM.	INSTALL a new ECM. For additional information, r to dealer technical support.
P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206	Concern with fuel system too lean/rich.	 Fuel injector(s). Fuel delivery fault. 	REFER to: Fuel Charging and Controls - 2.5L NA \AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J2 (303-04A Fuel Charging and Controls - 2.5L NA V AJV6/2.0L NA V6 - AJ27, Diagrand Testing).
P0300, P0301, P0302, P0303, P0304, P0305, P0306, P1313, P1314, P1316	Concern with ignition system/misfire monitoring.	 Ignition system. Ignition system wiring harness. 	REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0 V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnand Testing).
	Concern with ignition primary circuits.	 Ignition modules. Ignition module circuits. 	REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0 V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagrand Testing).
P0441, P0442,	Concern with evaporative emissions system.		REFER to: Intake Air Distribution and Filtering (30 12A Intake Air Distribution and Filtering - 2.5L NA AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagrand Testing).
P0460	Concern with fuel level sensors.		REFER to: Fuel Charging and Controls - 2.5L NA \ AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J2 (303-04A Fuel Charging and Controls - 2.5L NA V

		Instrument cluster.	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P0560	ECM battery power supply voltage malfunction. (This DTC could be set due to a fuel injection pressure sensor fault. If P0193 is also set, rectify P0193 first).	ECM battery power supply circuit open circuit or high resistance.	Repair the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
P0565, P0566, P0567, P0568, P0569, P0570, P0831, P0832, P0834, P0835, P1571	Concern with vehicle speed control.	 Switchpack. Switchpack circuits. Clutch cancel switch. Clutch safety switch. Brake on/off switch. 	REFER to: Speed Control - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (310-03 Speed Control, Diagnosis and Testing).
	Concern with the starter relay circuit.	Starter relay.Starter relay drive circuit.	REFER to: Starting System - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-06 Starting System, Diagnosis and Testing).
P1224, P1229, P1250, P1254	Concern with throttle body.	 Throttle motor. Throttle motor relay. Throttle motor relay circuits. Throttle body. Throttle position sensor. Throttle position sensor circuits. Throttle return spring. Limp-home spring. 	REFER to: Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P1234, P1236, P1338	Concern with fuel pump commands.	module. • Fuel pump control	REFER to: Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P1244, P1629, P1632, P1146	Concern with charging system.	Charging system.Charging system wiring harness.	REFER to: Charging System - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (414-00 Charging System - General Information, Diagnosis and Testing).
P0191, P0192, P0193	Concern with fuel pressure sensor.	 Fuel pressure sensor circuit(s). Fuel pressure sensor. Fuel system leak/blockage. 	REFER to: Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P0121, P0122, P0123, P0222, P0223	Concern with throttle position (TP) sensor.	TP sensor.TP sensor circuit(s).	REFER to: Throttle Position (TP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
P1000	System check not complete since last memory clear.	OBD errors not cleared by diagnosis.	Carry out comprehensive component monitor drive cycle. Refer to the DTC section of JTIS, accessed by the icon on the opening page.
P1111	System check complete since last memory clear.	This code does not indicate a failure of a component or system.	No action necessary.
P1367	Concern with right- hand bank ignition amplifier.	 Ignition module. Ignition module circuits. 	REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing)

	Concern with left-hand bank ignition amplifier.	 Ignition module circuits. 	REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
	Concern with TP sensor amplifier circuit.	1	INSTALL a new ECM. For additional information, refer to, dealer technical support.
P1609	CPU to CPU communications.	1	INSTALL a new ECM. For additional information, refer to, dealer technical support.
	network.	and circuits.	REFER to: Communications Network - VIN Range: E96603->J28492 (418-00 Module Communications Network, Diagnosis and Testing).

PINPOINT T	EST A : DTC P0116, P0117, P0118, P0125. ECT SENSOR		
TEST	DETAILS/RESULTS/ACTIONS		
CONDITIONS			
A1: CHECK TI	HE ENGINE COOLANT TEMPERATURE (ECT) SENSOR SIGNAL WIRE FOR OPEN CIRCUIT		
	1 Turn the ignition switch to the OFF position.		
	2 Disconnect the ECT sensor electrical connector EN18.		
	3 Disconnect the ECM electrical connector, EN16.		
	4 Measure the resistance between the ECT sensor electrical connector EN18, pin 2 (UY) and the ECM electrical connector EN16, pin 70 (UY).		
	Is the resistance less than 5 ohms?		
	Yes		
	GO to A2.		
	No REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST		
	the system for normal operation.		
A2: CHECK TI	HE ECT SENSOR SIGNAL WIRE FOR A SHORT TO GROUND		
	1 Measure the resistance between the ECT sensor electrical connector EN18, pin 2 (UY) and EN16,		
	pin 19.		
	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 CO to A3		
A 2. CHECK TI	GO to A3. HE ECT SENSOR GROUND CIRCUIT		
	ન⊑ ECT SENSOR GROUND CIRCUIT -1L∟ Measure the⊲esistance-between the ECJ sensoryelectrical connectop-EN18; pin 1 (BG) and EN16,		
IIIVSI	તામામ જાણકારાયા હવા હરાકારા કાર્યા હતા. જે કાર્યા કાર્યા કાર્યા કાર્યા હતા. જો માના હાલ જો કાર્યા હતા. જો કાર્યો pin 19.		
	Is the resistance less than 5 ohms?		
	Yes		
	GO to A4.		
	No		
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST		
	the system for normal operation.		
A4: CHECK TI	HE ECT SENSOR GROUND CIRCUIT FOR A SHORT TO BATTERY POSITIVE		
	1 Turn the ignition switch to the ON position.		
	2 Measure the voltage between the ECT electrical connector EN18, pin 1 (BG) and GROUND.		
	Is the voltage greater than 1 volt?		
	Yes		
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the		
	DTCs. TEST the system for normal operation. No		
	GO to A5.		
A5: CHECK TI	HE ECT SENSOR CIRCUIT FOR A SHORT TO BATTERY POSITIVE		
	1 Connect the ECM electrical connector EN16.		
	2 Turn the ignition switch to the ON position.		
	3 Measure the voltage between the ECT sensor electrical connector EN18, pin 2 (UY) and GROUND.		
	Is the voltage greater than 5 volts?		
	Yes		
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the		
	DTCs. TEST the system for normal operation.		
	No		
-	Instruct a new eC r sensor ocean the prostrest the system for normal operation in the pTo is		

repeated, INSTALL a new ECM.

REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).

Before replacing an ECM, contact dealer technical support.

PINPOINT 1	TEST B : DTC P0335, P0336, P1245, P1246. CRANKSHAFT POSITION (CKP) SENSOR
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
B1: CHECK T	HE 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 B2.
	No
	INSTALL the CKP sensor correctly.
	REFER to: <u>Crankshaft Position (CKP) Sensor</u> (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
D2. CHECK T	Reconnect the sensor. CLEAR the DTCs. TEST the system for normal operation. HE CKP SENSOR FOR DEBRIS
BZ: CHECK I	1 Remove the CKP sensor and inspect for debris.
	Is the CKP sensor free of debris?
	Yes
	GO to B3.
	No The second se
	CLEAN the sensor and wheel. INSTALL the sensor.
	REFER to: <u>Crankshaft Position (CKP) Sensor</u> (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Reconnect the sensor. CLEAR the DTCs. TEST the system for normal operation.
B3: CHECK T	HE CKP SENSOR GROUND WIRE FOR OPEN CIRCUIT
	1 Disconnect the ECM electrical connector EN16.
	2 Disconnect the CKP sensor electrical connector EN12.
	3 Measure the resistance between the CKP sensor electrical connector EN12, pin 1 (Y) and the ECM
	electrical connector EN16, pin 37 (Y).
	Is the resistance less than 5 ohms?
	Yes
	GO to B4.
	REPAIR the circuit. For additional information, refer to the wiring diagrams. Reconnect all
	connectors. CLEAR the DTCs. TEST the system for normal operation.
B4: CHECK T	HE CKP SENSOR SIGNAL WIRE FOR OPEN CIRCUIT
	1 Measure the resistance between the CKP sensor electrical connector EN12, pin 2 (P) and the ECM
	electrical connector EN16, pin 36 (P).
	Is the resistance less than 5 ohms?
	Yes CO to BE
	GO to B5.
	REPAIR the circuit. For additional information, refer to the wiring diagrams. Reconnect all
	connectors. CLEAR the DTCs. TEST the system for normal operation.
B5: CHECK T	HE CKP SENSOR GROUND WIRE FOR A SHORT TO GROUND
	1 Measure the resistance between the CKP sensor electrical connector EN12 pin 1 (Y) and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. Reconnect
	all connectors. CLEAR the DTCs. TEST the system for normal operation.
	GO to B6.
B6: CHECK T	HE CKP SENSOR SIGNAL WIRE FOR A SHORT TO GROUND
	1 Measure the resistance between the CKP sensor electrical connector EN12 pin 2 (P) and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. Reconnect
	all connectors. CLEAR the DTCs. TEST the system for normal operation.
	GO to B7.
	1
B7: CHECK T	HE CKP SENISOR GROUND, WIRE FAR A SHORT TO RATTERY

	1 Turn the ignition switch to the UN position.
	2 Measure the voltage between the CKP sensor electrical connector EN12 pin 1 (Y) and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. Reconnect all
	connectors. CLEAR the DTCs. TEST the system for normal operation. No
	GO to B8.
B8: CHECK TH	HE CKP SENSOR SIGNAL WIRE FOR A SHORT TO BATTERY
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the CKP sensor electrical connector EN12 pin 2 (P) and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. Reconnect all connectors. CLEAR the DTCs. TEST the system for normal operation.
	No '
	INSTALL a new CKP sensor.
	REFER to: <u>Crankshaft Position (CKP) Sensor</u> (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Reconnect all connectors. CLEAR the DTCs. TEST the system for normal operation. If the concern persists INSTALL a new ECM.
	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.

	Defore replacing an Eem, contact dealer technical support.
PINPOINT	TEST C : DTC P0340, P0341: RIGHT-HAND BANK CAMSHAFT POSITION (CMP) SENSOR
TEST	DETAILS/RESULTS/ACTIONS
CONDITION	
	THE RIGHT-HAND BANK 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 C2.
	No No
	INSTALL the CMP sensor correctly.
	REFER to: Camshaft Position (CMP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTCs. TEST the system for normal operation.
C2: CHECK 1	THE RIGHT-HAND BANK 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 C3.
	CLEAN the sensor and wheel. INSTALL the sensor.
	REFER to: Camshaft Position (CMP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTCs. TEST the system for normal operation.
C3: CHECK 1	THE RIGHT-HAND BANK CMP SENSOR SIGNAL WIRE FOR OPEN CIRCUIT
ĺ	1 Disconnect the ECM electrical connector EN16.
	2 Disconnect the CMP sensor electrical connector EN43.
	3 Measure the resistance between the CMP sensor electrical connector EN43, pin 1 (O) and the ECM
	electrical connector EN16, pin 94 (O).
	Is the resistance less than 5 ohms?
	Yes
	<u>GO to C4</u> .
	No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
	the system for normal operation.
C4: CHECK 1	THE RIGHT-HAND BANK CMP GROUND WIRE FOR OPEN CIRCUIT
	1 Measure the resistance between the CMP sensor electrical connector EN43, pin 2 (B) and the ECM
	electrical connector EN16, pin 95 (B).
	Is the resistance less than 5 ohms?
	Yes
	GO to C5.
	No

	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TE
CE. CHECK TH	the system for normal operation. HE RIGHT-HAND BANK CMP SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND
CS: CHECK IF	Measure the resistance between the CMP sensor electrical connector EN43, pin 1 (0) 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 C6.
C6: CHECK TH	HE RIGHT-HAND BANK CMP SENSOR GROUND CIRCUIT FOR A SHORT TO GROUND
OO. OHEOR H	1 Measure the resistance between the CMP sensor electrical connector EN43, pin 2 (B) 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 C7.
C7: CHECK TH	HE RIGHT-HAND BANK CMP SENSOR SIGNAL CIRCUIT FOR A SHORT TO BATTERY
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the CMP sensor electrical connector EN43, pin 1 (O) and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
	No
	<u>GO to C8</u> .
C8: CHECK TH	HE RIGHT-HAND BANK CMP SENSOR GROUND CIRCUIT FOR A SHORT TO BATTERY
	1 Turn the ignition switch to the ON position.
	Measure the voltage between the CMP sensor electrical connector EN43, pin 2 (B) and GROUND.
	Is the voltage greater than 1 volt?
	Yes REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the
	DTCs. TEST the system for normal operation.
	No
	INSTALL a new CMP sensor.
	REFER to: Camshaft Position (CMP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new
	ECM. PETER to: Engine Central Medule (ECM) (202-14B Floatronic Engine Centrals - 2-21 Duretora TD)
	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TD((110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.

PINPOINT T	EST D : DTC P1340, P1341: LEFT-HAND BANK CAMSHAFT POSITION (CMP) SENSOR
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
D1: CHECK TH	HE LEFT-HAND BANK 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
	<u>GO to D2</u> .
	No INCTAIL the CMD as made a source the
	INSTALL the CMP sensor correctly.
	REFER to: Camshaft Position (CMP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTCs. TEST the system for normal operation.
D2: CHECK TH	HE LEFT-HAND BANK 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 D3.
	No
1	CLEAN the sensor and wheel. INSTALL the sensor.

		REFER to: <u>Camshaft Position (CMP) Sensor</u> (303-14A Electronic Engine Controls - 2.5L NA V6 -
		AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
		CLEAR the DTCs. TEST the system for normal operation.
D3: CHECK II	1	LEFT-HAND BANK CMP SENSOR SIGNAL WIRE FOR OPEN CIRCUIT
	1	Disconnect the ECM electrical connector EN16.
	2	Disconnect the CMP sensor electrical connector EN33.
	3	Measure the resistance between the CMP sensor electrical connector EN33, pin 1 (G) and the ECM electrical connector EN16, pin 68 (G).
	ls t	he resistance less than 5 ohms?
	Yes	
	No	GO to D4.
	INO	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
D4: CHECK T	HF I	LEFT-HAND BANK CMP GROUND WIRE FOR OPEN CIRCUIT
D4. GIIEGK II	1	Measure the resistance between the CMP sensor electrical connector EN33, pin 2 (N) and the ECM
	•	electrical connector EN16, pin 69 (N).
	ls t	he resistance less than 5 ohms?
	Yes	s
	L.	GO to D5.
	No	
	1	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
D5: CHECK T	HF I	LEFT-HAND BANK CMP SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND
Bo. Grizok II	1	Measure the resistance between the CMP sensor electrical connector EN33, pin 1 (G) and
		GROUND.
		the resistance less than 10,000 ohms?
	Yes	s REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the
		DTCs. TEST the system for normal operation.
	No	Dies. 1231 the system for normal operation.
		<u>GO to D6</u> .
D6: CHECK T	HE I	LEFT-HAND BANK CMP SENSOR GROUND CIRCUIT FOR A SHORT TO GROUND
	1	Disconnect the ECM electrical connector, EN16.
	2	Measure the resistance between the CMP sensor electrical connector EN33, pin 2 (N) and GROUND.
	lc t	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	00 to D7
D7. CHECK T		GO to D7.
D7: CHECK I	1	LEFT-HAND BANK CMP SENSOR SIGNAL CIRCUIT FOR A SHORT TO BATTERY
<u> </u>	1	Turn the ignition switch to the ON position. Measure the voltage between the CMP sensor electrical connector EN33, pin 1 (G) and GROUND.
	2 Is t	the voltage greater than 1 volt?
	Yes	· ·
	1	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the
	 N I =	DTCs. TEST the system for normal operation.
1	No	GO to D8.
D8. CHECK TO	HE I	LEFT-HAND BANK CMP SENSOR GROUND CIRCUIT FOR A SHORT TO BATTERY
DO. OFFICIR T	1	Turn the ignition switch to the ON position.
	2	Measure the voltage between the CMP sensor electrical connector EN33, pin 2 (N) and GROUND.
	_	the voltage greater than 1 volt?
	Yes	
		REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the
	<u>.</u> .	DTCs. TEST the system for normal operation.
	No	
1	1	INSTALL a new CMP sensor. REFER to: Camshaft Position (CMP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
		AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
I	1	CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new
1	1	ECM.
I	1	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
1	1	(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
1	1	Before replacing an ECM, contact dealer technical support.

PINPOINT T	EST E : DTC P0031, P0032. RIGHT-HAND BANK HO2S HEATER
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	•
E1: CHECK TI	HE POWER SUPPLY CIRCUIT TO THE RIGHT-HAND BANK HO2S HEATER
	1 Disconnect HO2S sensor electrical connector, EN37.
	2 Turn the ignition switch to the ON position.
	Measure the voltage between the HO2S electrical connector EN37, pin 2 (WG) and GROUND.
	Is the voltage less than 10 volts? Yes
	GO to E5.
	No
	GO to E2.
E2: CHECK TI	HE GROUND CIRCUIT TO THE RIGHT-HAND BANK HO2S HEATER FOR OPEN CIRCUIT
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the ECM electrical connector EN16.
	3 Measure the resistance between the HO2S electrical connector EN37, pin 1 (RU) and the ECM electrical connector EN16, pin 1 and pin 2 (RU).
	Is the resistance of each wire less than 5 ohms?
	Yes GO to E3.
	No DEDAID the circuit. For additional information, refer to the wiring diagrams. CLEAD the DTCs. TEST
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
E3: CHECK TI	HE RIGHT-HAND BANK HO2S GROUND CIRCUIT FOR SHORT TO GROUND
	1 Measure the resistance between the bank 1 HO2S electrical connector EN37, pin 1 (RU) 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 E4.
E4: CHECK TI	HE RIGHT-HAND BANK HO2S GROUND CIRCUIT FOR SHORT TO BATTERY
	1 Check for a voltage between the HO2S electrical connector EN37, pin 1 (RU) and GROUND.
	Is the voltage greater than 1 volt? Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the
	DTCs. TEST the system for normal operation. No
	INSTALL a new HO2S.
	REFER to: <u>Heated Oxygen Sensor (HO2S) RH</u> (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new
	ECM. REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
	(110kW/150PS) - Puma/2.0L Duratorg-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.
E5: CHECK FI	USE 38 OF THE ENGINE COMPARTMENT FUSE BOX
	1 Check the fuse.
	Is the fuse OK?
	Yes CO to F7
	GO to E7. No
	GO to E6.
E6: CHECK FU	USE 38 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND
	1 Measure the resistance between electrical connector JB34 pin 97 of the engine compartment fuse box and GROUND.
	Is the resistance less than 10,000 ohms?
	PEDALD short to ground between the engine compartment fuse her and the right hand bank HOSS.
	REPAIR short to ground between the engine compartment fuse box and the right-hand bank HO2S. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No INSTALL a new fuse. CLEAR the DTC. TEST the system for normal operation.
E7: CHECK TI	HE POWER SUPPLY TO FUSE 38 IN THE ENGINE COMPARTMENT FUSE BOX

	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between electrical connector JB34 pin 131 and GROUND.
	Is the voltage less than 10 volts?
	Yes
	Repair the circuit between the battery and the EMS relay. Test the relay, renew as necessary. CLEAR the DTC. TEST the system for normal operation.
	No
	Repair the circuit from the ECM control relay to the engine compartment fuse box. For additional information, refer to the wiring diagrams. GO to P1. CLEAR the DTC. TEST the system for normal operation.

		operation.
DINIDOLNITT	ECI	F: DTC P0181, P0182, P0183. FUEL TEMPERATURE SENSOR
i		DETAILS/RESULTS/ACTIONS
TEST CONDITIONS		DETAILS/RESULTS/ACTIONS
		INUITY OF THE FUEL TEMPERATURE SENSOR POWER SUPPLY CIRCUIT
drizdit dd	1	Turn the ignition switch to the OFF position.
	2	Disconnect the fuel temperature sensor electrical connector IJ8.
	3	Disconnect the ECM electrical connector EN16.
	4	Measure the resistance between the fuel temperature sensor electrical connector IJ8, pin 2 (WU)
	-	and the ECM electrical connector EN16, pin 50 (WU).
	ls t	he resistance less than 5 ohms?
	Yes	
	<u>.</u> .	GO to F2.
	No	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
		the system for normal operation.
F2: CHECK TH	IF F	FUEL TEMPERATURE SENSOR GROUND CIRCUIT
	1	Measure the resistance between the fuel temperature sensor electrical connector IJ8 pin 1 (NU)
	Ĺ	and GROUND.
	ls t	he resistance less than 5 ohms?
	Yes	
	<u>.</u> .	GO to F3.
	No	DEDAID the circuit for additional information refer to the wiring diagrams. CLEAD the DTCs. TEST
		REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
E3: CHECK TH	<u></u>	FUEL TEMPERATURE SENSOR CIRCUIT FOR A SHORT TO GROUND
0.01.201.11	1	Measure the resistance between the fuel temperature sensor electrical connector IJ8 pin 2 (WU)
	•	and GROUND.
	ls t	he resistance less than 10,000 ohms?
	Yes	
		REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the
	No	DTCs. TEST the system for normal operation.
	ועט	GO to F4.
F4: CHECK TH	IE F	FUEL TEMPERATURE SENSOR GROUND CIRCUIT FOR A SHORT TO BATTERY
	1	Disconnect the FTP sensor electrical connector, FT1.
	2	Turn the ignition switch to the ON position.
	3	Check for a voltage between FT1, pin 3 (BG) and GROUND.
		he voltage greater than 1 volt?
	Yes	
		REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the
	<u>.</u>	DTCs. TEST the system for normal operation.
	No	CO to E5
ES. CHECK TH	<u> </u>	GO to F5. FUEL TEMPERATURE SENSOR CIRCUIT FOR A SHORT TO BATTERY
J. CHECK IF	1	Connect the ECM electrical connector EN16.
	2	Turn the ignition switch to the ON position.
	3	Measure the voltage between the fuel temperature sensor electrical connector IJ8, pin 2 (WU) and
		GROUND.
	ls t	he voltage greater than 10 volts?
	Yes	S
		REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the
	N	DTCs. TEST the system for normal operation.
	No	INSTALL a new fuel temperature sensor.
		·
1		REFER to: Fuel Temperature Sensor - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-14A Electronic

Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).

CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM.

REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi

REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).

Before replacing an ECM, contact dealer technical support.

PINPOINT T	EST G: DTC P0327, P0328, P0332, P0333, P1648. KNOCK SENSOR (KS)
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
G1: CHECK TI	HE KS SIGNAL WIRE FOR OPEN CIRCUIT
	Turn the ignition switch to the OFF position.Disconnect the KS sensor electrical connector EN23.
	Disconnect the KS sensor electrical connector EN23.Disconnect the ECM electrical connector EN16.
	4 Measure the resistance between EN23, pin 1 (N) and EN16, pin 98 (N). Is the resistance less than 5 ohms?
	Yes
	GO to G2.
	No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
C2. CHECK TI	the system for normal operation. HE KS SIGNAL WIRE FOR SHORT TO BATTERY
GZ: CHECK II	1 Turn the ignition switch to the ON position.
	2 Check for a voltage between EN23, pin 1 (N) and GROUND.
	Is a voltage present?
	Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the
	DTCs. TEST the system for normal operation.
	No CO to C3
G3: CHECK TI	GO to G3. HE KS SIGNAL WIRE FOR A SHORT TO GROUND
G3. CHECK II	1 Measure the resistance between the KS sensor electrical connector EN23, pin 1 (N) 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 INSTALL a new KS.
	REFER to: Knock Sensor (KS) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
	(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
	CLEAR DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM.
	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
	(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
CA. CHECK TI	Before replacing an ECM, contact dealer technical support. HE KS GROUND CIRCUIT FOR OPEN CIRCUIT
G4: CHECK II	1 Measure the resistance between the KS electrical connector EN23 pin 2 (W) and GROUND.
	Is the resistance greater than 5 ohms?
	Yes
	REPAIR the circuit between EN23, pin 2 (W) and GROUND. CLEAR the DTCs. TEST the system for
	normal operation.
	(This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams)
	No
OF OUTOK T	GO to G5.
G5: CHECK II	HE KS GROUND LEAD FOR OPEN CIRCUIT 1 Disconnect the KS electrical connector, EN23.
	2 Disconnect the ECM electrical connector, EN16.
	3 Measure the resistance between EN23, pin2 (W) and EN16, pin 100 (BG).
	Is the resistance less than 5 ohms?
	Yes .
	No <u>GO to G6</u>
	REPAIR the circuit between EN23, pin2 (W) and EN16, pin 100 (BG). For additional information,
	refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
C (CLIECK TI	HE VS CROUND LEAD FOR SHORT TO PATTERY

1 Connect the KS sensor electrical connector EN23.

G6: CHECK THE KS GROUND LEAD FOR SHORT TO BATTERY

 T .
2 Connect the ECM electrical connector EN16.
3 Turn the ignition switch to the ON position.
4 Check for a voltage between EN23, pin 2 (W) and GROUND.
Is the voltage greater than 1 volt?
Yes
REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the
DTCs. TEST the system for normal operation.
No
INSTALL a new KS.
REFER to: Knock Sensor (KS) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new
ECM.
REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
Before replacing an ECM, contact dealer technical support.

PINPOINT T	EST H: DTC P0196, P0197, P0198. OIL TEMPERATURE SENSOR
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
	HE OIL TEMPERATURE SENSOR SIGNAL WIRE FOR OPEN CIRCUIT
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the oil temperature sensor electrical connector EN25.
	3 Disconnect the ECM electrical connector EN16.
	4 Measure the resistance between the oil temperature sensor electrical connector EN25, pin 1 (Y)
	and the ECM electrical connector EN16, pin 78 (Y).
	Is the resistance less than 5 ohms?
	Yes
	GO to H2.
	No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
LIO OLIFOK TI	the system for normal operation.
HZ: CHECK II	HE OIL TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN CIRCUIT
	1 Measure the resistance between the oil temperature sensor electrical connector EN25, pin 2 (BG) and GROUND.
	Is the resistance less than 5 ohms?
	Yes
	GO to H3.
	No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
	the system for normal operation.
H3: CHECK TI	HE OIL TEMPERATURE SENSOR GROUND CIRCUIT FOR SHORT TO BATTERY
	1 Connect ECM electrical connector, EN16.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between the oil temperature sensor electrical connector EN25, pin 2 (BG) and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs.
	TEST the system for normal operation.
	No
	GO to H4.
H4: CHECK TI	HE OIL TEMPERATURE SENSOR CIRCUIT FOR A SHORT TO GROUND
	1 Turn the ignition switch to the OFF position.
	2 Disconnect ECM electrical connector, EN16.
	3 Measure the resistance between the oil temperature sensor electrical connector EN25, pin 1 (Y)
	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 CO to UE
	GO to H5.
H5: CHECK TI	HE OIL TEMPERATURE SENSOR CIRCUIT FOR A SHORT TO BATTERY
	1 Connect ECM electrical connector, EN16.
1	2 Turn the ignition quitch to the ON position

Turn the ignition switch to the ON position.

3 Measure the voltage between the oil temperature sensor electrical connector EN25, pin 1 (Y) and GROUND.
Is the voltage greater than 10 volts?
Yes
REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
No
INSTALL a new oil temperature sensor.
REFER to: Oil Temperature Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new
ECM.
REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
Before replacing an ECM, contact dealer technical support.

	Before replacing an ECM, contact dealer technical support.
DINDOINT	EST L. DTC DO121 DO122 DO122 D1646 DICHT HAND BANK HO2S
TEST	EST I: DTC P0131, P0132, P0133, P1646. RIGHT-HAND BANK H02S DETAILS/RESULTS/ACTIONS
CONDITIONS	
I 1: CHECK TH	E CONSTANT CIRCUIT OF THE RIGHT-HAND BANK HO2S FOR OPEN CIRCUIT
	1 Disconnect the HO2S electrical connector EN37.
	2 Disconnect the ECM electrical connector, EN16.
	3 Measure the resistance between EN16, pin 84 (P) and EN37, pin 4 (P).
	Is the resistance less than 5 ohms?
	Yes
	GO to 12. No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
	the system for normal operation.
12: CHECK TH	E CONSTANT CIRCUIT OF THE RIGHT-HAND BANK HO2S FOR SHORT TO GROUND
	1 Measure the resistance between EN16, pin 84 (P) 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 DTCs.
	TEST the system for normal operation.
	No CO to 12
I 2. CHECK TH	GO to 13. IE CONSTANT CIRCUIT OF THE RIGHT-HAND BANK HO2S FOR SHORT TO BATTERY
IS: CHECK IF	1 Connect the ECM electrical connector EN16.
	Turn the ignition switch to the ON position.
	Measure the voltage between EN37, pin 4 (P) and GROUND.
	Is the voltage greater than 5 volts?
	Yes
	REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs.
	TEST the system for normal operation.
	No
	GO to 14.
14: CHECK TH	E VARIABLE CIRCUIT OF THE RIGHT-HAND BANK HO2S FOR OPEN CIRCUIT
	1 Disconnect the ECM electrical connector, EN16.
	2 Measure the resistance between EN16, pin 83 (Y) and EN37, pin 3 (Y).
	Is the resistance less than 5 ohms?
	Yes
	GO to 15. No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
	the system for normal operation.
15: CHECK TH	IE VARIABLE CIRCUIT OF THE RIGHT-HAND BANK HO2S FOR SHORT TO GROUND
	1 Measure the resistance between EN16, pin 83 (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 DTCs.
	TEST the system for normal operation.
	No CO to 16
I 6. CHECK TH	GO to 16. IE VARIABLE CIRCUIT OF THE RIGHT-HAND BANK HO2S FOR SHORT TO BATTERY
I O. CITECK IF	L VARIABLE CIRCUIT OF THE RIGHT-HAND BANK HOZ3 FOR SHOKE TO BATTERY
	1 Connect the ECM electrical connector EN16.

2 Turn the ignition switch to the ON position.
3 Measure the voltage between EN37, pin 3 (Y) and GROUND.
Is the voltage greater than 5 volts?
Yes
REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs.
TEST the system for normal operation.
No
INSTALL a new HO2S.
REFER to: <u>Heated Oxygen Sensor (HO2S) RH</u> (303-14A Electronic Engine Controls - 2.5L NA V6 -
AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new
ECM.
REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
Before replacing an ECM, contact dealer technical support.

	Before replacing an ECM, contact dealer technical support.
DINDOINT T	ECT L DTO DOCCO DOCCO DOCCO DOCCO DOCCO DIQUIT HAND DANK CATALVET
MONITOR	EST J: DTC P0037, P0038, P0137, P0138, P0140. RIGHT-HAND BANK CATALYST
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
	HE POWER SUPPLY CIRCUIT TO THE RIGHT-HAND BANK CATALYST MONITOR HEATER
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the catalyst monitor sensor electrical connector EN14.
	3 Turn the ignition switch to the ON position.
	4 Measure the voltage between the catalyst monitor sensor electrical connector EN14, pin 2 (WG) and GROUND.
	Is the voltage less than 10 volts?
	Yes
	GO to J6. No
	GO to J2.
J2: CHECK CC	DNTINUITY OF THE RIGHT-HAND BANK CATALYST MONITOR SENSOR GROUND CIRCUIT
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the ECM electrical connector EN16.
	3 Measure the resistance between the catalyst monitor sensor electrical connector EN14, pin 3 (W) and the ECM electrical connector EN16, pin 130.
	Is the resistance less than 5 ohms?
	Yes
	GO to J3.
	No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
13. CHECK CC	DNTINUITY OF THE POWER SUPPLY WIRE TO THE RIGHT-HAND BANK CATALYST MONITOR
SENSOR	WITHOUT OF THE FOWER COLLET WINE TO THE RIGHT TIMES BRINK ON THE TOT MORNING
	1 Measure the resistance between the RH bank catalyst monitor sensor electrical connector EN14, pin 4 (N) and the ECM electrical connector EN16, pin 128 (N).
	Is the resistance less than 5 ohms?
	Yes
	<u>GO to J4</u> .
	No REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
	the system for normal operation.
J4: CHECK TH	HE RIGHT-HAND BANK CATALYST MONITOR SENSOR POWER SUPPLY WIRE FOR A SHORT TO
GROUND	
	1 Measure the resistance between the catalyst monitor sensor electrical connector EN14, pin 4 (N) 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 Contraction of the Contractio
 	GO to J5.
J5: CHECK TH BATTERY	HE RIGHT-HAND BANK CATALYST MONITOR SENSOR POWER SUPPLY WIRE FOR A SHORT TO
	1 Measure the voltage between the catalyst monitor sensor electrical connector EN14, pin 4 (N) and

GROUND.

Is the voltage greater than 1 volt? REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation. No INSTALL a new RH bank catalyst monitor sensor. For additional information, REFER to: Catalyst Monitor Sensor RH (303-14A Electronic Engine Controls - 2.5L NA V6 -AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. For additional information, REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Before replacing an ECM, contact dealer technical support. J6: CHECK THE RIGHT-HAND BANK CATALYST MONITOR SENSOR POWER SUPPLY CIRCUIT Measure the voltage between the catalyst monitor sensor electrical connector EN14 pin 2 (WG) and GROUND. Is the voltage less than 10 volts? Yes GO to J8. No GO to J7 J7: CHECK CONTINUITY OF THE RIGHT-HAND BANK CATALYST MONITOR SENSOR HEATER GROUND CIRCUIT Turn the ignition switch to the OFF position. 2 Disconnect the ECM electrical connector EN16. Measure the resistance between the catalyst monitor sensor electrical connector EN14, pin 1 (U) and the ECM electrical connector EN16, pin 92 (U). Is the resistance less than 5 ohms? Yes INSTALL a new ECM. For additional information, REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorg-TDCi, Removal and Installation). Before replacing a ECM, contact Dealer technical support. No REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation. J8: CHECK FUSE 38 OF THE ENGINE COMPARTMENT FUSE BOX Check the fuse. Is the fuse OK? Yes GO to J10. No GO to J9. J9: CHECK FUSE 38 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND Measure the resistance between electrical connector JB34, pin 97 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the right-hand bank HO2S. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system for normal operation. J10: CHECK THE POWER SUPPLY TO FUSE 38 IN THE ENGINE COMPARTMENT FUSE BOX Measure the voltage between fuse 38 electrical connector JB34 pin 97 and GROUND. Is the voltage less than 10 volts? Yes Repair the circuit from the ECM control relay to the engine compartment fuse box. CLEAR the DTC. TEST the system for normal operation. No Repair the circuit between the engine compartment fuse box and the HO2S. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. PINIPOINT TEST K · PO151 PO152 PO153 P1647 I FET-HAND BANK HO2S

FINECTIAL	E31 K. F0151, F0152, F0153, F1047. LEFT-HAIND BAINK H025
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
K1: CHECK TH	HE CONSTANT CIRCUIT OF THE LEFT-HAND BANK HO2S FOR OPEN CIRCUIT
	[

ı	1	Disconnect the HO2S electrical connector EN32.
	2	Disconnect the ECM electrical connector EN16.
	3	Measure the resistance between EN16, pin 108 (P) and EN32, pin 4 (P)
	ls t	the resistance less than 5 ohms?
	Yes	S
	L.	GO to K2.
	No	
	1	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
KO. CLIECK T		the system for normal operation. CONSTANT CIRCUIT OF THE LEFT-HAND BANK HO2S FOR SHORT TO GROUND
KZ: CHECK I	1	Measure the resistance between EN16, pin 108 (P) and GROUND.
	+-	the resistance less than 10,000 ohms?
	Yes	·
	. •.	REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs.
	1	TEST the system for normal operation.
	No	· · · · · · · · · · · · · · · · · · ·
		GO to K3.
K3: CHECK T	HE (CONSTANT CIRCUIT OF THE LEFT-HAND BANK HO2S FOR SHORT TO BATTERY
	1	Connect the ECM electrical connector EN16.
	2	Turn the ignition switch to the ON position.
	3	Measure the voltage between EN32, pin 4 (P) and GROUND.
		the voltage greater than 5 volts?
	Yes	
	1	REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
	No	· · · · · · · · · · · · · · · · · · ·
		GO to K4.
K4: CHECK T	HE \	VARIABLE CIRCUIT OF THE LEFT-HAND BANK HO2S FOR OPEN CIRCUIT
	1	Disconnect the HO2S electrical connector EN32.
	2	Disconnect the ECM electrical connector EN16.
	3	Measure the resistance between EN16, pin 107 (Y) and EN32, pin 3 (Y)
	ls t	the resistance less than 5 ohms?
	Yes	S
	1	GO to K5.
	No	
	1	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
K5: CHECK T	HF \	VARIABLE CIRCUIT OF THE LEFT-HAND BANK HO2S FOR SHORT TO GROUND
KS. CHECK I	1	Measure the resistance between EN16, pin 107 (Y) and GROUND.
	_	the resistance less than 10,000 ohms?
	Yes	
	1	REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs.
	1	TEST the system for normal operation.
	No	
	<u> </u>	GO to K6.
K6: CHECK T		VARIABLE CIRCUIT OF THE LEFT-HAND BANK HO2S FOR SHORT TO BATTERY
	1	Connect the ECM electrical connector EN16.
	2	Turn the ignition switch to the ON position.
	3	Measure the voltage between EN32 pin 3 (Y) and GROUND.
		the voltage greater than 5 volts?
	Yes	s REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs.
	1	TEST the system for normal operation.
	No	·
		INSTALL a new left-hand HO2S.
		REFER to: <u>Heated Oxygen Sensor (HO2S) LH</u> (303-14A Electronic Engine Controls - 2.5L NA V6 -
		AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
		CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new
		ECM. REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
		(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
		Before replacing an ECM, contact dealer technical support.
PINPOINT T	FS	T L : DTC P0057, P0058, P0157, P0158, P0160. LEFT-HAND BANK CATALYST

EN9. ENSOR GROUND CIRCUIT electrical connector EN9 pin 3 (W)
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additional information,
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stallation).
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Engine Centrols 2.21 Duraters Th
Engine Controls - 2.2L Duratorq-TD nstallation).
nstallation).
SUPPLY CIRCUIT
ectrical connector EN9 pin 2 (WR) an

	1 Turn the ignition switch to the OFF position.
	2 Disconnect the ECM electrical connector EN16.
	3 Measure the resistance between the catalyst monitor sensor electrical connector EN9 pin 1 (UY)
	and the ECM electrical connector EN16 pin 93 (UY).
	Is the resistance less than 5 ohms?
	Yes
	INSTALL a new ECM. For additional information,
	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDC
	(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.
	No DEDAUGH I I I E LIVI LI C LI
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
	the system for normal operation.
L8: CHECK	FUSE 42 OF THE ENGINE COMPARTMENT FUSE BOX
	1 Check the fuse.
	Is the fuse OK?
	Yes
	GO to L10.
	No OO L LO
	GO to L9.
L9: CHECK	FUSE 42 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND
	1 Measure the resistance between electrical connector JB34 pin 105 of the engine compartment fuse
	box and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR short to ground between the engine compartment fuse box and the left-hand bank HO2S.
	For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal
	operation.
	No
	INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system for normal operation.
LAO. CLIE	,
LTO: CHEC	K THE POWER SUPPLY TO FUSE 42 IN THE ENGINE COMPARTMENT FUSE BOX
	1 Measure the voltage between Fuse 42 electrical connector JB34 pin 105 and GROUND.
	Is the voltage less than 10 volts?
	Yes
	Repair the circuit from the ECM control relay to the engine compartment fuse box. For additional
	information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
í	No
l	Denote the classification of the control of the Con
	Repair the circuit between the engine compartment fuse box and the HO2S. For additional information, refer to wiring diagrams.

PINPOINT T	EST M : DTC P0101, P0102, P0103, P1104. MASS AIR FLOW SENSOR (MAF)
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
M1: CHECK TI	HE MAF SENSOR POWER SUPPLY
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the MAF sensor electrical connector EN6.
	3 Turn the ignition switch to the ON position.
	4 Measure the voltage between the MAF sensor electrical connector EN6 pin 1 (GU) and GROUND.
	Is the voltage less than 10 volts?
	Yes
	GO to M5.
	No CO to M2
MAG. OLIFOX O	GO to M2.
M2: CHECK C	ONTINUITY OF THE MAF SENSOR GROUND CIRCUIT
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the ECM electrical connector EN16.
	Measure the resistance between the MAF sensor electrical connector EN6 pin 3 (GW) and the ECM electrical connector EN16 pin 44 (GW).
	Is the resistance less than 5 ohms?
	Yes
	GO to M3.
	No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation

	CK CONTINUITY OF THE MAF SENSOR GROUND CIRCUIT
	1 Measure the resistance between the MAF sensor electrical connector EN6 pin 2 (BW) and the ECN electrical connector EN16 pin 45 and pin 46 (BW).
	Is the resistance less than 5 ohms?
	Yes
	GO to M4.
	No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TES
	the system for normal operation.
//4: CHEC	CK THE MAF SENSOR CIRCUIT FOR SHORT TO GROUND
	1 Measure the resistance between the MAF sensor electrical connector EN6 pin 3 (GW) and GROUN
	Is the resistance greater than 10,000 ohms? Yes
	INSTALL a new MAF sensor. For additional information,
	REFER to: Mass Air Flow (MAF) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM
	For additional information,
	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TD0
	(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.
	No
	REPAIR the short to ground. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
/E. CUEC	CK FUSE 36 OF THE ENGINE COMPARTMENT FUSE BOX
iio. CHEC	
	Is the fuse OK?
	Yes
	GO to M7.
	No
	GO to M6.
л6: CHEC	
	K FUSE 36 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND
	I Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse
	Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND.
	1 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse
	 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For
	 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes
	 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For
	Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No
	 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system
	 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system for normal operation.
M7: CHEC SENSOR	 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system
	 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system for normal operation. EK THE POWER SUPPLY FROM FUSE 36 IN THE ENGINE COMPARTMENT FUSE BOX TO THE MAF Measure the voltage between the engine compartment fuse box electrical connector JB34 pin 93
	 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system for normal operation. EK THE POWER SUPPLY FROM FUSE 36 IN THE ENGINE COMPARTMENT FUSE BOX TO THE MAF Measure the voltage between the engine compartment fuse box electrical connector JB34 pin 93 and GROUND.
	 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system for normal operation. CK THE POWER SUPPLY FROM FUSE 36 IN THE ENGINE COMPARTMENT FUSE BOX TO THE MAF Measure the voltage between the engine compartment fuse box electrical connector JB34 pin 93 and GROUND. Is the voltage less than 10 volts?
	Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system for normal operation. EK THE POWER SUPPLY FROM FUSE 36 IN THE ENGINE COMPARTMENT FUSE BOX TO THE MAF 1 Measure the voltage between the engine compartment fuse box electrical connector JB34 pin 93 and GROUND. Is the voltage less than 10 volts? Yes
	1 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system for normal operation. KK THE POWER SUPPLY FROM FUSE 36 IN THE ENGINE COMPARTMENT FUSE BOX TO THE MAF 1 Measure the voltage between the engine compartment fuse box electrical connector JB34 pin 93 and GROUND. Is the voltage less than 10 volts? Yes Repair the circuit from the engine compartment fuse box to the MAF sensor. For additional
	1 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system for normal operation. K THE POWER SUPPLY FROM FUSE 36 IN THE ENGINE COMPARTMENT FUSE BOX TO THE MAF 1 Measure the voltage between the engine compartment fuse box electrical connector JB34 pin 93 and GROUND. Is the voltage less than 10 volts? Yes Repair the circuit from the engine compartment fuse box to the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	1 Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse box and GROUND. Is the resistance less than 10,000 ohms? Yes REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system for normal operation. EK THE POWER SUPPLY FROM FUSE 36 IN THE ENGINE COMPARTMENT FUSE BOX TO THE MAF 1 Measure the voltage between the engine compartment fuse box electrical connector JB34 pin 93 and GROUND. Is the voltage less than 10 volts? Yes Repair the circuit from the engine compartment fuse box to the MAF sensor. For additional

PINPOINT	INPOINT TEST N: POTT1, POTT2, POTT3. TAT SENSOR	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
N1: CHECK CO	N1: CHECK CONTINUITY OF THE INTAKE AIR TEMPERATURE (IAT) SENSOR POWER SUPPLY CIRCUIT	
	1 Turn the ignition switch to the OFF position.	
	2 Disconnect the MAF sensor electrical connector EN6.	
	3 Disconnect the ECM electrical connector EN16.	
	4 Measure the resistance between the MAF sensor electrical connector EN6 pin 4 (O) and the ECM electrical connector EN16, pin 71 (O).	
	Is the resistance less than 5 ohms?	
	Yes GO to N2. No	
I	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs, TEST	

I	ı	the system for normal operation.
N2: CHECK C		INUITY OF THE IAT SENSOR CIRCUIT
NZ. CHECK C	1	Measure the resistance between the MAF sensor electrical connector EN6 pin 5 (BG) and the ECM
	Ι'	electrical connector EN16, pin 19 (BG).
	ls t	he resistance less than 5 ohms?
	Yes	
		GO to N4.
	No	
		REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
NO OUTOU	<u> </u>	the system for normal operation.
N3: CHECK II		IAT SENSOR CIRCUIT FOR SHORT TO BATTERY
	1	Turn the ignition switch to the OFF position.
	2	Disconnect the MAF sensor electrical connector EN6.
	3	Check for a voltage between EN6 pin 5 (BG) and GROUND.
		he voltage greater than 1 volt?
	Yes	
	No	GO to N1.
	1	INSTALL a new MAF sensor.
		REFER to: Mass Air Flow (MAF) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
		AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
		CLEAR the DTC. TEST the system for normal operation.
N4: CHECK TI	HE I	IAT SENSOR POWER SUPPLY CIRCUIT FOR SHORT TO GROUND
	1	Measure the resistance between the MAF sensor electrical connector EN6 pin 4 (O) and GROUND.
	ls t	he resistance less than 10,000 ohms?
	Yes	
		REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the
	L.	DTCs. TEST the system for normal operation.
	No	
NE OUEOU T	<u> </u>	GO to N5.
N5: CHECK II	1	IAT SENSOR GROUND CIRCUIT FOR SHORT TO BATTERY
	1	Connect the ECM electrical connector, EN16.
	2	Turn the ignition switch to the ON position.
	3	Check for voltage at EN6 pin 5 (BG)
		he voltage greater than 1 volt?
	Yes	
		REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
	No	TEST the system for normal operation.
	1	INSTALL a new MAF sensor.
		REFER to: Mass Air Flow (MAF) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
		AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
		CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new
		ECM.
		REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
		(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
		Before replacing an ECM, contact dealer technical support.

TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
O1: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE LEFT-HAND BANK HO2S HEATER
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the HO2S electrical connector EN32 pin 2 (WR) and GROUND.
	Is the voltage less than 10 volts?
	Yes
	<u>GO to O4</u> .
	No
	<u>GO to O2</u> .
O2: CHECK TH	HE GROUND CIRCUIT TO THE LEFT-HAND BANK HO2S HEATER
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the ECM electrical connector EN16.
	3 Measure the resistance between the HO2S electrical connector EN32 pin 1 (GO) and the ECM electrical connector EN16 pins 55 and 56 (GO).
	Is the resistance of each wire less than 5 ohms? Yes

	<u>GO to O3</u> .
	No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
O2: CHECK TI	HE LEFT-HAND BANK HO2S CIRCUIT FOR SHORT TO GROUND
O3. CHECK II	Measure the resistance between the HO2S electrical connector EN32 pin 1 (GO) 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 '
	INSTALL a new left-hand bank HO2S. For additional information,
	REFER to: <u>Heated Oxygen Sensor (HO2S) LH</u> (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM.
	For additional information, REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
	(110kW/150PS) - Puma/2.0L Duratorg-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.
O4: CHECK FU	JSE 42 OF THE ENGINE COMPARTMENT FUSE BOX
	1 Check the fuse.
	Is the fuse OK?
	Yes
	<u>GO to O6</u> .
	No
	<u>GO to O5</u> .
O5: CHECK F	USE 42 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND
	1 Measure the resistance between electrical connector JB34 pin 105 of the engine compartment fuse box and GROUND
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR short to ground between the engine compartment fuse box and the left-hand bank HO2S.
	For additional information, refer to wiring digrams. CLEAR the DTC. TEST the system for normal operation.
	No
	INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system
	for normal operation.
O6: CHECK TI	HE POWER SUPPLY TO FUSE 42 IN THE ENGINE COMPARTMENT FUSE BOX
	1 Measure the voltage between fuse 42, electrical connector JB34 pin 105 and GROUND.
	Is the voltage less than 10 volts?
	Yes
	Repair the circuit from the ECM control relay to the engine compartment fuse box. For additional
	information, refer to wiring digrams. CLEAR the DTC. TEST the system for normal operation.
	No
	Repair the circuit between the engine compartment fuse box and the HO2S. For additional information, refer to wiring digrams. CLEAR the DTC. TEST the system for normal operation.
<u> </u>	iniormation, refer to wiring digrams. CLLAR the DTC. TEST the system for normal operation.

PINPOINT T	EST P: DTC P1606. ECM RELAY.
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
P1: CHECK TH	IE ECM CONTROL RELAY
	1 Turn the ignition switch to the ON position.
	Does the ECM relay make an audible click?
	Yes
	GO to P2.
	No CO to Pr
DO 011501/50	GO to P6.
P2: CHECK FC	OR POWER SUPPLY FROM THE ECM CONTROL RELAY
	1 Measure the voltage between the ECM control relay JB34 pin 131 and GROUND.
	Is the voltage less than 10 volts?
	Yes
	GO to P3.
	No
	REPAIR the circuit from the ECM control relay to the ECM. For additional information, refer to
	wiring digrams. CLEAR the DTC. TEST the system for normal operation.
P3: CHECK FU	ISE 9 IN THE ENGINE COMPARTMENT FUSE BOX
	1 Check the fuse.

	Is the fuse OK?
	Yes
	GO to P4.
	No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system
	for normal operation.
P4: CHECK TH	HE POWER SUPPLY TO FUSE 9 IN THE ENGINE COMPARTMENT FUSE BOX
	1 Measure the voltage between Fuse 9 electrical connector JB34 pin 75 and GROUND.
	Is the voltage less than 10 volts?
	Yes
	Repair the circuit from the battery positive to the engine compartment fuse box. CLEAR the DTC.
	TEST the system for normal operation.
	No
5- 011-01/-	GO to P5.
CONTROL REL	HE POWER SUPPLY FROM FUSE 9 IN THE ENGINE COMPARTMENT FUSE BOX TO THE ECM
CONTROL REL	Measure the voltage between the ECM control relay electrical connector JB34 pin 132 and
	GROUND.
	Is the voltage less than 10 volts?
	Yes
	Repair the circuit from the engine compartment fuse box to the ECM control relay. CLEAR the
	DTC. TEST the system for normal operation.
	No
	INSTALL a new ECM control relay. For additional information, refer to the electrical guide. CLEAR
D/ OUEOVEL	the DTC. TEST the system for normal operation.
P6: CHECK FC	JSE 31 OF THE ENGINE COMPARTMENT FUSE BOX
	1 Check the fuse.
	Is the fuse OK? Yes
	GO to P7.
	No Start
	GO to P10.
P7: CHECK PC	OWER SUPPLY TO THE ECM CONTROL RELAY FROM FUSE 31 OF THE ENGINE COMPARTMENT
FUSE BOX	
	1 Measure the voltage between ECM relay electrical connector JB34 pin 133 and GROUND.
	Is the voltage less than 10 volts?
	Yes
	GO to P8. No
	GO to P12.
P8: CHECK CC	ONTINUITY OF THE ECM CONTROL RELAY GROUND CIRCUIT
	1 Disconnect the ECM electrical connector EN16.
	2 Remove the ECM control relay from the engine compartment fuse box.
	3 Measure the resistance between the ECM electrical connector EN16 pin 40 and JB34 pin 134 of the
	engine compartment fuse box.
	Is the resistance less than 5 ohms?
	Yes
	GO to P9.
	No
	REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	(This circu t includes the power distribut on fuse box and the EMS relay and diode)
P9: CHECK CC	ONTINUITY OF THE ECM CONTROL RELAY WINDING
	1 Measure the resistance of the ECM control relay winding between pins 1 and 2 of the ECM control
	relay.
	Is the resistance less than 60 ohms?
	Yes
	INSTALL a new ECM control relay. CLEAR the DTC. TEST the system for normal operation.
	No INSTALL a new ECM.
	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
	(110kW/150PS) - Puma/2.0L Duratorg-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support. CLEAR the DTC. TEST the system for
	normal operation.
P10: CHECK F	USE 31 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND
	1 Measure the resistance between electrical connector JB34 pin 83 of the engine compartment fuse
	box and GROUND.

Is the resistance less than 10,000 ohms? Yes REPAIR short to GROUND between the engine compartment fuse box and the ECM control	
REPAIR short to GROUND between the engine compartment fuse box and the ECM control	
	ıl relay.
CLEAR the DTC. TEST the system for normal operation.	
No	
INSTALL a new fuse. CLEAR the DTC. TEST the system for normal operation.	
P11: CHECK FUSE 9 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND	
Measure the resistance between electrical connector JB34 pin 132 of the engine compartr box and GROUND.	nent fuse
Is the resistance less than 10,000 ohms?	
Yes	
REPAIR short to ground between the engine compartment fuse box and the ECM control is	⁻elay.
CLEAR the DTC. TEST the system for normal operation.	
No	
INSTALL a new fuse. CLEAR the DTC. TEST the system for normal operation.	
P12: CHECK THE ECM CONTROL RELAY DIODE	
1 Remove the ECM control relay diode from the engine compartment fuse box.	
2 Measure the continuity of ECM control relay diode.	
Is the resistance less than 5 ohms?	
Yes	
Possible intermittent fault. Recheck DTCs.	
No	
INSTALL a new ECM control relay diode. Make sure that the ECM control relay diode is in:	stalled
correctly. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST	the
system for normal operation.	

I IIII OIII I	EST Q: P0105, P0106, P0107, P0108, P1107, P1108. MAP SENSOR
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS 21: CHECK THE GROUND CIRCUIT TO THE MAP SENSOR	
Q1: CHECK IF	Disconnect the MAP sensor electrical conector EN8.
	2 Measure the resistance between the MAP sensor electrical conector EN8 pin 4 (BG) and GROUND.
	2 Measure the resistance between the MAP sensor electrical confector ENO pin 4 (BG) and GROUND.
	Reconnect electrical connectors following test.
	Is the resistance less than 5 ohms?
	Yes
	<u>GO to Q2</u> .
	No
	REPAIR the circuit between the MAP sensor and GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
O2: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE MAP SENSOR FOR SHORT TO BATTERY
CE. GIIEGIC II	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the MAP sensor electrical connector EN8 pin 2 (OY) and GROUND.
	Is the voltage greater than 6 volts?
	Yes
	REPAIR the short to battery. For additional information, refer to wiring diagrams. CLEAR the DTC.
	TEST the system for normal operation.
	No contraction of the contractio
O2. CLIECK TI	GO to Q3.
Q3: CHECK IF	HE POWER SUPPLY CIRCUIT TO THE MAP SENSOR FOR SHORT TO GROUND 1 Turn the ignition switch to the ON position.
	·
	2 Measure the voltage between the MAP sensor electrical connector EN8 pin 2 (OY) and GROUND. Is the voltage less than 4 volts?
	Yes
	REPAIR the short to GROUND. For additional information, refer to wiring diagrams. CLEAR the
	DTC. TEST the system for normal operation.
	No
	<u>GO to Q4</u> .
Q4: CHECK CO	ONTINUITY OF THE MAP SENSOR SIGNAL WIRE
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the MAP sensor electrical connector EN8.
	3 Disconnect the ECM electrical connector EN16.
	4 Measure the resistance of the circuit between MAP sensor electrical connector EN8 pin 1 (BW) and
	ECM electrical connector EN16 pin 127 (BW).
	Is the resistance less than 5 ohms?

1	Yes
	GO to Q5.
	No
	REPAIR the circuit between the MAP sensor electrical connector EN8 pin 1 (BW) and ECM electrical connector EN16 pin 127 (BW). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
OF: CHECK TI	HE MAP SENSOR SIGNAL WIRE FOR SHORT TO GROUND
Q5. CHECK 11	1 Disconnect the ECM electrical connector EN16.
	2 Disconnect the MAP sensor electrical connector EN8.
	Measure the resistance between EN8 pin 1 (BW) 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. (The fault could be in any of the components or sensors in the 5 volt supply circu t, or the ECM)
	No <u>GO to Q6</u> .
Q6: CHECK TI	HE MAP SENSOR SIGNAL WIRE FOR SHORT TO BATTERY
	1 Connect the ECM electrical connector EN16.
	2 Turn the ignition switch to the ON position.
	3 Check for a voltage at EN8 pin 1 (BW)
	is the voltage greater than 10 volts?
	Yes
	Repair the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (The fault could be in any of the components or sensors in the 5 volt supply circuit, or the ECM)
	No INSTALL a new MAP sensor. CLEAR the DTC. TEST the system for normal operation.

TEST CONDITIONS R1: CHECK THE GROUND CIRCUIT TO THE RIGHT-HAND BANK VVT SOLENOID 1 Disconnect the VVT solenoid electrical connector EN61. 2 Measure the resistance between the VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. Is the resistance less than 5 ohms? Yes GO to R2. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. R2: CHECK CONTINUITY OF THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE 1 Measure the resistance between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). Is the resistance less than 5 ohms? Yes GO to R3. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. R3: CHECK FOR SHORT TO GROUND AT THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE
R1: CHECK THE GROUND CIRCUIT TO THE RIGHT-HAND BANK VVT SOLENOID 1 Disconnect the VVT solenoid electrical connector EN61. 2 Measure the resistance between the VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. Is the resistance less than 5 ohms? Yes GO to R2. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. R2: CHECK CONTINUITY OF THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE 1 Measure the resistance between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). Is the resistance less than 5 ohms? Yes GO to R3. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
1 Disconnect the VVT solenoid electrical connector EN61. 2 Measure the resistance between the VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. Is the resistance less than 5 ohms? Yes GO to R2. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. R2: CHECK CONTINUITY OF THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE 1 Measure the resistance between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). Is the resistance less than 5 ohms? Yes GO to R3. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
2 Measure the resistance between the VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. Is the resistance less than 5 ohms? Yes GO to R2. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. R2: CHECK CONTINUITY OF THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE 1 Measure the resistance between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). Is the resistance less than 5 ohms? Yes GO to R3. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
GROUND. Is the resistance less than 5 ohms? Yes GO to R2. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. R2: CHECK CONTINUITY OF THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE 1 Measure the resistance between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). Is the resistance less than 5 ohms? Yes GO to R3. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
Yes GO to R2. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. R2: CHECK CONTINUITY OF THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE 1 Measure the resistance between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). Is the resistance less than 5 ohms? Yes GO to R3. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
REPAIR the circuit between VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. R2: CHECK CONTINUITY OF THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE 1 Measure the resistance between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). Is the resistance less than 5 ohms? Yes GO to R3. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
REPAIR the circuit between VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. R2: CHECK CONTINUITY OF THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE 1 Measure the resistance between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). Is the resistance less than 5 ohms? Yes GO to R3. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
REPAIR the circuit between VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. R2: CHECK CONTINUITY OF THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE 1 Measure the resistance between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). Is the resistance less than 5 ohms? Yes GO to R3. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
Measure the resistance between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). Is the resistance less than 5 ohms? Yes GO to R3. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
electrical connector EN16 pin 109 (RW). Is the resistance less than 5 ohms? Yes GO to R3. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
Yes GO to R3. No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
No REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
R3: CHECK FOR SHORT TO GROUND AT THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE
1 Disconnect the ECM electrical connector EN16.
2 Measure the resistance between EN61 pin 1 (RW) and GROUND.
Is the resistance less than 10,000 ohms? Yes
REPAIR the short to GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to R4.
R4: CHECK FOR SHORT TO BATTERY AT THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE
RT. OFFICE OF STORE TO BATTERE AT THE RIGHT-HAND BANK VVI SOLENOID STONAL WIRE
1 TURN the ignition switch to the ON position.
2 Check for a voltage at EN61 pin 1 (RW).

1	
	Is the voltage greater than 1 volt?
	Yes
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No .
	INSTALL a new right-hand bank VVT solenoid.
	REFER to: Variable Camshaft Timing (VCT) Oil Control Solenoid (303-14A Electronic Engine
	Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTC. TEST the system for normal operation.

PINPOINT T	EST S : P0020, P1396. VVT LEFT-HAND BANK
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
S1: CHECK GF	ROUND CIRCUIT TO THE LEFT-HAND BANK VVT SOLENOID
	1 Disconnect the VVT solenoid electrical connector, EN42.
	2 Measure the resistance between the VVT solenoid electrical connector EN42 pin 2 (BG) and
	GROUND.
	Is the resistance less than 5 ohms?
	Yes
	GO to S2.
	No REPAIR the circuit between VVT solenoid electrical connector EN42 pin 2 (BG) and GROUND. For
	additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal
	operation.
S2: CHECK CO	ONTINUITY OF THE LEFT-HAND BANK VVT SOLENOID SIGNAL WIRE.
	1 Measure the resistance between VVT solenoid electrical connector EN42 pin 1 (G) and ECM
	electrical connector EN16 pin 110 (G).
	Is the resistance less than 5 ohms?
	Yes
	<u>GO to S3</u> .
	No
	REPAIR the circuit between VVT solenoid electrical connector EN42 pin 1 (G) and ECM electrical
	connector EN16 pin 110 (G). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
S2. CHECK EC	DR SHORT TO GROUND AT THE LEFT-HAND BANK VVT SOLENOID SIGNAL WIRE
33. CHECK I	1 Disconnect the ECM electrical connector EN16.
	Measure the resistance between EN61 pin 1 (RW) 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 '
	<u>GO to S4</u> .
S4: CHECK FO	OR SHORT TO BATTERY AT THE LEFT-HAND BANK VVT SOLENOID SIGNAL WIRE
	1 TURN the ignition switch to the ON position.
	2 Check for a voltage at EN61 pin 1 (RW).
	Is the voltage greater than 1 volt?
	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 left-hand bank VVT solenoid. REFER to: Variable Camshaft Timing (VCT) Oil Control Solenoid (303-14A Electronic Engine
	Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTC. TEST the system for normal operation.

PINPOINT T	PINPOINT TEST T : P1251, P1631, P1657, P1658. THROTTLE MOTOR RELAY	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS	
T1: CHECK TH	IE POWER SUPPLY CIRCUIT TO THE THROTTLE MOTOR RELAY	
	1 Turn the ignition switch to the ON position.	
	2 Measure the voltage between pin 1 of the throttle motor relay base and GROUND.	
	Is the voltage greater than 10 volts? Yes GO to T2. No	

	REPAIR the circuit between pin 1 of the throttle motor relay base and the EMS control relay. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
T2: CHECK C	ONTINUITY OF THE THROTTLE MOTOR RELAY SIGNAL WIRE
	1 Turn the ignition switch to the OFF position.
	2 Measure the resistance between the throttle motor relay base, pin 2 and the ECM electrical connector EN16 pin 52 (GR).
	Is the resistance less than 5 ohms?
	Yes
	GO to T3.
	REPAIR the circuit between the throttle motor relay base pin 2 and the ECM electrical connector EN16 pin 52 (GR). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
T3: CHECK T	HE THROTTLE MOTOR RELAY SIGNAL WIRE FOR SHORT TO BATTERY
	1 Turn the ignition switch to the OFF position.
	2 Remove the throttle motor relay.
	3 Disconnect the ECM electrical connector EN16.
	4 Check for a voltage between the throttle motor relay base pin 2 and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	REPAIR the short to battery. For additional information, refer to wiring digrams. CLEAR the DTC. TEST the system for normal operation. No
	GO to T4.
T4: CHECK T	HE THROTTLE MOTOR RELAY SIGNAL WIRE FOR SHORT TO GROUND
	1 Measure the resistance between the throttle motor relay base pin 2 and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR the short to GROUND. For additional information, refer to wiring digrams. CLEAR the DTC. TEST the system for normal operation.
	No OO L TE
TE 0115014.0	GO to T5.
15: CHECK C	ONTINUITY OF THE THROTTLE MOTOR RELAY OUTPUT WIRE
	1 Test for continuity between throttle motor relay base pin 5 and ECM electrical connector EN16 pin 134 (RW).
	Is the circuit continuous? Yes
	INSTALL a new throttle motor relay. CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Before replacing a ECM, contact Dealer technical support
	REPAIR the circuit between throttle motor relay base pin 2 and ECM electrical connector EN16 pin 134 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
TA: CHECK T	HE THROTTLE MOTOR RELAY OUTPUT WIRE FOR SHORT TO BATTERY
I. O. OITEOR I	1 Check for a voltage between the throttle motor relay base pin 5 and GROUND.
	Is the voltage greater than 1 volt? Yes
	REPAIR the short to battery. For additional information, refer to wiring digrams. CLEAR the DTC. TEST the system for normal operation.
	No COLLETT
T7 0115011	GO to T7.
I 7: CHECK T	HE THROTTLE MOTOR RELAY OUTPUT WIRE FOR SHORT TO GROUND
	1 Measure the resistance between the throttle motor relay base pin 5 and GROUND.
	Is the resistance less than 10,000 ohms? Yes REPAIR the short to GROUND. For additional information, refer to wiring digrams. CLEAR the DTC.
	TEST the system for normal operation. No INSTALL a new throttle motor relay. For additional information, refer to the electrical guide. CLEAR
	the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.

DINDOINTT	EST U : P1549. IMT VALVE 1
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
	HE POWER SUPPLY CIRCUIT TO THE IMT VALVE 1
O II OIIZOIX II	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between IMT valve 1 electrical connector EN999 pin 1 (NG) and GROUND.
	Is the voltage greater than 10 volts?
	Yes
	<u>GO to U2</u> .
	No
	REPAIR the circuit between the IMT valve 1 electrical connector EN999 pin 1 (NG) and the Battery
	power bus 2. CLEAR the DTC. TEST the system for normal operation. (This circut includes the power distribut on fuse box and the EMS control relay. For additional information, refer to wiring diagrams)
II2: CHECK CO	ONTINUITY OF THE IMT VALVE 1 SIGNAL WIRE.
UZ. CHECK CO	Disconnect the ECM electrical connector EN16.
	2 Measure the resistance between the IMT valve 1 electrical connector EN999 pin 2 (OY) and the
	ECM electrical connector EN16 pin 38 (OY).
	Is the resistance less than 5 ohms?
	Yes
	GO to U3.
	No
	REPAIR the circuit between the IMT valve 1 electrical connector EN999 pin 2 (OY) and the ECM
	electrical connector EN16 pin 38 (OY). For additional information, refer to wiring diagrams. CLEAR
H2. CHECK IN	the DTC. TEST the system for normal operation. IT VALVE SIGNAL WIRE FOR SHORT TO GROUND
US: CHECK III	Measure the resistance between EN999 pin 2 (OY) and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR the short to GROUND. For additional information, refer to wiring digrams. CLEAR the DTC.
	TEST the system for normal operation.
	No
	GO to U4.
U4: CHECK IN	IT VALVE SIGNAL WIRE FOR SHORT TO BATTERY
	1 Connect the ECM electrical connector EN16.
	2 Turn the ignition switch to the ON position.
	3 Check for a voltage at EN999 pin 2 (OY).
	Is the voltage greater than 10 volts?
	Yes
	REPAIR the short to battery. For additional information, refer to wiring digrams. CLEAR the DTC.
	TEST the system for normal operation. No
	INSTALL a new IMT valve. CLEAR the DTC. TEST the system for normal operation. If the DTC is
	repeated, INSTALL a new ECM.
	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
	(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support. CLEAR the DTC. TEST the system for
	normal operation.

PINPOINT T	PINPOINT TEST V : P1532. IMT VALVE 2	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
V1: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE IMT VALVE 2	
	1 Turn the ignition switch to the ON position.	
	2 Measure the voltage between IMT valve 2 electrical connector EN998 pin 1 (NG) and GROUND.	
	Is the voltage greater than 10 volts?	
	Yes	
	<u>GO to V2</u> .	
	No	
	REPAIR the circuit between the IMT valve 2 electrical connector EN998 pin 1 (NG) and the Battery	
	power bus 2. CLEAR the DTC. TEST the system for normal operation.	
	(This circu t includes the power distribut on fuse box and the EMS control relay. For additional information, refer to wiring diagrams)	
V2: CHECK CO	ONTINUITY OF THE IMT VALVE 2 SIGNAL WIRE	
	1 Disconnect the ECM electrical connector EN16.	
	Measure the resistance between the IMT valve 2 electrical connector EN998 pin 2 (OY) and the ECM electrical connector EN16 pin 39 (OY).	
	Is the resistance less than 5 ohms?	

I	Yes
	GO to V3.
	No No
	REPAIR the circuit between the IMT valve 2 electrical connector EN998 pin 2 (OY)and the ECM
	electrical connector EN16 pin 39 (OY). For additional information, refer to wiring diagrams. CLEAR
V3: CHECK	INT VALVE SIGNAL WIRE FOR SHORT TO GROUND
	1 Measure the resistance between EN998 pin 2 (OY) and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR the short to GROUND. For additional information, refer to wiring digrams. CLEAR the DTC.
	TEST the system for normal operation.
	No CO to V/4
	<u>GO to V4</u> .
V4: CHECK	IMT VALVE SIGNAL WIRE FOR SHORT TO BATTERY
	1 Connect the ECM electrical connector EN16.
	2 Turn the ignition switch to the ON position.
	3 Check for a voltage at EN998 pin 2 (OY).
	Is the voltage greater than 10 volts?
	Yes
	REPAIR the short to battery. For additional information, refer to wiring digrams. CLEAR the DTC.
	TEST the system for normal operation.
	No
	INSTALL a new IMT valve. CLEAR the DTC. TEST the system for normal operation. If the DTC is
	repeated, INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
	(110kW/150PS) - Puma/2.0L Duratorg-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support

PINPOINT TEST W : P1582. FLIGHT RECORDER DATA STORED	
DETAILS/RESULTS/ACTIONS	
HE FLIGHT RECORDER DATA	
 NOTE: Flight recorder data can only be extracted using the Jaguar approved diagnostic system, where available. 	
1 Connect the Jaguar approved diagnostic system, or code reader.	
Is DTC P1582 stored?	
Yes	
Refer to dealer technical support for information on extracting data.	
No Test not applicable.	

PINPOINT T	ES.	T X : P1240, P1241, P1242. SENSOR POWER SUPPLY
TEST		DETAILS/RESULTS/ACTIONS
CONDITIONS	<u> </u>	
X1: CHECK T	HE I	POWER SUPPLY CIRCUIT TO THE IP SENSOR
	1	Disconnect the IP sensor electrical connector, IJ7.
	2	Turn the ignition switch to the ON position.
	3	Measure the voltage between IP sensor electrical connector IJ7 pin 1 (YG) and GROUND.
	ls t	he voltage greater than 4 volts?
	Ye	
	L .	GO to X2.
	No	
	1	REPAIR the circuit between the IP sensor electrical connector IJ7 pin 1 (YG) and the sensor 5 volt
	1	supply bus. CLEAR the DTC. TEST the system for normal operation.
		(The fault could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For add t onal informat on, refer to wiring diagrams)
X2: CHECK T	HE I	POWER SUPPLY CIRCUIT TO THE IP SENSOR FOR SHORT TO BATTERY
	1	Measure the voltage between IP sensor electrical connector IJ7 pin 1 (YG) and GROUND.
	ls t	he voltage greater than 6 volts?
	Ye	
	1	REPAIR the circuit between the IP sensor electrical connector IJ7 pin 1 (YG) and the sensor 5 volt
	1	supply bus. CLEAR the DTC. TEST the system for normal operation.
	1	(The short could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For additional information, refer to wiring
		diagrams)
1	No	
		- GO to X3.
4		

X3: CHECK TH	IF POWER SUPPLY CIRCUIT TO THE MAP SENSOR I Disconnect the MAP sensor electrical connector EN8.
	Turn the ignition switch to the ON position. Negative the voltage between MAR sensor electrical connector ENR pin 3 (OV) and CROUND.
	Measure the voltage between MAP sensor electrical connector EN8 pin 2 (OY) and GROUND.
	Is the voltage greater than 4 volts? Yes
	GO to X4.
	No
	REPAIR the circuit between the MAP sensor electrical connector EN8 pin 2 (OY) and the sensor 5
	volt supply bus. CLEAR the DTC. TEST the system for normal operation.
	(The fault could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For add tonal information, refer to wiring diagrams)
X4: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE MAP SENSOR FOR SHORT TO BATTERY
CILCK II	1 Measure the voltage between MAP sensor electrical connector EN8 pin 2 (OY) and GROUND.
	Is the voltage greater than 6 volts?
	Yes
	REPAIR the circuit between the MAP sensor electrical connector EN8 pin 2 (OY) and the sensor 5
	volt supply bus. CLEAR the DTC. TEST the system for normal operation.
	(The short could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For additional information, refer to wiri diagrams)
	L. The state of th
	No CO to VE
VE. OUEQUET:	GO to X5.
	HE POWER SUPPLY CIRCUIT TO THE FTP SENSOR
	is to the FTP sensor involves the removal of the fuel tank. To reduce the amount of work necessary, a
	could be used. This can be connected at the access port beneath the rear seat. Tests can then be the slave harness and sensor. If system operation is normal with the slave harness and sensor, the
	e vehicle's harness and sensor.
	Disconnect the FTP sensor electrical connector FT1. (See note above).
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between FTP sensor electrical connector FT1 pin 1 (OY) and GROUND.
	Is the voltage greater than 4 volts?
	Yes
	GO to X6.
	No
	REPAIR the circuit between the FTP sensor electrical connector FT1 pin 1 (OY) and the sensor 5
	volt supply bus. CLEAR the DTC. TEST the system for normal operation.
	(The fault could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For add t onal informat on, refer to wirin diagrams)
X6: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE FTP SENSOR FOR SHORT TO BATTERY
	1 Measure the voltage between FTP sensor electrical connector FT1 pin 1 (OY) and GROUND.
	Is the voltage greater than 6 volts?
	Yes
	REPAIR the circuit between the FTP sensor electrical connector FT1 pin 1 (OY) and the sensor 5
	volt supply bus. CLEAR the DTC. TEST the system for normal operation.
	(The short could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For additional information, refer to wiri diagrams)
	L. The state of th
	No CO to V7
V7. CUECK T	GO to X7.
X7: CHECK IF	HE POWER SUPPLY CIRCUIT TO THE APP SENSOR
	1 Disconnect the APP sensor electrical connector.
	Turn the ignition switch to the ON position.
	Measure the voltage between APP sensor electrical connector PA1 pin 5 (OY) and GROUND.
	Is the voltage greater than 4 volts?
	Yes GO to X8
	GO to X8. No
	REPAIR the circuit between the APP sensor electrical connector PA1 pin 5 (OY) and the sensor 5
	volt supply bus. CLEAR the DTC. TEST the system for normal operation.
	(The fault could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For add t onal informat on, refer to wirir
X8. CHECK TL	diagrams) HE POWER SUPPLY CIRCUIT TO THE APP SENSOR FOR SHORT TO BATTERY
NO. CITEON IF	Measure the voltage between APP sensor electrical connector PA1 pin 5 (OY) and GROUND.
	Is the voltage greater than 6 volts?
	Yes
	REPAIR the circuit between the APP sensor electrical connector PA1 pin 5 (OY) and the sensor 5
	volt supply bus. CLEAR the DTC. TEST the system for normal operation.
	(The short could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For additional information, refer to wiri
	diagrams)
	I

1	L.
	No GO to X9
X9: CHECK T	HE POWER SUPPLY CIRCUIT TO THE TP SENSOR
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between TP sensor electrical connector EN13 pin 2 (OY) and GROUND.
	Is the voltage greater than 4 volts?
	Yes
	GO to X10.
	REPAIR the circuit between the TP sensor electrical connector EN13 pin 2 (OY) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The fault could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For add t onal informat on, refer to wiring diagrams)
X10: CHECK	THE POWER SUPPLY CIRCUIT TO THE TP SENSOR FOR SHORT TO BATTERY
	1 Measure the voltage between TP sensor electrical connector EN13 pin 2 (OY) and GROUND.
	Is the voltage greater than 6 volts?
	REPAIR the circuit between the TP sensor electrical connector EN13 pin 2 (OY) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The short could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For additional information, refer to wiring diagrams)
	No
	GO to X11.
X11: CHECK	THE POWER SUPPLY CIRCUIT TO THE AIR CONDITIONING PRESSURE (ACP) SENSOR
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between ACP sensor electrical connector JB106 pin 2 (OY) and GROUND.
	Is the voltage greater than 4 volts?
	Yes CO to V12
	GO to X12. No
	REPAIR the circuit between the ACP sensor electrical connector JB106 pin 2 (OY) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The fault could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For add t onal informat on, refer to wiring diagrams)
X12: CHECK BATTERY	THE POWER SUPPLY CIRCUIT TO THE AIR CONDITIONING PRESSURE SENSOR FOR SHORT TO
	1 Measure the voltage between ACP sensor electrical connector JB106 pin 2 (OY) and GROUND.
	Is the voltage greater than 6 volts?
	REPAIR the circuit between the ACP sensor electrical connector JB106 pin 2 (OY) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The short could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For additional information, refer to wiring diagrams.)
	No No electrical fault in power supply circuit. Recheck DTCs using the Jaguar approved diagnostic system, or code reader. (This fault could also be a PSV failure w thin the ECM.)

PINPOINT TEST Y: P1243. SENSOR GROUND CIRCUITS.	
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
Y1: CHECK TH	HE GROUND CIRCUIT TO THE ECT SENSOR
	1 Measure the resistance between ECT sensor electrical connector EN18 pin 1 (BG) and GROUND.
	Is the resistance less than 5 ohms?
	Yes
	<u>GO to Y2</u> .
	No
	REPAIR the circuit between the ECT sensor electrical connector EN18 pin 1 (BG) and GROUND.
	CLEAR the DTC. TEST the system for normal operation.
	(This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams)
Y2: CHECK TH	HE GROUND CIRCUIT TO THE EOT SENSOR
	1 Measure the resistance between EOT sensor electrical connector EN25 pin 2 (BG) and GROUND.
	Is the resistance less than 5 ohms?
	Yes
	GO to Y3.
	No
	REPAIR the circuit between the EOT sensor electrical connector EN25 pin 2 (BG) and GROUND.
	CLEAR the DTC. TEST the system for normal operation.

1	(This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams)
Y3: CHECK TH	HE GROUND CIRCUIT TO THE IP SENSOR
21.201.11	1 Measure the resistance between IP sensor electrical connector IJ7 pin 2 (WG) and GROUND.
	Is the resistance less than 5 ohms?
	Yes
	GO to Y4.
	No
	REPAIR the circuit between the IP sensor electrical connector IJ7 pin 2 (WG) and GROUND. CLEAR
	the DTC. TEST the system for normal operation. (This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams)
VA. CHECK TI	HE GROUND CIRCUIT TO THE EFT SENSOR
14: CHECK IF	Measure the resistance between EFT sensor electrical connector IJ8 pin 1 (NU) and GROUND.
	Is the resistance less than 5 ohms?
	Yes
	GO to Y5.
	No Section 1
	REPAIR the circuit between the EFT sensor electrical connector IJ8 pin 1 (NU) and GROUND.
	CLEAR the DTC. TEST the system for normal operation.
\	(This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams)
Y5: CHECK TH	HE GROUND CIRCUIT TO THE MAP SENSOR
	1 Measure the resistance between MAP sensor electrical connector EN8 pin 4 (BG) and GROUND.
	Is the resistance less than 5 ohms?
	Yes GO to Y6.
	No
	REPAIR the circuit between the MAP sensor electrical connector EN8 pin 4 (BG) and GROUND.
	CLEAR the DTC. TEST the system for normal operation.
	(This circut includes the ECM. For add tonal information, refer to wiring diagrams)
	HE GROUND CIRCUIT TO THE FTP SENSOR
	is to the FTP sensor involves the removal of the fuel tank. To reduce the amount of work necessary, a
slave harness	could be used. This can be connected at the access port beneath the rear seat. Tests can then be
	the slave harness and sensor. If system operation is normal with the slave harness and sensor, the
rault lies in the	e vehicle's harness or sensor.
	1 Measure the resistance between FTP sensor electrical connector FT1 pin 3 (BG) and GROUND.
	Is the resistance less than 5 ohms? Yes
	GO to Y7.
	No
	REPAIR the circuit between the FTP Sensor electrical connector FT1 pin 3 (BG) and GROUND.
	CLEAR the DTC. TEST the system for normal operation.
	(This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams)
Y7: CHECK IF	HE GROUND CIRCUIT TO THE APP SENSOR (TRACK 1)
	1 Measure the resistance between APP sensor electrical connector PA1 pin 3 (BG) and GROUND.
	Is the resistance less than 5 ohms?
	Yes GO to V8
	GO to Y8. No
	REPAIR the circuit between the APP sensor electrical connector PA1 pin 3 (BG) and GROUND.
	CLEAR the DTC. TEST the system for normal operation.
	(This circu t includes the ECM. For add t onal information, refer to wiring diagrams)
Y8: CHECK TH	HE GROUND CIRCUIT TO THE TP SENSOR
	1 Measure the resistance between TP sensor electrical connector EN13 pin 1 (BG) and GROUND.
	Is the resistance less than 5 ohms?
	Yes
	GO to Y9. No
	REPAIR the circuit between the TP sensor electrical connector EN13 pin 1 (BG) and GROUND.
	CLEAR the DTC. TEST the system for normal operation.
	(This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams)
Y9: CHECK TH	HE GROUND CIRCUIT TO THE APP SENSOR (TRACK 3)
	1 Measure the resistance between APP sensor electrical connector PA1 pin 6 (BG) and GROUND.
	Is the resistance less than 5 ohms?
	Yes
	GO to Y10.
	No
	REPAIR the circuit between the APP sensor electrical connector PA1 pin 6 (BG) and GROUND.
	CLEAR the DTC. TEST the system for normal operation. (This circut includes the ECM. For addit onal information, refer to wiring diagrams)
1	l

10: CHECK THE GROUND CIRCUIT TO THE AIR CONDITIONING PRESSURE SENSOR
1 Measure the resistance between ACP sensor electrical connector JB106 pin 1 (BG) and GROUND.
Is the resistance less than 5 ohms?
Yes
No electrical fault in ground circuit. Recheck DTCs.
No
REPAIR the circuit between the ACP sensor electrical connector JB106 pin 1 (BG) and GROUND.
CLEAR the DTC. TEST the system for normal operation.
(This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams)

	EST Z : P1122, P1123, P1344. APP SENSOR (TRACK 1)
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	,
Z1: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE APP SENSOR. TRACK 1
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between APP sensor electrical connector PA1 pin 2 (Y) and GROUND.
	Is the voltage greater than 4volts?
	Yes
	GO to Z2.
	No REPAIR the circuit between the APP sensor electrical connector PA1 pin 2 (Y) and the sensor 5 volt
	supply 2. CLEAR the DTC. TEST the system for normal operation.
	(This circu t includes the ECM, EMS control relay, and power distribution fuse box. For add t onal informat on, refer to wiring diagrams)
Z2: CHECK TH	HE GROUND CIRCUIT TO THE APP SENSOR
	1 Turn the ignition switch to the OFF position.
	2 Disconnect APP Sensor electrical connector PA1.
	3 Measure the resistance between APP sensor electrical connector PA1 pin 6 (BG) and GROUND.
	Is the resistance less than 5 ohms?
	Yes
	GO to Z5.
	No
	REPAIR the circuit between the APP sensor electrical connector PA1 pin 6 (BG) and GROUND. CLEAR the DTC. TEST the system for normal operation.
	(This circut includes the ECM. For add t onal information, refer to wiring diagrams)
Z3: CHECK TI	HE GROUND CIRCUIT TO THE APP SENSOR. FOR CONTINUITY
	1 Disconnect the ECM electrical connector EN16.
	2 Disconnect the APP sensor electrical connector PA1.
	3 Measure the resistance between EN16 pin 20 (BG) and PA1 pin 6 (BG).
	Is the resistance less than 5 ohms?
	Yes
	<u>GO to Z4</u> .
	No
	REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the
74. CLIFOK TI	system for normal operation.
Z4: CHECK TI	HE GROUND CIRCUIT TO THE APP SENSOR. FOR SHORT TO BATTERY
	1 Connect the ECM electrical connector EN16.
	2 Turn the ignition switch to the ON position.
	3 Check for a voltage at PA1 pin 6 (BG).
	Is the voltage greater than 1 volt?
	Yes REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC.
	TEST the system for normal operation.
	No
	<u>GO to Z5</u> .
Z5: CHECK CO	ONTINUITY OF THE APP SENSOR SIGNAL WIRE
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the APP sensor electrical connector PA1.
	3 Measure the resistance between APP sensor electrical connector PA1 pin 4 (R) and the ECM
	electrical connector EN16 pin 102 (R).
	Is the resistance less than 5 ohms?
	Yes
	GO to Z6.
	No
	REPAIR the circuit between the APP sensor electrical connector PA1 pin 4 (R) and the ECM electrical connector EN16 pin 102 (R). For additional information, refer to wiring diagrams. CLEAR
	the DTC. TEST the system for normal operation.
	, ·
Z6: CHECK CO	ONTINUITY OF THE APP SENSOR POTENTIOMETER

	1 Measure the resistance between APP sensor electrical connector PA1 pins 4 and 6.
	2 Operate the accelerator pedal through it's full range while observing the resistance reading.
	Does the resistance vary as the pedal is operated?
1	Yes
1	INSTALL a new ECM.
1	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
1	(110kW/150PS) - Puma/2.0L Duratorg-TDCi, Removal and Installation).
1	Before replacing an ECM, contact dealer technical support.
	No
1	INSTALL a new accelerator pedal position sensor,
1	REFER to: Accelerator Pedal (310-02 Acceleration Control, Removal and Installation).
	CLEAR the DTC. TEST the system for normal operation.

	CLEAR the DTC. TEST the system for normal operation.
DINDC:::=	FOT AA D4045 D4044 D4044 ADD 05N00D (TD404 C)
PINPOINT T	EST AA : P1215, P1216, P1344. APP SENSOR (TRACK 3)
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
AA1: CHECK	THE POWER SUPPLY CIRCUIT TO THE APP SENSOR. TRACK 3
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between APP sensor electrical connector PA1 pin 1(Y) and GROUND.
	Is the voltage greater than 4 volts?
	Yes
	GO to AA2.
	No
	REPAIR the circuit between the APP sensor electrical connector PA1 pin 1 (Y) and the sensor 5 volt supply. CLEAR the DTC. TEST the system for normal operation. (This circuit includes the ECM, EMS control relay, and power distribution fuse box. For additional information, refer to wiring diagrams. This
A A O OLIFOX	supply is also linked to other sensors. The fault could be in any of these or their wiring.)
AAZ: CHECK	THE GROUND CIRCUIT TO THE APP SENSOR
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the APP sensor electrical connector PA1.
	Measure the resistance between APP sensor electrical connector PA1 pin 3 (BG) and GROUND.
	Is the resistance less than 5 ohms?
	Yes
	GO to AA5. No
	REPAIR the circuit between the APP sensor electrical connector PA1 pin 3 (BG) and GROUND. CLEAR the DTC. TEST the system for normal operation. (This circut includes the ECM. For add t onal informat on, refer to wiring diagrams.)
AA3: CHECK	THE GROUND CIRCUIT TO THE APP SENSOR FOR CONTINUITY
	1 Disconnect the ECM electrical connector EN16.
	2 Disconnect the APP sensor electrical connector PA1.
	3 Measure the resistance between EN16 pin 19 (BG) and PA1 pin 3 (BG).
	Is the resistance less than 5 ohms?
	Yes
	GO to AA4.
	No
	REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the
2 2 4 2 1 1 5 2 1 5	system for normal operation.
AA4: CHECK	THE GROUND CIRCUIT TO THE APP SENSOR FOR SHORT TO BATTERY
	1 Connect the ECM electrical connector EN16.
	2 Turn the ignition switch to the ON position.
	3 Check for a voltage at PA1 pin 3 (BG).
	Is the voltage greater than 1 volt?
	Yes DEDAID the chart circuit for additional information, refer to wiring diagrams. CLEAD the DTC
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No
	GO to AA5.
AA5: CHECK	CONTINUITY OF THE APP SENSOR SIGNAL WIRE
J.S. SHESK V	Measure the resistance between APP sensor electrical connector PA1 pin 1 (Y) and the ECM
	electrical connector EN16 pin 103 (Y).
	Is the resistance less than 5 ohms?
1	Yes
	GO to AA6.

REPAIR the circuit between the APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EN16 pin 103 (Y). For additional information, refer to wiring diagrams. CLEAR

No

	the DTC. TEST the system for normal operation.	
AA6: CH	AA6: CHECK CONTINUITY OF THE APP SENSOR POTENTIOMETER	
	1 Measure the resistance between APP sensor electrical connector PA1 pins 1 and 3.	
	2 Operate the accelerator pedal through it's full range while observing the resistance reading.	
	Does the resistance vary as the pedal is operated?	
	Yes INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Before replacing a ECM, contact Dealer technical support.	
	No INSTALL a new accelerator pedal position sensor, REFER to: Accelerator Pedal (310-02 Acceleration Control, Removal and Installation). CLEAR the DTC. TEST the system for normal operation.	

PINPOINT T	EST AB : P0480. RADIATOR COOLING FAN MODULE DRIVE
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
AB1: CHECK T	HE PULSE WIDTH MODULATED SIGNAL TO THE COOLING FAN MODULE
	Disconnect the radiator cooling fan module electrical connector PWM1.
	2 RUN the engine to a temperature at which the cooling fans would operate.
	3 Using a suitable meter, test for a pulse width modulated signal at PWM1 pin 3 (WU).
	Is a PWM signal present?
	Yes
	INSTALL a new cooling fan module. CLEAR the DTC. TEST the system for normal operation.
	No CO to ABO
100 0110111	GO to AB2.
AB2: CHECK C	CONTINUITY OF THE RADIATOR COOLING FAN MODULE SIGNAL WIRE
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the ECM electrical connector EN16.
	3 Measure the resistance between the radiator cooling fan module electrical connector PWM1 pin 3 (WU) and the ECM electrical connector EN16 pin 51 (WU).
	Is the resistance less than 5 ohms?
	Yes
	INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Before replacing an ECM, contact dealer technical support.
	No REPAIR the circuit between the radiator cooling fan module electrical connector PWM1 pin 3 (WU) and the ECM electrical connector EN16 pin 51 (WU). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

PINPOINT T	PINPOINT TEST AC: P0646, P0647. AIR CONDITIONING CLUTCH RELAY DRIVE	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
AC1: CHECK T	THE GROUND SUPPLY TO THE AIR CONDITIONING CLUTCH	
WARNING	6: This test involves working in proximity to rotating parts. Make sure due care is exercised.	
	1 Turn the ignition switch to the ON position.	
	2 Disconnect the ECM electrical connector EN16.	
	3 Disconnect the air conditioning clutch electrical connector EN30.	
	4 Measure the resistance between EN30 pin 2 (B) and GROUND.	
	Is the resistance less than 5 ohms?	
	Yes	
	REPAIR the circuit between EN30 pin 2 (B) and GROUND. For additional information, refer to wiring	
	diagrams. CLEAR the DTC. TEST the system for normal operation.	
	No CO to ACC	
100 011501/3	GO to AC2.	
AC2: CHECK	THE CIRCUIT INTEGRITY BETWEEN THE ECM AND THE AIR CONDITIONING CLUTCH	
	1 Apply a GROUND to the disconnected ECM electrical connector EN16 pin 34 (BG).	
	2 Measure the voltage at air conditioning clutch electrical connector EN30 pin 1 (RG).	
	Is the voltage greater than 10 volts?	
	Yes	
	GO to AC3.	
	No	

	THE AIR CONDITIONING CLUTCH RELAY TO ECM CIRCUIT FOR SHORT TO GROUND
	1 Measure the resistance between EN16 pin 34 (BG) and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	GO to AC4.
	No
	INSTALL a new air conditioning compressor clutch relay. For additional information, refer to the electrical guide. CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM.
	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDC (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.
AC4: CHECK SHORT TO B	THE CIRCUIT BETWEEN THE AIR CONDITIONING COMPRESSOR CLUTCH AND THE RELAY FOR
SHOKI IO B	1 Measure the voltage between EN30 pin 1 (RG) and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC.
	TEST the system for normal operation.
	No CO to ACE
ACE, OUTOY	GO to ACS. THE CLICKLE PETWEEN THE ALD CONDITIONING COMPRESSOR CHARGE AND THE ACCCURED AND THE ACCOUNTY AND THE ACCCURED AND THE ACCURED AND THE ACC
	THE CIRCUIT BETWEEN THE AIR CONDITIONING COMPRESSOR CLUTCH AND THE ACCC RELAY TO GROUND
OK SHUKI	
	1 Measure the resistance between EN30 pin 1 (RG) 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 CO to AO (
	GO to AC6.
	THE CIRCUIT BETWEEN FUSE 23 OF THE POWER DISTRIBUTION FUSE BOX AND THE ACCC
RELAY FOR	SHORT TO GROUND
	1 Remove Fuse 23.
	2 Measure the resistance between fuse box electrical connector JB34 pin 79 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 OO LAG
	GO to AC7.
C7: CHECK	THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 3
	1 Refit Fuse 23.
	2 Measure the voltage between the ACCC relay base pin 3 and GROUND.
	Is the voltage greater than 10 volts?
	Is the voltage greater than 10 volts? Yes
	Is the voltage greater than 10 volts? Yes GO to AC8.
	Is the voltage greater than 10 volts? Yes GO to AC8. No
	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo
	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal
JOS. CHECK	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION
	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND
	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND 1 Remove Fuse 36.
	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND 1 Remove Fuse 36. 2 Measure the resistance between the ACCC relay base pin 1 and GROUND.
	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND 1 Remove Fuse 36. 2 Measure the resistance between the ACCC relay base pin 1 and GROUND. Is the resistance less than 10,000 ohms?
	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND 1 Remove Fuse 36. 2 Measure the resistance between the ACCC relay base pin 1 and GROUND. Is the resistance less than 10,000 ohms? Yes
	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND 1 Remove Fuse 36. 2 Measure the resistance between the ACCC relay base pin 1 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.
	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND 1 Remove Fuse 36. 2 Measure the resistance between the ACCC relay base pin 1 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.
	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND 1 Remove Fuse 36. 2 Measure the resistance between the ACCC relay base pin 1 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.
FUSE BOX F	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND 1 Remove Fuse 36. 2 Measure the resistance between the ACCC relay base pin 1 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 GO to AC9.
FUSE BOX F	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND 1 Remove Fuse 36. 2 Measure the resistance between the ACCC relay base pin 1 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 GO to AC9. THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1
FUSE BOX F	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND 1 Remove Fuse 36. 2 Measure the resistance between the ACCC relay base pin 1 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 GO to AC9. THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36.
FUSE BOX F	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND 1 Remove Fuse 36. 2 Measure the resistance between the ACCC relay base pin 1 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 GO to AC9. THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position.
FUSE BOX F	Is the voltage greater than 10 volts? Yes GO to AC8. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. Fo additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION OR SHORT TO GROUND 1 Remove Fuse 36. 2 Measure the resistance between the ACCC relay base pin 1 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 GO to AC9. THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36.

_{No}	GO to AC10.
	Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal
	operation. (This circu t includes the EMS relay, and Fuses 9 and 31)
AC10: CHECK T	HE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR CONTINUITY
1	Remove the ACCC relay.
2	Measure the resistance between the ECM electrical connector EN16 pin 34 (BG) and ACCC relay base pin 2.
Is	the resistance less than 5 ohms?
Ye	
l [GO to AC11.
No	
	REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
AC11: CHECK T	HE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR SHORT TO BATTERY
1	Check for a voltage between the ECM electrical connector EN16 pin 34 (BG) and GROUND.
Is	the voltage greater than 1 volt?
Ye	
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC.
l L.	TEST the system for normal operation.
No	
AC12, CLIECK T	GO to AC12.
	HE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR SHORT TO GROUND
1	Measure the resistance between the ECM electrical connector EN16 pin 34 (BG) and GROUND.
Ye	the resistance less than 10,000 ohms?
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
No	INSTALL a new ACCC relay. For additional information, refer to the electrical guide. CLEAR the DTC. TEST the system for normal operation.

PINPOINT T	PINPOINT TEST AD: P1516, P1517. P/N SWITCH STARTING/DRIVING MALFUNCTIONS.	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
AD1: CHECK	THE P/N INPUT TO THE ECM.	
	1 Select PARK.	
	2 Set the ignition switch to the ON position.	
	3 Measure the voltage at the ECM electrical connector EN16 pin 31 (B).	
	Is the voltage greater than 10 volts?	
	Yes	
	INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Before replacing a ECM, contact Dealer technical support.	
	REPAIR the circuit between the ECM electrical connector EN16 pin 31 (B) and the ignition switch. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (On automatic transmission vehicles, this circuit includes the TR sensor, central junction fuse box, ign t on relay, and inertia switch. On NAS manual transmiss on vehicles, this circuit also includes the clutch safety switch.)	

PINPOINT TEST AE: P1245; P1246. IGNITION SWITCH CRANK SIGNAL		
WARNING	3: N	Make sure the starter motor does not engage in the course of these tests. Failure to follow these
		result in personal injury.
TEST		DETAILS/RESULTS/ACTIONS
CONDITIONS		
AE1: CHECK THE START INPUT TO THE ECM		
	1	Move the gear selector to the N position.
	2	Disconnect the ECM electrical connector EN16.
	3	Remove the starter relay from the power distribution fuse box.
	4	Turn the ignition switch to the CRANK position.
	5	Measure the voltage between EN16 pin 6 (Y) and GROUND.
	ls t	the voltage greater than 10 volts?

1	Yes GO to AE2.
	No
	REPAIR the circuit between the ECM and the battery. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circu t includes the ignition switch and the power distribution fuse box. [Fuse 28].)
AE2: CHECK	THE START INPUT TO THE STARTER RELAY
	1 Turn the ignition switch to the START position and hold.
	2 Measure the voltage between the starter relay base (R10) pin 1 and GROUND.
	Is the voltage greater than 10 volts?
	Yes
	GO to AE3.
	No REPAIR the circuit between the starter relay base and the battery. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circuit includes the ignition switch and the power distribution fuse box)
AE3: CHECK	THE START INPUT WIRE FOR SHORT TO BATTERY AT ECM
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between EN16 pin 6 (Y) and GROUND.
	Is the voltage greater than 10 volts?
	Yes
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC.
	TEST the system for normal operation.
	No OO LATA
	GO to AE4.
AE4: CHECK	THE START INPUT WIRE FOR SHORT TO BATTERY AT RELAY
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the starter relay base pin 1 and GROUND.
	Is the voltage greater than 10 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 AE5.
AE5: CHECK	THE STARTER RELAY INPUT FROM THE ECM FOR CONTINUITY
	1 Measure the resistance between EN16 pin 41 (GO) and relay base pin 2.
	Is the resistance less than 5 ohms?
	Yes
	GO to AE6.
	No REPAIR the open circuit. For additional information, refer to wiring diagrams. CLEAR the DTC.
	TEST the system for normal operation.
AF6: CHECK	THE STARTER RELAY INPUT FROM THE ECM FOR SHORT TO GROUND
ALG: GIILGK	1 Disconnect ignition switch electrical connector IP18.
	2 Measure the resistance between EN16 pin 41 (GO) 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
	GO to AE7.
AE7: CHECK	THE STARTER RELAY INPUT FROM THE ECM FOR SHORT TO BATTERY
	Measure the voltage between the starter relay base pin 2 and GROUND.
	Is the voltage greater than 1 volt?
	Yes REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC.
	TEST the system for normal operation.
	No
	INSTALL a new starter relay. For additional information, refer to wiring diagrams. CLEAR the DTC.
	TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM.
	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
	(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Before replacing an ECM, contact dealer technical support.

Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Electronic Engine Controls2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: J28493->V99999

Diagnosis and Testing

- 1. 1. Verify the customer concern by operating the system.
- 2. 2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
 Engine oil level Cooling system coolant level Fuel Contamination Throttle body 	 Fuses (9, 31, 32, 37) Wiring harness Electrical connector(s) Sensor(s) Engine control module (ECM)

- 3. **3.** Verify the following systems are working correctly:
- Air intake system
- · Cooling system
- Charging system
- Fuel charging system
- 4. **4.** If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- If the concern 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 (DTCs) Index
 Chart.
- 6. **6.** Make sure that a power supply is present to the ECM from fuse 32 of the engine compartment fuse box before carrying out diagnostic work on the electronic engine control system.

Diagnostic Trouble Code (DTC) Index

DTC	Description	Possible Source	Action
P0116, P0117, P0118, P0125	Concern with engine coolant temperature (ECT) sensor.	 ECT sensor. ECT sensor circuit(s). Low/contaminated coolant. Thermostat failure. Overheating. 	GO to Pinpoint Test <u>A.</u> .
P0128	Concern with engine temperature, set by ECT sensor inputs.	Thermostat.ECT sensor.ECT sensor circuit(s).	Mechanical check of thermostat.GO to Pinpoint Test <u>A.</u> .
P0335, P0336	Concern with crankshaft position (CKP) sensor.	CKP sensor.CKP sensor circuit(s).CKP sensor air gap.CKP sensor debris.	GO to Pinpoint Test <u>B.</u> .
P0011, P0012, P0340, P0341	Concern with right- hand bank camshaft position (CMP) sensor. Right-hand camshaft position timing over- advanced/over- retarded.	 CMP sensor. CMP sensor circuit(s). CMP sensor air gap. CMP sensor debris. 	GO to Pinpoint Test <u>C.</u> .
	Concern with left-hand bank camshaft position (CMP) sensor. Left-hand camshaft position timing over-advanced/over-retarded.	 CMP sensor air gap. 	GO to Pinpoint Test <u>D.</u> .
P0031, P0032	Concern with right- hand bank heated oxygen sensor (HO2S	H02S 1/1 failure.H02S 1/1 circuit(s).Fuse 38.	GO to Pinpoint Test <u>E.</u> .

	Concern with fuel temperature sensor.	Fuel temperature sensor.Fuel temperature sensor circuit(s).	GO to Pinpoint Test <u>F.</u>
P0324, P0327, P0328, P0332, P0333	Concern with knock sensor (KS).	 KS. KS circuit(s). Poor contact with cylinder block. ECM failure. 	GO to Pinpoint Test <u>G.</u> .
	Concern with oil temperature sensor.	Oil temperature sensor.Oil temperature sensor circuit(s).	GO to Pinpoint Test <u>H.</u> .
P0131, P0132	Concern with right- hand bank heated oxygen sensor (HO2S 1/1).	HO2S 1/1.HO2S 1/1 circuit(s).	GO to Pinpoint Test <u>I.</u> .
P0133	Concern with right- hand bank heated oxygen sensor (HO2S 1/1). Slow response.	disconnected.H02S 1/1 mechanical damage.H02S 1/1 to ECM wiring fault.	GO to Pinpoint Test I. Refer to pinpoint tests for components listed, REFER to: Exhaust System (309-00 Exhaust System, Diagnosis and Testing) / Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P1646	Concern with right- hand bank heated oxygen sensor (HO2S 1/1).		GO to Pinpoint Test <u>I.</u> Refer to pinpoint tests for components listed.
	Concern with right- hand bank catalyst monitor sensor (H02S ½).	 H02S ½. H02S ½ circuit(s). Fuse 38. 	GO to Pinpoint Test <u>J.</u> .
P0139, P0140	Concern with right- hand bank catalyst monitor sensor (H02S ½).	 Exhaust leak. Low exhaust temperature. Injector flow partially blocked. 	GO to Pinpoint Test J. Inspect exhaust system, REFER to: Exhaust System (309-00 Exhaust System, Diagnosis and Testing). Inspect fuel system, REFER to: Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJV6/3
	Concern with left-hand bank heated oxygen		GO to Pinpoint Test <u>K.</u> .

P0153	Concern with left-hand bank heated oxygen sensor (HO2S 2/1). Slow response.	 H02S 2/1 disconnected. H02S 2/1 mechanical damage. H02S 2/1 to ECM wiring fault. 	GO to Pinpoint Test K. Refer to pinpoint tests for components listed, REFER to: Exhaust System (309-00 Exhaust System, Diagnosis and Testing) / Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603- >J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P1647	Concern with left-hand bank heated oxygen sensor (HO2S 2/1).	 H02S 2/1 heater failure. H02S 2/1 sensing circuit, short circuit to ground. H02S 2/1 sensing circuit, short circuit to high voltage. H02S 2/1 sensing circuit, open circuit. ECM failure. 	GO to Pinpoint Test <u>K.</u> Refer to pinpoint tests for components listed.
P0057, P0058, P0157, P0158	Concern with left-hand bank catalyst monitor sensor (HO2S 2/2).	 HO2S 2/2. HO2S 2/2 sensor circuit(s). Fuse 42. 	GO to Pinpoint Test <u>L.</u> .
P0159, P0160	Concern with left-hand bank catalyst monitor sensor (HO2S 2/2).	 H02S 2/2 circuit(s). Exhaust leak. Low exhaust temperature. Injector flow partially blocked. 	GO to Pinpoint Test L. Inspect exhaust system, REFER to: Exhaust System (309-00 Exhaust System, Diagnosis and Testing). Inspect fuel system, REFER to: Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P0420	Concern with right- hand bank catalytic converter system. (Efficiency below threshold).	disconnected.HO2 sensor to ECM	Refer to pinpoint tests for components listed. Visually inspect catalytic converters. REFER to: Exhaust System (309-00 Exhaust System, Diagnosis and Testing).
P0430	Concern with left-hand bank catalytic converter system. (Efficiency below threshold).	disconnected.HO2 sensor to ECM	Refer to pinpoint tests for components listed. Visually inspect catalytic converters, REFER to: Exhaust System (309-00 Exhaust System, Diagnosis and Testing).

		 ECM wiring fault. HO2 sensor heater failure. Upstream HO2 sensor failure. Downstream HO2 sensor failure. HO2 sensor failed. Catalytic converter failure. 	
P0101, P0102	Concern with mass air flow (MAF) sensor.	Blocked air filter.Air intake leak.	GO to Pinpoint Test M. Visually inspect components listed, REFER to: Intake Air Distribution and Filtering (303-12A Intake Air Distribution and Filtering - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing) / Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603- >J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P0103, P1104	Concern with mass air flow (MAF) sensor.	MAF sensor.MAF sensor circuit(s).	GO to Pinpoint Test <u>M.</u> .
P0111	Concern with the intake air temperature (IAT) sensor.	Blocked air filter.Air intake leak.	GO to Pinpoint Test N. Visually inspect components listed. REFER to: Intake Air Distribution and Filtering (303-12A Intake Air Distribution and Filtering - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P0112, P0113	Concern with the intake air temperature (IAT) sensor.	 Intake air temperature (IAT) sensor. Intake air temperature (IAT)sensor circuit. 	GO to Pinpoint Test <u>N.</u> .
P0051, P0052	Concern with the left- hand bank heated oxygen sensor (HO2S 2/1) heater.	HO2S 2/1.HO2S 2/1 circuit.Fuse 42.	GO to Pinpoint Test <u>O.</u> .
P1606	Concern with ECM relay.	ECM.ECM relay.ECM relay circuit(s).Fuse 31.	GO to Pinpoint Test <u>P.</u> .
P0106, P0107, P0108	Concern with MAP sensor.	MAP sensor.MAP sensor circuits.	GO to Pinpoint Test <u>Q.</u> .
P0069, P2228, P2229	Concern with barometric pressure (HAC) sensor.	Barometric pressure sensor within the ECM.	INSTALL a new ECM. For additional information, refer to, dealer technical support.
P0010, P1384	Concern with VVT circuit, right-hand bank.	 VVT solenoid and circuit. Oil flow. Camshaft failure. 	GO to Pinpoint Test R. REFER to: <u>Variable</u> <u>Camshaft Timing (VCT) Oil Control Solenoid</u> (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
P0020, P1396	Concern with VVT circuit, left-hand bank.	 VVT solenoid and circuit. Oil flow. Camshaft failure. 	GO to Pinpoint Test S. REFER to: <u>Variable</u> <u>Camshaft Timing (VCT) Oil Control Solenoid</u> (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
P1251, P1631, P1657, P1658	Concern with throttle motor relay.	 Throttle motor relay. Throttle motor relay circuit. 	GO to Pinpoint Test <u>T.</u> Check Fuse 18.
P1549	Concern with IMT Valve 1 circuit.	IMT valve. IMT valve circuit.	GO to Pinpoint Test <u>U.</u>

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Concern with IMT Valve 2 circuit.	IMT valve. IMT valve circuit.	GO to Pinpoint Test <u>V.</u> .
"Flight Recorder" data stored.	This code does not indicate a failure of a component or system.	GO to Pinpoint Test <u>W.</u> .
Concern with sensor power circuit.	 ECM. Power supply circuits. Sensors within the circuit. 	GO to Pinpoint Test <u>AC.</u> .
Concern with sensor ground circuit.	 ECM. Sensor ground circuits. Sensors within the circuit. 	GO to Pinpoint Test <u>X.</u> .
Concern with accelerator pedal position sensor; Track 1.	APP sensor.APP sensor circuits.	GO to Pinpoint Test <u>Z.</u> .
Concern with accelerator pedal position sensor; Track 3.	APP sensor.APP sensor circuits.	GO to Pinpoint Test <u>AA.</u> .
Concern with radiator cooling fan module drive.	 Cooling fan module. Cooling fan module circuits. 	GO to Pinpoint Test <u>Y.</u> .
Concern with air conditioning clutch relay drive.	 Air conditioning clutch relay. Air conditioning clutch relay circuits. 	GO to Pinpoint Test <u>AE.</u> .
Concern with P/N switch starting/driving malfunctions.	 CJFB. Ignition relay. TR sensor. Inertia switch and circuits. 	GO to Pinpoint Test <u>AD.</u> .
Concern with engine crank signal, high/low voltage.	 Starter relay. ECM. Ignition switch. Associated circuits. 	GO to Pinpoint Test <u>AB.</u> .
Security input malfunction.		Reprogram key, check CAN network, REFER to: <u>Communications Network - VIN Range:</u> <u>E96603->J28492</u> (418-00 Module Communications Network, Diagnosis and Testing).
Cold start monitor engine speed low.	 Air intake restriction. Accessory drive overload. (defective/seized component). Throttle valve stuck closed. Throttle body failure. 	REFER to: Intake Air Distribution and Filtering (303-12A Intake Air Distribution and Filtering - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing) / Accessory Drive (303-05 Accessory Drive, Diagnosis and Testing) / Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
Cold start monitor engine speed high.	between MAF sensor	REFER to: Intake Air Distribution and Filtering (303-12A Intake Air Distribution and Filtering - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
	"Flight Recorder" data stored. Concern with sensor power circuit. Concern with sensor ground circuit. Concern with accelerator pedal position sensor; Track 1. Concern with radiator cooling fan module drive. Concern with air conditioning clutch relay drive. Concern with P/N switch starting/driving malfunctions. Concern with engine crank signal, high/low voltage. Cold start monitor engine speed low.	Valve 2 circuit. "Flight Recorder" data stored. "Goncern with sensor power circuit. Concern with sensor ground circuit. Concern with sensor ground circuit. Concern with accelerator pedal position sensor; Track 1. Concern with radiator cooling fan module drive. Concern with air conditioning clutch relay drive. Concern with starting/driving malfunctions. Concern with engine crank signal, high/low voltage. Cold start monitor engine speed low. Cold start monitor engine speed high. Cold start monitor engine speed high.

P050A	Co'd start monitor airflow low/high.	 Accessory drive overload. (defective/seized component). Throttle valve stuck closed. Throttle body failure. Intake air leak between MAF sensor and throttle. Intake air leak between throttle and engine. Engine crankcase breather leak. 	REFER to: Intake Air Distribution and Fi'tering (303-12A Intake Air Distribution and Filtering - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing) / Accessory Drive (303-05 Accessory Drive, Diagnosis and Testing) / Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P050B	Cold start ignition timing performance.	 Blocked intake system. Sticking/slow throttle. Poor engine condition. 	Check the intake air system, including the air cleaner element. Carry out a complete vehicle read for related DTCs. Rectify as necessary.
P0603, P0607, P1633, P1656	Concern with powertrain control module (ECM).	ECM.	INSTALL a new ECM. For additional information, refer to dealer technical support.
P0171, P0172, P0174, P0175, P0201, P0202, P0203, P0204, P0205, P0206	Concern with fuel system too lean/rich.	 Fuel injector(s). Fuel delivery fault. 	REFER to: Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P0300, P0301, P0302, P0303, P0304, P0305, P0306, P1313, P1314, P1316	Concern with ignition system/misfire monitoring.	 Ignition system. Ignition system wiring harness. 	REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P0351, P0352, P0353, P0354, P0355, P0356	Concern with ignition primary circuits.	 Ignition modules. Ignition module circuits. 	REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P0442, P0443, P0444, P0445, P0446, P0447, P0448, P0450, P0452, P0453, P0455, P0456, P0457	Concern with evaporative emissions system.	 Evaporative/purge valve and circuits. Fuel tank and lines. Filler cap. Carbon canister. Canister close valve and circuits. Fuel tank pressure sensor. Fuel tank vapor port. Vapor lines. 	REFER to: Intake Air Distribution and Filtering (303-12A Intake Air Distribution and Filtering - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P0460	Concern with fuel level sensors.	 Fuel level sensors. Fuel level sensor circuits. Instrument cluster. 	REFER to: Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P0560		ECM battery power supply circuit open circuit or high resistance.	Repair the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

	sensor fault. If P0193 is also set, rectify P0193 first).		
P0565, P0566, P0567, P0568, P0569, P0570, P0831, P0832, P0834, P0835, P1571	Concern with vehicle speed control.	 Switchpack. Switchpack circuits. Clutch cancel switch. Clutch safety switch. Brake on/off switch. 	REFER to: Speed Control - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (310-03 Speed Contro Diagnosis and Testing).
	Concern with the starter relay circuit.	Starter relay.Starter relay drive circuit.	REFER to: Starting System - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-06 Starting System Diagnosis and Testing).
	Concern with throttle body.	 Throttle motor. Throttle motor relay. Throttle motor relay circuits. Throttle body. Throttle return spring. Limp-home spring. 	REFER to: Fuel Charging and Controls - 2.5L N/V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing
P2107	Concern with throttle body control.	ECM	REFER to: Fuel Charging and Controls - 2.5L No. V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing
P2118, P2119	Concern with throttle body.	 Throttle actuator 	REFER to: Fuel Charging and Controls - 2.5L N. V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing
P0627, P0628, P0629, P2635	Concern with fuel pump commands.	 Fuel pump control module. Fuel pump control module circuits. ECM. 	REFER to: Fuel Charging and Controls - 2.5L NV6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing
	Concern with charging system.	 Charging system. Charging system wiring harness. 	REFER to: Charging System - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (41 00 Charging System - General Information, Diagnosis and Testing).
	Concern with fuel pulse damper.	 fuel pulse damper circuit(s). fuel pulse damper. Fuel system leak/blockage. 	REFER to: Fuel Charging and Controls - 2.5L NV6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing
P0222, P0223, P2135		TP sensor.TP sensor circuit(s).	REFER to: Throttle Position (TP) Sensor (303-1 Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJ27, Removal and Installation).
	System check not complete since last memory clear.	OBD errors not cleared by diagnosis.	Carry out comprehensive component monitor drive cycle. Refer to the DTC section of GTR, accessed by the icon on the opening page.

P ¹¹¹¹	Cristom choch	This node does not indicate a	No action necessary.
	complete since last	failure of a component or	
P1367	memory clear. Concern with right- hand bank ignition amplifier.	system Ignition module. Ignition module circuits.	REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P1368	Concern with left-hand bank ignition amplifier.		REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
P1656	Concern with TP sensor amplifier circuit.	ECM.	INSTALL a new ECM. For additional information, refer to, dealer technical support.
P1609	CPU to CPU communications.	ECM.	INSTALL a new ECM. For additional information, refer to, dealer technical support.
P2610	ECM/PCM internal engine off timer performance.	ECM.	INSTALL a new ECM. For additional information, refer to, dealer technical support.
P0860, P1637, P1638. P1642, P1643, P1699	Concern with CAN network.	CAN network modules and circuits.	REFER to: Communications Network - VIN Range: E96603->J28492 (418-00 Module Communications Network, Diagnosis and Testing).

P1643, P1699		Ů.
DINIDOINT T	ECT	TA . DTC D041/ D0417 D0410 D042F FCT CFNCOD
	E5	T A : DTC P0116, P0117, P0118, P0125. ECT SENSOR
TEST CONDITIONS		DETAILS/RESULTS/ACTIONS
	-	ENGINE COOLANT TEMPERATURE (ECT) SENSOR SIGNAL WIRE FOR OPEN CIRCUIT
A I. CHECK II	1	Turn the ignition switch to the OFF position.
	2	Disconnect the ECT sensor electrical connector EN18.
	-	Disconnect the ECM electrical connector, EN16.
	4	
	4	Measure the resistance between the ECT sensor electrical connector EN18, pin 2 (UY) and the ECM electrical connector EN16, pin 70 (UY).
	ls t	he resistance less than 5 ohms?
	Yes	
	L.	GO to A2.
	No	
		REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
A 2. CHECK TI		ECT SENSOR SIGNAL WIRE FOR A SHORT TO GROUND
AZ. CHECK II	1	Measure the resistance between the ECT sensor electrical connector EN18, pin 2 (UY) and EN16,
	'	pin 19.
	lc t	he resistance less than 10,000 ohms?
	Yes	
	١٠٠,	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 A3.
A3: CHECK TI	HE I	ECT SENSOR GROUND CIRCUIT
	1	Measure the resistance between the ECT sensor electrical connector EN18, pin 1 (BG) and EN16, pin 19.
	ls t	he resistance less than 5 ohms?
	Yes	
	L.	GO to A4.
	No	
		REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
A A CHECK TI	<u> </u>	ECT SENSOR GROUND CIRCUIT FOR A SHORT TO BATTERY POSITIVE
A4: CHECK II		
	1	Turn the ignition switch to the ON position.
	2	Measure the voltage between the ECT electrical connector EN18, pin 1 (BG) and GROUND.
	Is t	the voltage greater than 1 volt?
	1163	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the
		DTCs. TEST the system for normal operation.
	No	·
	-	GO to A5.
	,	

VE. CHECK THE	ELL SENSUD CIDCIIIL EUD V SHUDL LO BVLLEDA DUSILINE
1	Connect the ECM electrical connector EN16.
2	Turn the ignition switch to the ON position.
3	Measure the voltage between the ECT sensor electrical connector EN18, pin 2 (UY) and GROUND.
Is	the voltage greater than 5 volts?
Y	es
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
l N	o
	INSTALL a new ECT sensor. CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM.
	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
	(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.

	Before replacing an ECM, contact dealer technical support.
	EST B : DTC P0335, P0336. CRANKSHAFT POSITION (CKP) SENSOR
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: CHECK TI	HE 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
	<u>GO to B2</u> .
	No
	INSTALL the CKP sensor correctly.
	REFER to: Crankshaft Position (CKP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Reconnect the sensor. CLEAR the DTCs. TEST the system for normal operation.
B2: CHECK TI	HE CKP SENSOR FOR DEBRIS
DZ. GIILGK II	Remove the CKP sensor and inspect for debris.
	Is the CKP sensor free of debris?
	Yes
	GO to B3.
	No Solo Solo Solo Solo Solo Solo Solo So
	CLEAN the sensor and wheel. INSTALL the sensor.
	REFER to: Crankshaft Position (CKP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Reconnect the sensor. CLEAR the DTCs. TEST the system for normal operation.
B3: CHECK TI	HE CKP SENSOR GROUND WIRE FOR OPEN CIRCUIT
	1 Disconnect the ECM electrical connector EN16.
	2 Disconnect the CKP sensor electrical connector EN12.
	Measure the resistance between the CKP sensor electrical connector EN12, pin 1 (Y) and the ECM electrical connector EN16, pin 37 (Y).
	Is the resistance less than 5 ohms?
	Yes
	GO to B4.
	No REPAIR the circuit. For additional information, refer to the wiring diagrams. Reconnect all
	connectors. CLEAR the DTCs. TEST the system for normal operation.
BA: CHECK TI	HE CKP SENSOR SIGNAL WIRE FOR OPEN CIRCUIT
D4. CHECK II	1 Measure the resistance between the CKP sensor electrical connector EN12, pin 2 (P) and the ECM
	electrical connector EN16, pin 36 (P).
	Is the resistance less than 5 ohms?
	Yes
	GO to B5.
	No The state of th
	REPAIR the circuit. For additional information, refer to the wiring diagrams. Reconnect all
	connectors. CLEAR the DTCs. TEST the system for normal operation.
B5: CHECK TI	HE CKP SENSOR GROUND WIRE FOR A SHORT TO GROUND
	1 Measure the resistance between the CKP sensor electrical connector EN12 pin 1 (Y) and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. Reconnect
	all connectors. CLEAR the DTCs. TEST the system for normal operation.
1	INO

B6: CHECK T	HE CKP SENSOR SIGNAL WIRE FOR A SHORT TO GROUND
	1 Measure the resistance between the CKP sensor electrical connector EN12 pin 2 (P) and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. Reconnect
	all connectors. CLEAR the DTCs. TEST the system for normal operation.
	No
	GO to B7.
B7: CHECK T	HE CKP SENSOR GROUND WIRE FOR A SHORT TO BATTERY
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the CKP sensor electrical connector EN12 pin 1 (Y) and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. Reconnect all
	connectors. CLEAR the DTCs. TEST the system for normal operation.
	No CO to DO
	GO to B8.
B8: CHECK I	HE CKP SENSOR SIGNAL WIRE FOR A SHORT TO BATTERY
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the CKP sensor electrical connector EN12 pin 2 (P) and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. Reconnect all
	connectors. CLEAR the DTCs. TEST the system for normal operation.
	No INSTALL a row CVD correct
	INSTALL a new CKP sensor. REFER to: Crankshaft Position (CKP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Reconnect all connectors. CLEAR the DTCs. TEST the system for normal operation. If the concern
	persists INSTALL a new ECM.
	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
	(110kW/150PS) - Puma/2.0L Duratorg-TDCi, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.

DINIDOINIT T	TOTAL DECIDENCE DOUGLE DOOLS DOOLS DIGHT HAND DANK CAMOUATT DOOLTION
1	EST C : DTC P0011, P0012, P0340, P0341: RIGHT-HAND BANK CAMSHAFT POSITION
(CMP) SENS	
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	'
C1: CHECK TH	HE RIGHT-HAND BANK 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
	<u>GO to C2</u> .
	No
	INSTALL the CMP sensor correctly.
	REFER to: Camshaft Position (CMP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). CLEAR the DTCs. TEST the system for normal operation.
CO. CLIECK TI	HE RIGHT-HAND BANK CMP SENSOR FOR FOREIGN DEBRIS
CZ. CHECK II	
	1 Remove the CMP sensor and inspect for foreign debris.
	Is the CMP sensor free of foreign debris? Yes
	GO to C3.
	No Section C.S.
	CLEAN the sensor and wheel. INSTALL the sensor.
	REFER to: <u>Camshaft Position (CMP) Sensor</u> (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTCs. TEST the system for normal operation.
C3: CHECK TH	HE RIGHT-HAND BANK CMP SENSOR SIGNAL WIRE FOR OPEN CIRCUIT
	1 Disconnect the ECM electrical connector EN16.
	2 Disconnect the CMP sensor electrical connector EN43.
	3 Measure the resistance between the CMP sensor electrical connector EN43, pin 1 (O) and the ECM
	electrical connector EN16, pin 94 (O).
	Is the resistance less than 5 ohms?
	L.
I	lYes I

1	GO to C4.
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
C4: CHECK T	HE RIGHT-HAND BANK CMP GROUND WIRE FOR OPEN CIRCUIT
	1 Measure the resistance between the CMP sensor electrical connector EN43, pin 2 (B) and the ECM electrical connector EN16, pin 95 (B).
	Is the resistance less than 5 ohms? Yes
	GO to C5.
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
C5: CHECK T	HE RIGHT-HAND BANK CMP SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND
	1 Measure the resistance between the CMP sensor electrical connector EN43, pin 1 (0) 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 <u>GO to C6</u> .
C6: CHECK T	HE RIGHT-HAND BANK CMP SENSOR GROUND CIRCUIT FOR A SHORT TO GROUND
	1 Measure the resistance between the CMP sensor electrical connector EN43, pin 2 (B) 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 C7.
C7: CHECK T	HE RIGHT-HAND BANK CMP SENSOR SIGNAL CIRCUIT FOR A SHORT TO BATTERY
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the CMP sensor electrical connector EN43, pin 1 (O) and GROUND.
	Is the voltage greater than 1 volt? Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
	No
C8: CHECK T	GO to C8. HE RIGHT-HAND BANK CMP SENSOR GROUND CIRCUIT FOR A SHORT TO BATTERY
OG. OFFICER T	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the CMP sensor electrical connector EN43, pin 2 (B) and GROUND.
	Is the voltage greater than 1 volt? Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
	No INSTALL a new CMP sensor.
	REFER to: Camshaft Position (CMP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM.
	REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). Before replacing an ECM, contact dealer technical support.

PINPOINT TEST D : DTC P0021, P0022, P1340, P1341: LEFT-HAND BANK CAMSHAFT POSITION (CMP) SENSOR	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
D1: CHECK TH	HE LEFT-HAND BANK 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
1	GO to D2.

ı	No
	INSTALL the CMP sensor correctly.
	REFER to: <u>Camshaft Position (CMP) Sensor</u> (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTCs. TEST the system for normal operation.
D2: CHECK T	HE LEFT-HAND BANK 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 D3.
	No No
	CLEAN the sensor and wheel. INSTALL the sensor. REFER to: Camshaft Position (CMP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTCs. TEST the system for normal operation.
D3: CHECK T	HE LEFT-HAND BANK CMP SENSOR SIGNAL WIRE FOR OPEN CIRCUIT
	1 Disconnect the ECM electrical connector EN16.
	2 Disconnect the CMP sensor electrical connector EN33.
	3 Measure the resistance between the CMP sensor electrical connector EN33, pin 1 (G) and the ECM electrical connector EN16, pin 68 (G).
	Is the resistance less than 5 ohms?
	Yes
	GO to D4.
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
D4: CHECK T	HE LEFT-HAND BANK CMP GROUND WIRE FOR OPEN CIRCUIT
	1 Measure the resistance between the CMP sensor electrical connector EN33, pin 2 (N) and the ECM electrical connector EN16, pin 69 (N).
	Is the resistance less than 5 ohms? Yes
	GO to D5. No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
D5: CHECK T	HE LEFT-HAND BANK CMP SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND
	1 Measure the resistance between the CMP sensor electrical connector EN33, pin 1 (G) 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 D6.
D6: CHECK T	HE LEFT-HAND BANK CMP SENSOR GROUND CIRCUIT FOR A SHORT TO GROUND
	1 Disconnect the ECM electrical connector, EN16.
	2 Measure the resistance between the CMP sensor electrical connector EN33, pin 2 (N) 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 D7.
D7: CHECK T	HE LEFT-HAND BANK CMP SENSOR SIGNAL CIRCUIT FOR A SHORT TO BATTERY
D7. GIILON I	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the CMP sensor electrical connector EN33, pin 1 (G) and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
	No GO to D8.
D8: CHECK T	HE LEFT-HAND BANK CMP SENSOR GROUND CIRCUIT FOR A SHORT TO BATTERY
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the CMP sensor electrical connector EN33, pin 2 (N) and GROUND.

 · · · · · · · · · · · · · · · · · · ·
Is the voltage greater than 1 volt?
Yes
REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the
DTCs. TEST the system for normal operation.
No
INSTALL a new CMP sensor.
REFER to: Camshaft Position (CMP) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new
ECM.
REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 -
AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
Before replacing an ECM, contact dealer technical support.

	Before replacing an ECM, contact dealer technical support.
PINPOINT T	EST E : DTC P0031, P0032. RIGHT-HAND BANK HO2S HEATER
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
E1: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE RIGHT-HAND BANK HO2S HEATER
	1 Disconnect HO2S sensor electrical connector, EN37.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between the HO2S electrical connector EN37, pin 2 (WG) and GROUND.
	Is the voltage less than 10 volts?
	Yes
	GO to E5.
	No GO to E2.
F2: CHECK TI	HE GROUND CIRCUIT TO THE RIGHT-HAND BANK HO2S HEATER FOR OPEN CIRCUIT
EZ. OHEOK H	1 Turn the ignition switch to the OFF position.
	2 Disconnect the ECM electrical connector EN16.
	3 Measure the resistance between the HO2S electrical connector EN37, pin 1 (RU) and the ECM
	electrical connector EN16, pin 1 and pin 2 (RU).
	Is the resistance of each wire less than 5 ohms?
	Yes
	GO to E3.
	No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
EQ. OLIFOX TI	the system for normal operation.
E3: CHECK II	HE RIGHT-HAND BANK HO2S GROUND CIRCUIT FOR SHORT TO GROUND
	Measure the resistance between the bank 1 HO2S electrical connector EN37, pin 1 (RU) 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 E4.
E4: CHECK TI	HE RIGHT-HAND BANK HO2S GROUND CIRCUIT FOR SHORT TO BATTERY
	1 Check for a voltage between the HO2S electrical connector EN37, pin 1 (RU) and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation. No
	INSTALL a new HO2S.
	REFER to: <u>Heated Oxygen Sensor (HO2S) RH</u> (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM.
	REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
EE. OUEOK E	Before replacing an ECM, contact dealer technical support.
E5: CHECK FU	JSE 38 OF THE ENGINE COMPARTMENT FUSE BOX
	1 Check the fuse.
	Is the fuse OK?
	Yes GO to E7.
	L.
1	No

	GO to E6.
E6: CHECK FUSE	38 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND
1	Measure the resistance between electrical connector JB34 pin 97 of the engine compartment fuse box and GROUND.
Is	the resistance less than 10,000 ohms?
Ye	S
	REPAIR short to ground between the engine compartment fuse box and the right-hand bank HO2S. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
No	
	INSTALL a new fuse. CLEAR the DTC. TEST the system for normal operation.
E7: CHECK THE	POWER SUPPLY TO FUSE 38 IN THE ENGINE COMPARTMENT FUSE BOX
1	Turn the ignition switch to the ON position.
2	Measure the voltage between electrical connector JB34 pin 131 and GROUND.
Is	the voltage less than 10 volts?
Ye	s
	Repair the circuit between the battery and the EMS relay. Test the relay, renew as necessary. CLEAR the DTC. TEST the system for normal operation.
No	
	Repair the circuit from the ECM control relay to the engine compartment fuse box. For additional information, refer to the wiring diagrams. GO to P1. CLEAR the DTC. TEST the system for normal operation.

	operation.
DINIDOINT TE	CT F. DTC DO101 D0102 D0102 FUEL TEMPEDATURE CENCOR
TEST	ST F: DTC P0181, P0182, P0183. FUEL TEMPERATURE SENSOR DETAILS/RESULTS/ACTIONS
CONDITIONS	DETAILS/ RESULTS/ ACTIONS
	ITINUITY OF THE FUEL TEMPERATURE SENSOR POWER SUPPLY CIRCUIT
1	
2	Disconnect the fuel temperature sensor electrical connector IJ8.
3	Disconnect the ECM electrical connector EN16.
4	Measure the resistance between the fuel temperature sensor electrical connector IJ8, pin 2 (WU) and the ECM electrical connector EN16, pin 50 (WU).
Is	the resistance less than 5 ohms?
Ye	es
	GO to F2.
N	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
F2: CHECK THE	FUEL TEMPERATURE SENSOR GROUND CIRCUIT
1	Measure the resistance between the fuel temperature sensor electrical connector IJ8 pin 1 (NU) and GROUND.
1	s the resistance less than 5 ohms? es GO to F3.
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
F3: CHECK THE	FUEL TEMPERATURE SENSOR CIRCUIT FOR A SHORT TO GROUND
1	
Is	the resistance less than 10,000 ohms?
Ye	es REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
N	o GO to F4.
F4: CHECK THE	FUEL TEMPERATURE SENSOR GROUND CIRCUIT FOR A SHORT TO BATTERY
1	Disconnect the FTP sensor electrical connector, FT1.
2	Turn the ignition switch to the ON position.
3	Check for a voltage between FT1, pin 3 (BG) and GROUND.
	the voltage greater than 1 volt?
Ye	es REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
	GO to F5.

F5: CHECK THE FUEL TEMPERATURE SENSOR CIRCUIT FOR A SHORT TO BATTERY	
1	Connect the ECM electrical connector EN16.
2	Turn the ignition switch to the ON position.
3	Measure the voltage between the fuel temperature sensor electrical connector IJ8, pin 2 (WU) and GROUND.
Is	the voltage greater than 10 volts?
Ye	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
No.	INSTALL a new fuel temperature sensor. REFER to: Fuel Temperature Sensor - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). Before replacing an ECM, contact dealer technical support.

	Before replacing an ECM, contact dealer technical support.
DINDOINT	TEST C . DTC D0224 D0227 D0229 D0222 D0222 KNOCK SENSOD (KS)
TEST	TEST G : DTC P0324, P0327, P0328, P0332, P0333. KNOCK SENSOR (KS)
CONDITION	DETAILS/RESULTS/ACTIONS
	THE KS SIGNAL WIRE FOR OPEN CIRCUIT
OTT STILL ON	1 Turn the ignition switch to the OFF position.
	2 Disconnect the KS sensor electrical connector EN23.
	3 Disconnect the ECM electrical connector EN16.
	4 Measure the resistance between EN23, pin 1 (N) and EN16, pin 98 (N).
	Is the resistance less than 5 ohms?
	Yes
	GO to G2.
	No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
CO. CLIECK	the system for normal operation.
GZ: CHECK	THE KS SIGNAL WIRE FOR SHORT TO BATTERY
	1 Turn the ignition switch to the ON position.
	2 Check for a voltage between EN23, pin 1 (N) and GROUND.
	Is a voltage present? Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the
	DTCs. TEST the system for normal operation.
	No
	<u>GO to G3</u> .
G3: CHECK	THE KS SIGNAL WIRE FOR A SHORT TO GROUND
	1 Measure the resistance between the KS sensor electrical connector EN23, pin 1 (N) 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
	INSTALL a new KS.
	REFER to: Knock Sensor (KS) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi
	(110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation) /
	Knock Sensor (KS) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) -
	Puma/2.0L Duratorq-TDCi, Removal and Installation).
	CLEAR DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.
G4: CHECK	THE KS GROUND CIRCUIT FOR OPEN CIRCUIT
	1 Measure the resistance between the KS electrical connector EN23 pin 2 (W) and GROUND.
	Is the resistance greater than 5 ohms? Yes
	REPAIR the circuit between EN23, pin 2 (W) and GROUND. CLEAR the DTCs. TEST the system for

normal operation. (This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams.)

No

	GO to G5.
G5: CHECK THE	KS GROUND LEAD FOR OPEN CIRCUIT
1	Disconnect the KS electrical connector, EN23.
2	Disconnect the ECM electrical connector, EN16.
3	Measure the resistance between EN23, pin2 (W) and EN16, pin 100 (BG).
I	the resistance less than 5 ohms?
Y€	es
l <u>.</u> .	<u>GO to G6</u> .
No	REPAIR the circuit between EN23, pin2 (W) and EN16, pin 100 (BG). For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
G6: CHECK THE	KS GROUND LEAD FOR SHORT TO BATTERY
1	Connect the KS sensor electrical connector EN23.
2	Connect the ECM electrical connector EN16.
3	Turn the ignition switch to the ON position.
4	Check for a voltage between EN23, pin 2 (W) and GROUND.
	the voltage greater than 1 volt?
Y€ No	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
	INSTALL a new KS.
	REFER to: Knock Sensor (KS) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). Before replacing an ECM, contact dealer technical support.

PINPOINT T	EST H: DTC P0196, P0197, P0198. OIL TEMPERATURE SENSOR	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS	,	
H1: CHECK T	HE OIL TEMPERATURE SENSOR SIGNAL WIRE FOR OPEN CIRCUIT	
	1 Turn the ignition switch to the OFF position.	
	2 Disconnect the oil temperature sensor electrical connector EN25.	
	3 Disconnect the ECM electrical connector EN16.	
	4 Measure the resistance between the oil temperature sensor electrical connector EN25, pin 1 (Y)	
	and the ECM electrical connector EN16, pin 78 (Y).	
	Is the resistance less than 5 ohms?	
	Yes	
	GO to H2. No	
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST	
	the system for normal operation.	
H2: CHECK THE OIL TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN CIRCUIT		
	1 Measure the resistance between the oil temperature sensor electrical connector EN25, pin 2 (BG)	
	and GROUND.	
	Is the resistance less than 5 ohms?	
	Yes	
	GO to H3.	
	No	
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST	
LI2. CLIECK T	the system for normal operation. HE OIL TEMPERATURE SENSOR GROUND CIRCUIT FOR SHORT TO BATTERY	
H3: CHECK I	·	
	1 Connect ECM electrical connector, EN16.	
	2 Turn the ignition switch to the ON position.	
	3 Measure the voltage between the oil temperature sensor electrical connector EN25, pin 2 (BG) and GROUND.	
	Is the voltage greater than 1 volt?	
	Yes	
	REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs.	
	TEST the system for normal operation. No	
	GO to H4.	
H4: CHECK T	HE OIL TEMPERATURE SENSOR CIRCUIT FOR A SHORT TO GROUND	

	1 Turn the ignition switch to the OFF position.
	2 Disconnect ECM electrical connector, EN16.
	Measure the resistance between the oil temperature sensor electrical connector EN25, pin 1 (Y) and GROUND.
	s the resistance less than 10,000 ohms?
	/es
	REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the
l [DTCs. TEST the system for normal operation.
l l	No
115 0115014 711	GO to H5.
	E OIL TEMPERATURE SENSOR CIRCUIT FOR A SHORT TO BATTERY
	1 Connect ECM electrical connector, EN16.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between the oil temperature sensor electrical connector EN25, pin 1 (Y) and GROUND.
	s the voltage greater than 10 volts?
	/es
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
	No
	INSTALL a new oil temperature sensor.
	REFER to: Oil Temperature Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L
	NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new
	ECM.
	REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.
	before replacing an Lewi, contact dealer technical support.

	Before replacing an ECM, contact dealer technical support.
PINPOINT T	TEST I: DTC P0131, P0132, P0133, P1646. RIGHT-HAND BANK HO2S
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
1: CHECK TH	HE CONSTANT CIRCUIT OF THE RIGHT-HAND BANK HO2S FOR OPEN CIRCUIT
	1 Disconnect the HO2S electrical connector EN37.
	2 Disconnect the ECM electrical connector, EN16.
	3 Measure the resistance between EN16, pin 84 (P) and EN37, pin 4 (P).
	Is the resistance less than 5 ohms?
	Yes
	GO to 12.
	No REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TE
	the system for normal operation.
2: CHECK TI	HE CONSTANT CIRCUIT OF THE RIGHT-HAND BANK HO2S FOR SHORT TO GROUND
2. 0.1201. 11	1 Measure the resistance between EN16, pin 84 (P) 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 DTG
	TEST the system for normal operation.
	No
	GO to 13.
3: CHECK TI	HE CONSTANT CIRCUIT OF THE RIGHT-HAND BANK HO2S FOR SHORT TO BATTERY
	1 Connect the ECM electrical connector EN16.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between EN37, pin 4 (P) and GROUND.
	Is the voltage greater than 5 volts?
	PEDALD the short sireuit. For additional information, refer to the wiring diagrams. CLEAD the DT/
	REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTG TEST the system for normal operation.
	No
	GO to 14.
4: CHECK TI	HE VARIABLE CIRCUIT OF THE RIGHT-HAND BANK HO2S FOR OPEN CIRCUIT
	1 Disconnect the ECM electrical connector, EN16.
	2 Measure the resistance between EN16, pin 83 (Y) and EN37, pin 3 (Y).
	Is the resistance less than 5 ohms?
	Yes
	GO to 15.

No
REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TES
the system for normal operation.
I5: CHECK THE VARIABLE CIRCUIT OF THE RIGHT-HAND BANK HO2S FOR SHORT TO GROUND
1 Measure the resistance between EN16, pin 83 (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 CO to 1/
GO to 16.
16: CHECK THE VARIABLE CIRCUIT OF THE RIGHT-HAND BANK HO2S FOR SHORT TO BATTERY
1 Connect the ECM electrical connector EN16.
2 Turn the ignition switch to the ON position.
3 Measure the voltage between EN37, pin 3 (Y) and GROUND.
Is the voltage greater than 5 volts?
Yes
REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs
TEST the system for normal operation.
INSTALL a new HO2S.
REFER to: <u>Heated Oxygen Sensor (HO2S) RH</u> (303-14A Electronic Engine Controls - 2.5L NA V6 -
AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new
ECM.
REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 -
AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
Before replacing an ECM, contact dealer technical support.

	EST J: DTC P0037, P0038, P0137, P0138, P0139, P0140. RIGHT-HAND BANK
CATALYST M TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
J1: CHECK TH	IE POWER SUPPLY CIRCUIT TO THE RIGHT-HAND BANK CATALYST MONITOR HEATER
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the catalyst monitor sensor electrical connector EN14.
	3 Turn the ignition switch to the ON position.
	4 Measure the voltage between the catalyst monitor sensor electrical connector EN14, pin 2 (WG) and GROUND.
	Is the voltage less than 10 volts?
	Yes
	GO to J6. No
	GO to J2.
J2: CHECK CO	ONTINUITY OF THE RIGHT-HAND BANK CATALYST MONITOR SENSOR GROUND CIRCUIT
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the ECM electrical connector EN16.
	Measure the resistance between the catalyst monitor sensor electrical connector EN14, pin 3 (W) and the ECM electrical connector EN16, pin 130.
	Is the resistance less than 5 ohms?
	Yes
	GO to J3. No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
J3: CHECK CO SENSOR	INTINUITY OF THE POWER SUPPLY WIRE TO THE RIGHT-HAND BANK CATALYST MONITOR
	1 Measure the resistance between the RH bank catalyst monitor sensor electrical connector EN14, pin 4 (N) and the ECM electrical connector EN16, pin 128 (N).
	Is the resistance less than 5 ohms?
	Yes
	GO to J4. No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
J4: CHECK TH	IE RIGHT-HAND BANK CATALYST MONITOR SENSOR POWER SUPPLY WIRE FOR A SHORT TO

GROUND	
	1 Measure the resistance between the catalyst monitor sensor electrical connector EN14, pin 4 (N) 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 <u>GO to J5</u> .
J5: CHECK TH BATTERY	E RIGHT-HAND BANK CATALYST MONITOR SENSOR POWER SUPPLY WIRE FOR A SHORT TO
	Measure the voltage between the catalyst monitor sensor electrical connector EN14, pin 4 (N) as GROUND.
	Is the voltage greater than 1 volt? Yes
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
	No INSTALL a new RH bank catalyst monitor sensor. For additional information, REFER to: Catalyst Monitor Sensor RH (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a nev ECM. For additional information,
	REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
IA: CHECK TH	Before replacing an ECM, contact dealer technical support. E RIGHT-HAND BANK CATALYST MONITOR SENSOR POWER SUPPLY CIRCUIT
JO. OFFICIAL TE	Measure the voltage between the catalyst monitor sensor electrical connector EN14 pin 2 (WG) and GROUND.
	Is the voltage less than 10 volts? Yes
	GO to J8. No
	GO to J7.
	NTINUITY OF THE RIGHT-HAND BANK CATALYST MONITOR SENSOR HEATER GROUND
CIRCUIT	1 Turn the ignition switch to the OFF position.
	2 Disconnect the ECM electrical connector EN16.
	3 Measure the resistance between the catalyst monitor sensor electrical connector EN14, pin 1 (U) and the ECM electrical connector EN16, pin 92 (U).
	Is the resistance less than 5 ohms? Yes
	INSTALL a new ECM. For additional information, REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Before replacing a ECM, contact Dealer technical support. No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. Te the system for normal operation.
J8: CHECK FU	SE 38 OF THE ENGINE COMPARTMENT FUSE BOX
	1 Check the fuse. Is the fuse OK?
	Yes
	<u>GO to J10</u> . No
	<u>GO to J9</u> .
J9: CHECK FU	SE 38 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND 1 Measure the resistance between electrical connector JB34, pin 97 of the engine compartment fu
	box and GROUND. Is the resistance less than 10,000 ohms?
	Yes REPAIR short to ground between the engine compartment fuse box and the right-hand bank HO CLEAR the DTC. TEST the system for normal operation.
	No INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the syste for normal operation.
J10: CHECK T	HE POWER SUPPLY TO FUSE 38 IN THE ENGINE COMPARTMENT FUSE BOX. 1 Measure the voltage between fuse 38 electrical connector JB34 pin 97 and GROUND.

 ,
Is the voltage less than 10 volts?
Yes
Repair the circuit from the ECM control relay to the engine compartment fuse box. CLEAR the DTC. TEST the system for normal operation.
No
Repair the circuit between the engine compartment fuse box and the HO2S. For additional
information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

	information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
DINDOINT T	TOT I/ DOALS DOALS DOALS DAY AT LEFT HAND DANK HOOS
	EST K : P0151, P0152, P0153, P1647. LEFT-HAND BANK HO2S
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
K1: CHECK TI	HE CONSTANT CIRCUIT OF THE LEFT-HAND BANK HO2S FOR OPEN CIRCUIT
	1 Disconnect the HO2S electrical connector EN32.
	2 Disconnect the ECM electrical connector EN16.
	3 Measure the resistance between EN16, pin 108 (P) and EN32, pin 4 (P).
	Is the resistance less than 5 ohms?
	Yes
	GO to K2.
	No REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
	the system for normal operation.
K2: CHECK TI	HE CONSTANT CIRCUIT OF THE LEFT-HAND BANK HO2S FOR SHORT TO GROUND
	1 Measure the resistance between EN16, pin 108 (P) 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 DTCs.
	TEST the system for normal operation.
	No contraction
V2. CHECK TI	GO to K3. HE CONSTANT CIRCUIT OF THE LEFT-HAND BANK HO2S FOR SHORT TO BATTERY
K3: CHECK II	1 Connect the ECM electrical connector EN16.
	5
	Measure the voltage between EN32, pin 4 (P) and GROUND.
	Is the voltage greater than 5 volts? Yes
	REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs.
	TEST the system for normal operation.
	No
	<u>GO to K4</u> .
K4: CHECK TI	HE VARIABLE CIRCUIT OF THE LEFT-HAND BANK HO2S FOR OPEN CIRCUIT
	1 Disconnect the HO2S electrical connector EN32.
	2 Disconnect the ECM electrical connector EN16.
	3 Measure the resistance between EN16, pin 107 (Y) and EN32, pin 3 (Y)
	Is the resistance less than 5 ohms?
	Yes CO to KE
	GO to K5. No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
	the system for normal operation.
K5: CHECK TH	HE VARIABLE CIRCUIT OF THE LEFT-HAND BANK HO2S FOR SHORT TO GROUND
	1 Measure the resistance between EN16, pin 107 (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 DTCs.
	TEST the system for normal operation.
	No GO to K6.
K6: CHECK TI	HE VARIABLE CIRCUIT OF THE LEFT-HAND BANK HO2S FOR SHORT TO BATTERY
T.S. G.ILGK II	1 Connect the ECM electrical connector EN16.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between EN32 pin 3 (Y) and GROUND.
	Is the voltage greater than 5 volts?
	Yes
1	DEDAID HOLD THE THE THE STATE OF STATE

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs.

TEST the system for normal operation.

INSTALL a new left-hand HO2S.

REFER to: Heated Oxygen Sensor (HO2S) LH (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).

CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM.

REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).

Before replacing an ECM, contact dealer technical support.

PINPOINT T MONITOR	EST L: DTC P0057, P0058, P0157, P0158, P0159, P0160. LEFT-HAND BANK CATALYST
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	HE POWER SUPPLY CIRCUIT TO THE LEFT-HAND BANK CATALYST MONITOR HEATER
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the catalyst monitor sensor electrical connector EN9.
	3 Turn the ignition switch to the ON position.
	4 Measure the voltage between the catalyst monitor sensor electrical connector EN9 pin 2 (WR) and GROUND.
	Is the voltage less than 10 volts?
	Yes
	<u>GO to L6</u> .
	No CO to 1.3
10 011501/0/	GO to L2.
L2: CHECK CC	ONTINUITY OF THE LEFT-HAND BANK CATALYST MONITOR SENSOR GROUND CIRCUIT
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the ECM electrical connector EN16.
	Measure the resistance between the catalyst monitor sensor electrical connector EN9 pin 3 (W) and EN16, pin 130.
	Is the resistance less than 5 ohms?
	Yes
	<u>GO to L3</u> .
	No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TES the system for normal operation.
L3: CHECK CO SENSOR	ONTINUITY OF THE POWER SUPPLY WIRE TO THE LEFT-HAND BANK CATALYST MONITOR
	1 Measure the resistance between the catalyst monitor sensor electrical connector EN9 pin 4 (N) and the ECM electrical connector EN16 pin 129 (N).
	Is the resistance less than 5 ohms?
	Yes
	<u>GO to L4</u> .
	No
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TES the system for normal operation.
L4: CHECK TH GROUND	HE LEFT-HAND BANK CATALYST MONITOR SENSOR POWER SUPPLY WIRE FOR A SHORT TO
	1 Measure the resistance between the catalyst monitor sensor electrical connector EN9 pin 4 (N) 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
	<u>GO to L5</u> .
L5: CHECK TH BATTERY	HE LEFT-HAND BANK CATALYST MONITOR SENSOR POWER SUPPLY WIRE FOR A SHORT TO
,D. () - ()	1 Measure the voltage between the catalyst monitor sensor electrical connector EN9 pin 4 (N) and GROUND.
	Is the voltage greater than 1 volt?
	Yes DEDAID the chart to bettery. For additional information, refer to the wiring diagrams. CLEAD the
	REPAIR the short to battery. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
	No INSTALL a new left-hand bank catalyst monitor sensor. For additional information,
	REFER to: <u>Catalyst Monitor Sensor LH</u> (303-14A Electronic Engine Controls - 2.5L NA V6 -

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1	
	ECM. For additional information,
	REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.
.6: CHECK THE	LEFT-HAND BANK CATALYST MONITOR SENSOR POWER SUPPLY CIRCUIT
1	Measure the voltage between the catalyst monitor sensor electrical connector EN9 pin 2 (WR) and GROUND.
Is	the voltage less than 10 volts?
Υe	es
L.	GO to L8.
No	o GO to L7.
7. CLIECK CON	TINUITY OF THE LEFT-HAND BANK CATALYST MONITOR SENSOR HEATER GROUND CIRCUIT
1	
1	
2	
3	and the ECM electrical connector EN16 pin 93 (UY).
I 1	the resistance less than 5 ohms?
Ye	
	INSTALL a new ECM. For additional information, REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.
l _N o	· · ·
	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TES
	the system for normal operation.
8: CHECK FUS	E 42 OF THE ENGINE COMPARTMENT FUSE BOX
1	Check the fuse.
Is	the fuse OK?
	es
	<u>GO to L10</u> .
No	
	GO to L9.
9: CHECK FUS	E 42 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND
1	Measure the resistance between electrical connector JB34 pin 105 of the engine compartment fuse box and GROUND.
	the resistance less than 10,000 ohms?
Υe	
	REPAIR short to ground between the engine compartment fuse box and the left-hand bank HO2S.
	For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal
,	operation.
No	INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system
	for normal operation.
10. CHECK TH	E POWER SUPPLY TO FUSE 42 IN THE ENGINE COMPARTMENT FUSE BOX
1 .	
1	Measure the voltage between Fuse 42 electrical connector JB34 pin 105 and GROUND. the voltage less than 10 volts?
Υe	
''	Repair the circuit from the ECM control relay to the engine compartment fuse box. For additional
	information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
No	
[Repair the circuit between the engine compartment fuse box and the HO2S. For additional
	information, refer to wiring diagrams.
INPOINT TES	ST M : DTC P0101, P0102, P0103, P1104. MASS AIR FLOW SENSOR (MAF)
TEST	DETAILS / DESULTS / ACTIONS

TEST CONDITIONS	EST M : DTC P0101, P0102, P0103, P1104. MASS AIR FLOW SENSOR (MAF) DETAILS/RESULTS/ACTIONS
M1: CHECK TH	HE MAF SENSOR POWER SUPPLY
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the MAF sensor electrical connector EN6.
	3 Turn the ignition switch to the ON position.
	4 Measure the voltage between the MAF sensor electrical connector EN6 pin 1 (GU) and GROUND.
	Is the voltage less than 10 volts?
	Yes

		GO to M5.
	No	
		GO to M2.
M2: CHECK CO		INUITY OF THE MAF SENSOR GROUND CIRCUIT
	2	Turn the ignition switch to the OFF position. Disconnect the ECM electrical connector EN16.
\vdash	3	Measure the resistance between the MAF sensor electrical connector EN6 pin 3 (GW) and the ECM
		electrical connector EN16 pin 44 (GW).
	Is th Yes	he resistance less than 5 ohms?
	103	GO to M3.
	No	
		REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
M3: CHECK CO		INUITY OF THE MAF SENSOR GROUND CIRCUIT
	1	Measure the resistance between the MAF sensor electrical connector EN6 pin 2 (BW) and the ECM electrical connector EN16 pin 45 and pin 46 (BW).
		he resistance less than 5 ohms?
	Yes	
	No	GO to M4.
		REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
M4: CHECK TH	HE N	MAF SENSOR CIRCUIT FOR SHORT TO GROUND
	1	Measure the resistance between the MAF sensor electrical connector EN6 pin 3 (GW) and GROUND.
	Is th	he resistance greater than 10,000 ohms?
	Yes	
		INSTALL a new MAF sensor. For additional information,
		REFER to: Mass Air Flow (MAF) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
		CLEAR DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM.
		For additional information,
		REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 -
		AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). Before replacing an ECM, contact dealer technical support.
	No	before replacing an Lewi, contact acaret technical support.
		REPAIR the short to ground. For additional information, refer to the wiring diagrams. CLEAR the
ME, CHECK EI	ICE	DTCs. TEST the system for normal operation.
M5: CHECK FU	JSE 1	36 OF THE ENGINE COMPARTMENT FUSE BOX Check the fuse.
	_	he fuse OK?
	Yes	
		GO to M7.
	No	
M4. CHECK EI	ICE	GO to M6. 36 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND
IVIO. CITECK FO	1	Measure the resistance between electrical connector JB34 pin 93 of the engine compartment fuse
		box and GROUND.
		ne resistance less than 10,000 ohms?
	Yes	
		REPAIR short to ground between the engine compartment fuse box and the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal
		operation.
	No	
		INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system for normal operation.
M7: CHECK TH	HE F	POWER SUPPLY FROM FUSE 36 IN THE ENGINE COMPARTMENT FUSE BOX TO THE MAF
SENSOR		The William Control of
	1	Measure the voltage between the engine compartment fuse box electrical connector JB34 pin 93 and GROUND.
	Is th	he voltage less than 10 volts?
	Yes	
		Repair the circuit from the engine compartment fuse box to the MAF sensor. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No	Recheck DTCs.

TEST CONDITIONS		DETAILS/RESULTS/ACTIONS
N1: CHECK CO	דעכ זעכ	TINUITY OF THE INTAKE AIR TEMPERATURE (IAT) SENSOR POWER SUPPLY CIRCUIT
	1	Turn the ignition switch to the OFF position.
	2	Disconnect the MAF sensor electrical connector EN6.
	3	Disconnect the ECM electrical connector EN16.
	4	Measure the resistance between the MAF sensor electrical connector EN6 pin 4 (0) and the ECM electrical connector EN16, pin 71 (0).
	ls t	the resistance less than 5 ohms?
	Ye	
	No	GO to N2.
		REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST the system for normal operation.
N2: CHECK CO	יי זאכ	TINUITY OF THE IAT SENSOR CIRCUIT
	1	Measure the resistance between the MAF sensor electrical connector EN6 pin 5 (BG) and the ECM electrical connector EN16, pin 19 (BG).
	ls t	the resistance less than 5 ohms?
	Ye	
		GO to N4.
	No	REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TEST
		the system for normal operation.
N3: CHECK TH	HE	IAT SENSOR CIRCUIT FOR SHORT TO BATTERY
	1	Turn the ignition switch to the OFF position.
	2	Disconnect the MAF sensor electrical connector EN6.
	3	Check for a voltage between EN6 pin 5 (BG) and GROUND.
	ls t	the voltage greater than 1 volt?
	Ye	• •
	L.	GO to N1.
	No	
		INSTALL a new MAF sensor. REFER to: Mass Air Flow (MAF) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
		AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
		CLEAR the DTC. TEST the system for normal operation.
N4: CHECK TH	HE	IAT SENSOR POWER SUPPLY CIRCUIT FOR SHORT TO GROUND
	1	Measure the resistance between the MAF sensor electrical connector EN6 pin 4 (O) and GROUND.
	ls t	the resistance less than 10,000 ohms?
	Ye	
		REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the
	No	DTCs. TEST the system for normal operation.
	"	GO to N5.
N5: CHECK TH	ΗE	IAT SENSOR GROUND CIRCUIT FOR SHORT TO BATTERY
	1	Connect the ECM electrical connector, EN16.
	2	Turn the ignition switch to the ON position.
	3	Check for voltage at EN6 pin 5 (BG)
	ls t	the voltage greater than 1 volt?
	Ye	s
		REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs.
	N.	TEST the system for normal operation.
	No	INSTALL a new MAF sensor.
		REFER to: Mass Air Flow (MAF) Sensor (303-14A Electronic Engine Controls - 2.5L NA V6 -
		AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
		CLEAR the DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new
		ECM.
		REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
		Before replacing an ECM, contact dealer technical support.
		20.0. 0 . op. aon. g an Eom, comact acaier toomical support.
DINDOINT	EC.	T.O.: DTC P0051, P0052, LEFT-HAND BANK H02S HEATER

PINPOINT TEST 0: DTC P0051, P0052. LEFT-HAND BANK H02S HEATER		
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
O1: CHECK THE POWER SUPPLY CIRCUIT TO THE LEFT-HAND BANK HO2S HEATER		
1 Turn the ignition switch to the ON position.		

2 Measure the voltage between the HO2S electrical connector EN32 pin 2 (WR) and GROUND.
Is the voltage less than 10 volts?
Yes
GO to O4.
No GO to O2.
O2: CHECK THE GROUND CIRCUIT TO THE LEFT-HAND BANK HO2S HEATER
1 Turn the ignition switch to the OFF position.
2 Disconnect the ECM electrical connector EN16.
3 Measure the resistance between the HO2S electrical connector EN32 pin 1 (GO) and the ECM
electrical connector EN16 pins 55 and 56 (GO).
Is the resistance of each wire less than 5 ohms?
Yes GO to O3.
No No
REPAIR the circuit. For additional information, refer to the wiring diagrams. CLEAR the DTCs. TES
the system for normal operation.
O3: CHECK THE LEFT-HAND BANK HO2S CIRCUIT FOR SHORT TO GROUND
1 Measure the resistance between the HO2S electrical connector EN32 pin 1 (GO) 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 INSTALL a new left hand hank HO2S. For additional information
INSTALL a new left-hand bank HO2S. For additional information, REFER to: Heated Oxygen Sensor (HO2S) LH (303-14A Electronic Engine Controls - 2.5L NA V6 -
AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
CLEAR DTCs. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECN
For additional information,
REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
Before replacing an ECM, contact dealer technical support.
O4: CHECK FUSE 42 OF THE ENGINE COMPARTMENT FUSE BOX
1 Check the fuse.
Is the fuse OK?
Yes GO to O6.
No SO 10 CO.
<u>GO to O5</u> .
O5: CHECK FUSE 42 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND
Measure the resistance between electrical connector JB34 pin 105 of the engine compartment fus box and GROUND.
Is the resistance less than 10,000 ohms?
Yes REPAIR short to ground between the engine compartment fuse box and the left-hand bank HO2S
For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for norma
operation.
No No This is the state of the
INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system for normal operation.
O6: CHECK THE POWER SUPPLY TO FUSE 42 IN THE ENGINE COMPARTMENT FUSE BOX
1 Measure the voltage between fuse 42, electrical connector JB34 pin 105 and GROUND.
Is the voltage less than 10 volts?
Yes
Repair the circuit from the ECM control relay to the engine compartment fuse box. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
No
Repair the circuit between the engine compartment fuse box and the HO2S. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
PINPOINT TEST P : DTC P1606. ECM RELAY.
TEST DETAILS/RESULTS/ACTIONS

PINPOINT TEST P: DTC P1606. ECM RELAY.		
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
P1: CHECK TH	IE ECM CONTROL RELAY	
	1 Turn the ignition switch to the ON position.	
	Does the ECM relay make an audible click?	
	Yes	

	GO to P2.
	No CO to P6
	<u>GO to P6</u> .
i	OR POWER SUPPLY FROM THE ECM CONTROL RELAY
	1 Measure the voltage between the ECM control relay JB34 pin 131 and GROUND. Is the voltage less than 10 volts?
	Yes
	GO to P3.
	No
	REPAIR the circuit from the ECM control relay to the ECM. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
P3: CHECK FU	ISE 9 IN THE ENGINE COMPARTMENT FUSE BOX
	1 Check the fuse.
	Is the fuse OK?
l l	Yes
	GO to P4. No
l l	INSTALL a new fuse. Check the circuit for cause of fuse failure. CLEAR the DTC. TEST the system
	for normal operation.
P4: CHECK TH	IE POWER SUPPLY TO FUSE 9 IN THE ENGINE COMPARTMENT FUSE BOX
	1 Measure the voltage between Fuse 9 electrical connector JB34 pin 75 and GROUND.
	Is the voltage less than 10 volts?
	Yes Repair the circuit from the battery positive to the engine compartment fuse box. CLEAR the DTC.
	TEST the system for normal operation.
	No
	GO to P5.
P5: CHECK TH	IE POWER SUPPLY FROM FUSE 9 IN THE ENGINE COMPARTMENT FUSE BOX TO THE ECM
OOIT NOE KEE	Measure the voltage between the ECM control relay electrical connector JB34 pin 132 and
	GROUND.
	Is the voltage less than 10 volts?
	Yes Repair the circuit from the engine compartment fuse box to the ECM control relay. CLEAR the
	DTC. TEST the system for normal operation.
	No
	INSTALL a new ECM control relay. For additional information, refer to the electrical guide. CLEAR
P6: CHECK EU	the DTC. TEST the system for normal operation. ISE 31 OF THE ENGINE COMPARTMENT FUSE BOX
	1 Check the fuse.
ii	Is the fuse OK?
	Yes
	<u>GO to P7</u> .
	No GO to P10.
P7: CHECK PO	OWER SUPPLY TO THE ECM CONTROL RELAY FROM FUSE 31 OF THE ENGINE COMPARTMENT
FUSE BOX	WER SOLLET TO THE EOM CONTROL RELAT FROM TOSE STOLETHE ENGINE COMPARTMENT
	1 Measure the voltage between ECM relay electrical connector JB34 pin 133 and GROUND.
	Is the voltage less than 10 volts?
	Yes
	GO to P8. No
	GO to P12.
P8: CHECK CO	NTINUITY OF THE ECM CONTROL RELAY GROUND CIRCUIT
	1 Disconnect the ECM electrical connector EN16.
	2 Remove the ECM control relay from the engine compartment fuse box.
	3 Measure the resistance between the ECM electrical connector EN16 pin 40 and JB34 pin 134 of the
\vdash	engine compartment fuse box. Is the resistance less than 5 ohms?
	Yes
	GO to P9.
	No
	REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	(This circu t includes the power distribut on fuse box and the EMS relay and diode.)
P9: CHECK CO	NTINUITY OF THE ECM CONTROL RELAY WINDING
ı <u> </u>	

	1 Measure the resistance of the ECM control relay winding between pins 1 and 2 of the ECM control
	relay. Is the resistance less than 60 ohms?
	Yes
	INSTALL a new ECM control relay. CLEAR the DTC. TEST the system for normal operation.
	No
	INSTALL a new ECM.
	REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Before replacing an ECM, contact dealer technical support. CLEAR the DTC. TEST the system for
	normal operation.
P10: CHECK F	FUSE 31 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND
	1 Measure the resistance between electrical connector JB34 pin 83 of the engine compartment fuse
	box and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR short to GROUND between the engine compartment fuse box and the ECM control relay.
	CLEAR the DTC. TEST the system for normal operation.
	No
D44 011E01/ F	INSTALL a new fuse. CLEAR the DTC. TEST the system for normal operation.
PTT: CHECK F	TUSE 9 OF THE ENGINE COMPARTMENT FUSE BOX FOR A SHORT TO GROUND
	Measure the resistance between electrical connector JB34 pin 132 of the engine compartment fuse
	box and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes REPAIR short to ground between the engine compartment fuse box and the ECM control relay.
	CLEAR the DTC. TEST the system for normal operation.
	No
	INSTALL a new fuse. CLEAR the DTC. TEST the system for normal operation.
P12: CHECK 1	THE ECM CONTROL RELAY DIODE
	1 Remove the ECM control relay diode from the engine compartment fuse box.
	2 Measure the continuity of ECM control relay diode.
	Is the resistance less than 5 ohms?
	Yes
	Possible intermittent fault. Recheck DTCs.
	No motali som i i i i i i i i i i i i i i i i i i i
	INSTALL a new ECM control relay diode. Make sure that the ECM control relay diode is installed
	correctly. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	System for mormal operation.

PINPOINT T	EST Q : P0106, P0107, P0108. MAP SENSOR
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
Q1: CHECK TH	HE GROUND CIRCUIT TO THE MAP SENSOR
	1 Disconnect the MAP sensor electrical connecter EN8.
	2 Measure the resistance between the MAP sensor electrical connecter EN8 pin 4 (BG) and GROUND.
	Reconnect electrical connectors following test.
	Is the resistance less than 5 ohms?
	Yes
	<u>GO to Q2</u> .
	No REPAIR the circuit between the MAP sensor and GROUND. For additional information, refer to
22 21 22 21 21	wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
Q2: CHECK IF	HE POWER SUPPLY CIRCUIT TO THE MAP SENSOR FOR SHORT TO BATTERY
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the MAP sensor electrical connector EN8 pin 2 (OY) and GROUND.
	Is the voltage greater than 6 volts?
	Yes REPAIR the short to battery. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No
	<u>GO to Q3</u> .
Q3: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE MAP SENSOR FOR SHORT TO GROUND
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between the MAP sensor electrical connector EN8 pin 2 (OY) and GROUND.

	s the voltage less than 4 volts?
Y	es
	REPAIR the short to GROUND. For additional information, refer to wiring diagrams. CLEAR the
	DTC. TEST the system for normal operation.
	lo GO to O4
Q4: CHECK CO	NTINUITY OF THE MAP SENSOR SIGNAL WIRE
	1 Turn the ignition switch to the OFF position.
	2 Disconnect the MAP sensor electrical connector EN8.
	3 Disconnect the ECM electrical connector EN16.
ſ	Measure the resistance of the circuit between MAP sensor electrical connector EN8 pin 1 (BW) and ECM electrical connector EN16 pin 127 (BW).
1:	s the resistance less than 5 ohms?
Y	'es
	<u>GO to Q5</u> .
	lo
	REPAIR the circuit between the MAP sensor electrical connector EN8 pin 1 (BW) and ECM electrical
	connector EN16 pin 127 (BW). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
OF: CHECK TH	E MAP SENSOR SIGNAL WIRE FOR SHORT TO GROUND
	1 Disconnect the ECM electrical connector EN16.
	2 Disconnect the MAP sensor electrical connector EN8.
	3 Measure the resistance between EN8 pin 1 (BW) and GROUND.
	s the resistance less than 10,000 ohms?
	es
l l'	REPAIR the short to GROUND. For additional information, refer to the wiring diagrams. CLEAR the
	DTC. TEST the system for normal operation.
	(The fault could be in any of the components or sensors in the 5 volt supply circut, or the ECM.)
	lo
I '	GO to Q6.
Q6: CHECK TH	E MAP SENSOR SIGNAL WIRE FOR SHORT TO BATTERY
·	1 Connect the ECM electrical connector EN16.
	2 Turn the ignition switch to the ON position.
	3 Check for a voltage at EN8 pin 1 (BW).
i i	s the voltage greater than 10 volts?
	'es
	Repair the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.
	TEST the system for normal operation.
	(The fault could be in any of the components or sensors in the 5 volt supply circut, or the ECM.)
	lo
	INSTALL a new MAP sensor. CLEAR the DTC. TEST the system for normal operation.

DINIDOINTT	EST D. DOOAG DASSA NAT DICHT HAND DANK
F	EST R : P0010, P1384. VVT RIGHT-HAND BANK
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
R1: CHECK TH	HE GROUND CIRCUIT TO THE RIGHT-HAND BANK VVT SOLENOID
	1 Disconnect the VVT solenoid electrical connector EN61.
	2 Measure the resistance between the VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND.
	Is the resistance less than 5 ohms?
	Yes
	GO to R2.
	No
	REPAIR the circuit between VVT solenoid electrical connector EN61 pin 2 (BG) and GROUND. For
	additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal
	operation.
R2: CHECK CO	ONTINUITY OF THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE
	Measure the resistance between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical connector EN16 pin 109 (RW).
	Is the resistance less than 5 ohms?
	Yes
	<u>GO to R3</u> .
	No
	REPAIR the circuit between VVT solenoid electrical connector EN61 pin 1 (RW) and ECM electrical
	connector EN16 pin 109 (RW). For additional information, refer to wiring diagrams. CLEAR the
	DTC. TEST the system for normal operation.
I	l '

R3: CHECK FO	OR SHORT TO GROUND AT THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE
	1 Disconnect the ECM electrical connector EN16.
	2 Measure the resistance between EN61 pin 1 (RW) and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR the short to GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No ·
	GO to R4.
R4: CHECK FO	R SHORT TO BATTERY AT THE RIGHT-HAND BANK VVT SOLENOID SIGNAL WIRE
	1 TURN the ignition switch to the ON position.
	2 Check for a voltage at EN61 pin 1 (RW).
	Is the voltage greater than 1 volt?
	Yes
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC.
	TEST the system for normal operation.
	No .
	INSTALL a new right-hand bank VVT solenoid.
	REFER to: Variable Camshaft Timing (VCT) Oil Control Solenoid (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	CLEAR the DTC. TEST the system for normal operation.

	CLEAR the DTC. TEST the system for normal operation.
DINDOINT T	TEST S : P0020, P1396. VVT LEFT-HAND BANK
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
	ROUND CIRCUIT TO THE LEFT-HAND BANK VVT SOLENOID
<u> </u>	1 Disconnect the VVT solenoid electrical connector, EN42.
	2 Measure the resistance between the VVT solenoid electrical connector EN42 pin 2 (BG) and
	GROUND.
	Is the resistance less than 5 ohms?
	Yes
	<u>GO to S2</u> .
	No
	REPAIR the circuit between VVT solenoid electrical connector EN42 pin 2 (BG) and GROUND. For
	additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for norma
	operation.
S2: CHECK C	ONTINUITY OF THE LEFT-HAND BANK VVT SOLENOID SIGNAL WIRE.
	1 Measure the resistance between VVT solenoid electrical connector EN42 pin 1 (G) and ECM
	electrical connector EN16 pin 110 (G).
	Is the resistance less than 5 ohms? Yes
	GO to S3.
	No
	REPAIR the circuit between VVT solenoid electrical connector EN42 pin 1 (G) and ECM electrical
	connector EN16 pin 110 (G). For additional information, refer to the wiring diagrams. CLEAR the
	DTC. TEST the system for normal operation.
S3: CHECK F	OR SHORT TO GROUND AT THE LEFT-HAND BANK VVT SOLENOID SIGNAL WIRE
	1 Disconnect the ECM electrical connector EN16.
	2 Measure the resistance between EN61 pin 1 (RW) 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 S4.
SA. CHECK E	OR SHORT TO BATTERY AT THE LEFT-HAND BANK VVT SOLENOID SIGNAL WIRE
54: CHECK F	
	1. Ferrit and ignition to the end on postation
	2 Check for a voltage at EN61 pin 1 (RW).
	Is the voltage greater than 1 volt? 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 left-hand bank VVT solenoid.
	REFER to: Variable Camshaft Timing (VCT) Oil Control Solenoid (303-14A Electronic Engine
	Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	I

PINPOINT T	EST T : P1251, P1631, P1657, P1658. THROTTLE MOTOR RELAY
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
T1: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE THROTTLE MOTOR RELAY
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between pin 1 of the throttle motor relay base and GROUND.
	Is the voltage greater than 10 volts?
	Yes GO to T2.
	No Stories - Sto
	REPAIR the circuit between pin 1 of the throttle motor relay base and the EMS control relay. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
T2: CHECK CO	ONTINUITY OF THE THROTTLE MOTOR RELAY SIGNAL WIRE
	1 Turn the ignition switch to the OFF position.
	2 Measure the resistance between the throttle motor relay base, pin 2 and the ECM electrical
	connector EN16 pin 52 (GR).
	Is the resistance less than 5 ohms?
	Yes CO to T2
	GO to T3. No
	REPAIR the circuit between the throttle motor relay base pin 2 and the ECM electrical connector
	EN16 pin 52 (GR). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST
	the system for normal operation.
T3: CHECK TH	HE THROTTLE MOTOR RELAY SIGNAL WIRE FOR SHORT TO BATTERY
	1 Turn the ignition switch to the OFF position.
	2 Remove the throttle motor relay.
	3 Disconnect the ECM electrical connector EN16.
	4 Check for a voltage between the throttle motor relay base pin 2 and GROUND.
	Is the voltage greater than 1 volt? Yes
	REPAIR the short to battery. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No
T.A. OLIFOX TI	GO to T4.
14: CHECK IF	THROTTLE MOTOR RELAY SIGNAL WIRE FOR SHORT TO GROUND 1 Measure the resistance between the throttle motor relay base pin 2 and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR the short to GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No
	GO to T5.
T5: CHECK CO	ONTINUITY OF THE THROTTLE MOTOR RELAY OUTPUT WIRE
	1 Test for continuity between throttle motor relay base pin 5 and ECM electrical connector EN16 pin 134 (RW).
	Is the circuit continuous? Yes
	INSTALL a new throttle motor relay. CLEAR the DTC. TEST the system for normal operation. If the
	DTC is repeated, INSTALL a new ECM. DEFER to Engine Control Module (ECM) (202, 14B Floatronic Engine Controls 2, 21 Durators TDC)
	REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
	Before replacing a ECM, contact Dealer technical support.
	No
	REPAIR the circuit between throttle motor relay base pin 2 and ECM electrical connector EN16 pin 134 (RW). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system
T/ 011501751	for normal operation.
1 6: CHECK TH	HE THROTTLE MOTOR RELAY OUTPUT WIRE FOR SHORT TO BATTERY
	1 Check for a voltage between the throttle motor relay base pin 5 and GROUND.
	Is the voltage greater than 1 volt? Yes
	REPAIR the short to battery. For additional information, refer to wiring diagrams. CLEAR the DTC.
	TEST the system for normal operation.
	No

	<u>GO to T7</u> .
T7: CHECK TH	HE THROTTLE MOTOR RELAY OUTPUT WIRE FOR SHORT TO GROUND
	1 Measure the resistance between the throttle motor relay base pin 5 and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes
	REPAIR the short to GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No
	INSTALL a new throttle motor relay. For additional information, refer to the electrical guide. CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Before replacing an ECM, contact dealer technical support.

PINPOINT TEST U : P1549. IMT VALVE 1					
TEST	DETAILS/RESULTS/ACTIONS				
CONDITIONS					
	U1: CHECK THE POWER SUPPLY CIRCUIT TO THE IMT VALVE 1				
	1 Turn the ignition switch to the ON position.				
	2 Measure the voltage between IMT valve 1 electrical connector EN999 pin 1 (NG) and GROUND.				
	Is the voltage greater than 10 volts?				
	Yes				
	GO to U2.				
	No				
	REPAIR the circuit between the IMT valve 1 electrical connector EN999 pin 1 (NG) and the Battery				
	power bus 2. CLEAR the DTC. TEST the system for normal operation. (This circu t includes the power distribut on fuse box and the EMS control relay. For additional informat on, refer to wiring diagrams.)				
U2: CHECK CO	ONTINUITY OF THE IMT VALVE 1 SIGNAL WIRE.				
	1 Disconnect the ECM electrical connector EN16.				
	2 Measure the resistance between the IMT valve 1 electrical connector EN999 pin 2 (OY) and the				
	ECM electrical connector EN16 pin 38 (OY).				
	Is the resistance less than 5 ohms?				
	Yes				
	GO to U3.				
	No REPAIR the circuit between the IMT valve 1 electrical connector EN999 pin 2 (OY) and the ECM				
	electrical connector EN16 pin 38 (OY). For additional information, refer to wiring diagrams. CLEAR				
	the DTC. TEST the system for normal operation.				
U3: CHECK IN	IT VALVE SIGNAL WIRE FOR SHORT TO GROUND				
	1 Measure the resistance between EN999 pin 2 (OY) and GROUND.				
	Is the resistance less than 10,000 ohms?				
	Yes				
	REPAIR the short to GROUND. For additional information, refer to wiring diagrams. CLEAR the				
	DTC. TEST the system for normal operation.				
	No				
LIA. CHECK IN	GO to U4.				
U4: CHECK IN	T VALVE SIGNAL WIRE FOR SHORT TO BATTERY 1				
\vdash	Connect the ECM electrical connector EN16. Turn the ignition switch to the ON position.				
\vdash	2 Turn the ignition switch to the ON position.3 Check for a voltage at EN999 pin 2 (OY).				
\vdash					
	Is the voltage greater than 10 volts? Yes				
	REPAIR the short to battery. For additional information, refer to wiring diagrams. CLEAR the DTC.				
	TEST the system for normal operation.				
	No				
	INSTALL a new IMT valve. CLEAR the DTC. TEST the system for normal operation. If the DTC is				
	repeated, INSTALL a new ECM.				
	REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 -				
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). Before replacing an ECM, contact dealer technical support. CLEAR the DTC. TEST the system for				
	normal operation.				
	normal operation.				

PINPOINT TEST V : P1532. IMT VALVE 2		
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
V1: CHECK THE POWER SUPPLY CIRCUIT TO THE IMT VALVE 2		

	13 Measthe માર્ગિયા જાયું પાતા કાર્યા પાતા માર્ગિયા પાતા કર્યા છે. electrical connector EN998 pin 1 (NG) and GROUND.
	Is the voltage greater than 10 volts?
	Yes
	GO to V2.
	No
	REPAIR the circuit between the IMT valve 2 electrical connector EN998 pin 1 (NG) and the Battery
	power bus 2. CLEAR the DTC. TEST the system for normal operation. (This circu t includes the power distribut on fuse box and the EMS control relay. For additional informat on, refer to wiring diagrams.)
V2: CHECK CO	ONTINUITY OF THE IMT VALVE 2 SIGNAL WIRE
	1 Disconnect the ECM electrical connector EN16.
	2 Measure the resistance between the IMT valve 2 electrical connector EN998 pin 2 (OY) and the
	ECM electrical connector EN16 pin 39 (OY).
	Is the resistance less than 5 ohms?
	Yes
	GO to V3.
	No
	REPAIR the circuit between the IMT valve 2 electrical connector EN998 pin 2 (OY)and the ECM
	electrical connector EN16 pin 39 (OY). For additional information, refer to wiring diagrams. CLEAR
VO. 011E01/ IB	the DTC. TEST the system for normal operation.
V3: CHECK IN	AT VALVE SIGNAL WIRE FOR SHORT TO GROUND
	1 Measure the resistance between EN998 pin 2 (OY) and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes REPAIR the short to GROUND. For additional information, refer to wiring diagrams. CLEAR the
	DTC. TEST the system for normal operation.
	No
	GO to V4.
V4: CHECK IN	/IT VALVE SIGNAL WIRE FOR SHORT TO BATTERY
	1 Connect the ECM electrical connector EN16.
	2 Turn the ignition switch to the ON position.
	3 Check for a voltage at EN998 pin 2 (OY).
	Is the voltage greater than 10 volts?
	Yes
	REPAIR the short to battery. For additional information, refer to wiring diagrams. CLEAR the DTC.
	TEST the system for normal operation.
	No
	INSTALL a new IMT valve. CLEAR the DTC. TEST the system for normal operation. If the DTC is
	repeated, INSTALL a new ECM.
	REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.
	perore repracting an ecrit, contact dealer technical Support.

PINPOINT TEST W: P1582. FLIGHT RECORDER DATA STORED		
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS	
W1: EXTRACT THE FLIGHT RECORDER DATA		
	NOTE: Flight recorder data can only be extracted using the Jaguar approved diagnostic system, where available.	
	1 Connect the Jaguar approved diagnostic system, or code reader.	
	Is DTC P1582 stored?	
	Yes	
	Refer to dealer technical support for information on extracting data. No	
	Test not applicable.	

PINPOINT TEST X : P1243. SENSOR GROUND CIRCUITS.			
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS		
X1: CHECK TH	IE GROUND CIRCUIT TO THE ECT SENSOR		
	1 Measure the resistance between ECT sensor electrical connector EN18 pin 1 (BG) and GROUND.		
	Is the resistance less than 5 ohms?		
	Yes GO to X2. No REPAIR the circuit between the ECT sensor electrical connector EN18 pin 1 (BG) and GROUND. CLEAR the DTC. TEST the system for normal operation.		

(This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams.) X2: CHECK THE GROUND CIRCUIT TO THE EOT SENSOR Measure the resistance between EOT sensor electrical connector EN25 pin 2 (BG) and GROUND Is the resistance less than 5 ohms? Yes GO to X3. No REPAIR the circuit between the EOT sensor electrical connector EN25 pin 2 (BG) and GROUND. CLEAR the DTC. TEST the system for normal operation. (This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams.) X3: CHECK THE GROUND CIRCUIT TO THE IP SENSOR Measure the resistance between IP sensor electrical connector IJ7 pin 2 (WG) and GROUND. Is the resistance less than 5 ohms? Yes GO to X4. Νo REPAIR the circuit between the IP sensor electrical connector IJ7 pin 2 (WG) and GROUND. CLEAR the DTC. TEST the system for normal operation. (This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams.) X4: CHECK THE GROUND CIRCUIT TO THE EFT SENSOR Measure the resistance between EFT sensor electrical connector IJ8 pin 1 (NU) and GROUND Is the resistance less than 5 ohms? Yes GO to X5. No REPAIR the circuit between the EFT sensor electrical connector IJ8 pin 1 (NU) and GROUND. CLEAR the DTC. TEST the system for normal operation. (This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams.) X5: CHECK THE GROUND CIRCUIT TO THE MAP SENSOR Measure the resistance between MAP sensor electrical connector EN8 pin 4 (BG) and GROUND Is the resistance less than 5 ohms? Yes GO to X6. No REPAIR the circuit between the MAP sensor electrical connector EN8 pin 4 (BG) and GROUND. CLEAR the DTC. TEST the system for normal operation. (This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams.) X6: CHECK THE GROUND CIRCUIT TO THE FTP SENSOR NOTE: Access to the FTP sensor involves the removal of the fuel tank. To reduce the amount of work necessary, a slave harness could be used. This can be connected at the access port beneath the rear seat. Tests can then be carried out via the slave harness and sensor. If system operation is normal with the slave harness and sensor, the fault lies in the vehicle's harness or sensor. Measure the resistance between FTP sensor electrical connector FT1 pin 3 (BG) and GROUND. Is the resistance less than 5 ohms? Yes GO to X7. No REPAIR the circuit between the FTP Sensor electrical connector FT1 pin 3 (BG) and GROUND. CLEAR the DTC. TEST the system for normal operation. (This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams.) X7: CHECK THE GROUND CIRCUIT TO THE APP SENSOR (TRACK 1) Measure the resistance between APP sensor electrical connector PA1 pin 3 (BG) and GROUND Is the resistance less than 5 ohms? Yes GO to X8. No REPAIR the circuit between the APP sensor electrical connector PA1 pin 3 (BG) and GROUND. CLEAR the DTC. TEST the system for normal operation. (This circu t includes the ECM. For add t onal information, refer to wiring diagrams.) X8: CHECK THE GROUND CIRCUIT TO THE TP SENSOR Measure the resistance between TP sensor electrical connector EN13 pin 1 (BG) and GROUND. Is the resistance less than 5 ohms? Yes GO to X9. No REPAIR the circuit between the TP sensor electrical connector EN13 pin 1 (BG) and GROUND. CLEAR the DTC. TEST the system for normal operation. (This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams.) X9: CHECK THE GROUND CIRCUIT TO THE APP SENSOR (TRACK 3)

I .	REPAIR the circuit between the APP sensor electrical connector PA1 pin 6 (BG) and GROUND.			
	CLEAR the DTC. TEST the system for normal operation.			
	(This circu t includes the ECM. For add t onal informat on, refer to wiring diagrams.)			
72. CHECK TI	HE GROUND CIRCUIT TO THE APP SENSOR. FOR CONTINUITY			
Z3: CHECK II	Disconnect the ECM electrical connector EN16.			
	Disconnect the APP sensor electrical connector PA1. Measure the registered between FN14 pin 20 (PC) and PA1 pin 4 (PC)			
	3 Measure the resistance between EN16 pin 20 (BG) and PA1 pin 6 (BG).			
	Is the resistance less than 5 ohms? Yes			
	GO to Z4.			
	No State Line			
	REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the			
	system for normal operation.			
Z4: CHECK TI	HE GROUND CIRCUIT TO THE APP SENSOR. FOR SHORT TO BATTERY			
	1 Connect the ECM electrical connector EN16.			
	2 Turn the ignition switch to the ON position.			
	3 Check for a voltage at PA1 pin 6 (BG).			
	Is the voltage greater than 1 volt?			
	Yes			
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC.			
	TEST the system for normal operation.			
	No GO to Z5.			
75. CHECK C	ONTINUITY OF THE APP SENSOR SIGNAL WIRE			
25. CHECK C	1 Turn the ignition switch to the OFF position.			
	2 Disconnect the APP sensor electrical connector PA1.			
	3 Measure the resistance between APP sensor electrical connector PA1 pin 4 (R) and the ECM			
	electrical connector EN16 pin 102 (R).			
	Is the resistance less than 5 ohms? Yes			
	GO to Z6.			
	No Section 20.			
	REPAIR the circuit between the APP sensor electrical connector PA1 pin 4 (R) and the ECM			
	electrical connector EN16 pin 102 (R). For additional information, refer to wiring diagrams. CLEAR			
ļ	the DTC. TEST the system for normal operation.			
Z6: CHECK C	ONTINUITY OF THE APP SENSOR POTENTIOMETER			
	1 Measure the resistance between APP sensor electrical connector PA1 pins 4 and 6.			
	2 Operate the accelerator pedal through it's full range while observing the resistance reading.			
	Does the resistance vary as the pedal is operated?			
	Yes			
	INSTALL a new ECM.			
	REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).			
	Before replacing an ECM, contact dealer technical support.			
	No			
	INSTALL a new accelerator pedal position sensor,			
	REFER to: Accelerator Pedal (310-02 Acceleration Control, Removal and Installation).			
	CLEAR the DTC. TEST the system for normal operation.			

PINPOINT TEST AA : P2122, P2123. APP SENSOR (TRACK 3)					
TEST	DETAILS/RESULTS/ACTIONS				
CONDITIONS					
AA1: CHECK THE POWER SUPPLY CIRCUIT TO THE APP SENSOR. TRACK 3					
	1	1 Turn the ignition switch to the ON position.			
	2	2 Measure the voltage between APP sensor electrical connector PA1 pin 1 (Y) and GROUND.			
	Is the voltage greater than 4 volts?				
	Yes				
		GO to AA2.			
	No				
		REPAIR the circuit between the APP sensor electrical connector PA1 pin 1 (Y) and the sensor 5 volt			
		supply. CLEAR the DTC. TEST the system for normal operation.			
		(This circut includes the ECM, EMS control relay, and power distribution fuse box. For add tonal information, refer to wiring diagrams. This supply is also linked to other sensors. The fault could be in any of these or their wiring.)			
AA2: CHECK 1	ГНЕ	GROUND CIRCUIT TO THE APP SENSOR			
	1	Turn the ignition switch to the OFF position.			
	2	Disconnect the APP sensor electrical connector PA1.			

Is the resistance less than 5 ohms? Yes GO to AA5. No REPAIR the circuit between the APP sensor electrical connector PA1 pin 3 (BG) and GROUND. CLEAR the DTC. TEST the system for normal operation. (This drout includes the ECM. For add closel information, refer to witing diagrams.) AA3: CHECK THE GROUND CIRCUIT TO THE APP SENSOR FOR CONTINUITY 1 Disconnect the ECM electrical connector FN16. 2 Disconnect the ECM electrical connector FN16. 3 Measure the resistance between EN16 pin 19 (BG) and PA1 pin 3 (BG). Is the resistance less than 5 ohms? Yes GO to AA4. No REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST th system for normal operation. AA4: CHECK THE GROUND CIRCUIT TO THE APP SENSOR FOR SHORT TO BATTERY 1 Connect the ECM electrical connector EN16. 2 Turn the ignition switch to the ON position. 3 Check for a voltage at PA1 pin 3 (BG). Is the voltage greater than 1 volt? Yes REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No No AA5: CHECK CONTINUITY OF THE APP SENSOR SIGNAL WIRE 1 Measure the resistance between APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EN16 pin 103 (Y). Is the resistance less than 5 ohms? Yes GO to AA6. No REPAIR the circuit between the APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EN16 pin 103 (Y). Is the resistance less than 5 ohms? Yes GO to AA6. No REPAIR the circuit between the APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EN16 pin 103 (Y). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. A66: CHECK CONTINUITY OF THE APP SENSOR POTEMITIOMETER 1 Measure the resistance between APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EN16 pin 103 (Y). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. A66: CHECK CONTINUITY		3 Measure the resistance between APP sensor electrical connector PA1 pin 3 (BG) and GROUND.
GO to AA5. No REPAIR the circuit between the APP sensor electrical connector PA1 pin 3 (BG) and GROUND. CLEAR the DTC. TEST the system for normal operation. (The deput includes the COM. For wait invalidation of the vering diagrams.) MA3: CHECK THE GROUND CIRCUIT TO THE APP SENSOR FOR CONTINUITY 1 Disconnect the ECM electrical connector PA1. 2 Disconnect the APP sensor electrical connector PA1. 3 Measure the resistance between EN16 pin 19 (BG) and PA1 pin 3 (BG). Is the resistance less than 5 ohms? Yes GO to AA4. No REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST th system for normal operation. A44: CHECK THE GROUND CIRCUIT TO THE APP SENSOR FOR SHORT TO BATTERY 1 Connect the ECM electrical connector EN16. 2 Turn the ignition switch to the COM position. 3 Check for a voltage at PA1 pin 3 (BG). Is the voltage greater than 1 volt? Yes REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AA5. AA5: CHECK CONTINUITY OF THE APP SENSOR SIGNAL WIRE 1 Measure the resistance between APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EN16 pin 103 (Y). Is the resistance less than 5 ohms? Yes GO to AA6. No REPAIR the circuit between the APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EN16 pin 103 (Y). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. AA6: CHECK CONTINUITY OF THE APP SENSOR PROPER		
REPAIR the circuit between the APP sensor electrical connector PA1 pin 3 (BG) and GROUND. CLEAR the DTC. TEST the system for normal operation. (The denut bedudes the CEM. For add non-thomation, erice to wiring diagrams.) IA3: CHECK THE GROUND CIRCUIT TO THE APP SENSOR FOR CONTINUITY 1 Disconnect the ECM electrical connector PA1. 2 Disconnect the APP sensor electrical connector PA1. 3 Measure the resistance between EM16 pin 19 (BG) and PA1 pin 3 (BG). Is the resistance less than 5 ohms? Yes GO to AA4. No REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST th system for normal operation. IA4: CHECK THE GROUND CIRCUIT TO THE APP SENSOR FOR SHORT TO BATTERY 1 Connect the ECM electrical connector EM16. 2 Turn the ignition switch to the ON position. 3 Check for a voltage at PA1 pin 3 (BG). Is the voltage greater than 1 volt? Yes REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AA5. IA5: CHECK CONTINUITY OF THE APP SENSOR SIGNAL WIRE 1 Measure the resistance between APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EM16 pin 103 (Y). Is the resistance less than 5 ohms? Yes GO to AA6. No REPAIR the circuit between the APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EM16 pin 103 (Y). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. IA6: CHECK CONTINUITY OF THE APP SENSOR POTENTIOMETER 1 Measure the resistance between APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EM16 pin 103 (Y). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. IA6: CHECK CONTINUITY OF THE APP SENSOR POTENTIOMETER 1 Measure the resistance between APP sensor electrical connector PA1 pins 1 and 3. 2 Operate the accelerator pedal through II's full range while observing the resistance reading.		
REPAIR the circuit between the APP sensor electrical connector PA1 pin 3 (BG) and GROUND. CLEAR the DTC. TEST the system for normal poreation. (This drout includes the ECM. For add to roul information, order to wiring diagrams.) (A3: CHECK THE GROUND CIRCUIT TO THE APP SENSOR FOR CONTINUITY 1 Disconnect the ECM electrical connector PA1. 2 Disconnect the APP sensor electrical connector PA1. 3 Measure the resistance between EN16 pin 19 (BG) and PA1 pin 3 (BG). Is the resistance less than 5 ohms? Yes GO to AA4. No REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (A4: CHECK THE GROUND CIRCUIT TO THE APP SENSOR FOR SHORT TO BATTERY) 1 Connect the ECM electrical connector EN16. 2 Turn the ignition switch to the ON position. 3 Check for a voltage at PA1 pin 3 (BG). Is the voltage greater than 1 volt? Yes REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No (A5: CHECK CONTINUITY OF THE APP SENSOR SIGNAL WIRE) 1 Measure the resistance between APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EN16 pin 103 (Y). Is the resistance less than 5 ohms? Yes GO to AA6. No REPAIR the circuit between the APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EN16 pin 103 (Y). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. VA6: CHECK CONTINUITY OF THE APP SENSOR POTENTIOMETER 1 Measure the resistance between APP sensor electrical connector PA1 pin 1 (Y) and the ECM electrical connector EN16 pin 103 (Y). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. VA6: CHECK CONTINUITY OF THE APP SENSOR POTENTIOMETER 1 Measure the resistance between APP sensor electrical connector PA1 pins 1 and 3. 2 Operate the accelerator pedal through it's full range while observing the resistance reading. D		
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1 OLLAN THE DIO. TEST THE System for Horman operation.		
		CLEAR the DTO. TEST the System for normal operation.
PINPOINT TEST AB: P0512, P1245. IGNITION SWITCH CRANK SIGNAL		,

	G: Make sure the starter motor does not engage in the course of these tests. Failure to follow these
instructions m	ay result in personal injury.
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
AB1: CHECK	THE START INPUT TO THE ECM
	1 Move the gear selector to the N position.
	2 Disconnect the ECM electrical connector EN16.
	3 Remove the starter relay from the power distribution fuse box.
	4 Turn the ignition switch to the CRANK position.
	5 Measure the voltage between EN16 pin 6 (Y) and GROUND.
	Is the voltage greater than 10 volts?
	Yes

	GO to AB2.
	No DEDAID the circuit between the ECM and the bettery. For additional information, refer to wiring
	REPAIR the circuit between the ECM and the battery. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	(This circuit, it cludes the guiting switch and the power distribution for so how [Figs 28])
AB2: CHECK	THE START INPUT TO THE STARTER RELAY
	1 Turn the ignition switch to the START position and hold.
	2 Measure the voltage between the starter relay base (R10) pin 1 and GROUND.
	Is the voltage greater than 10 volts?
	Yes
	GO to AB3. No
	REPAIR the circuit between the starter relay base and the battery. For additional information, refe
	to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	(This circut includes the ignition switch and the power distribution fuse box.)
AB3: CHECK	THE START INPUT WIRE FOR SHORT TO BATTERY AT ECM
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between EN16 pin 6 (Y) and GROUND.
	Is the voltage greater than 10 volts?
	Yes
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No CO to AB4
NDA: OUEOU	GO to AB4.
AB4: CHECK	THE START INPUT WIRE FOR SHORT TO BATTERY AT RELAY
	1 Turn the ignition switch to the ON position.
	Measure the voltage between the starter relay base pin 1 and GROUND.
	Is the voltage greater than 10 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 AB5.
AB5: CHECK	THE STARTER RELAY INPUT FROM THE ECM FOR CONTINUITY
ADS. OFFICIR	1 Measure the resistance between EN16 pin 41 (GO) and relay base pin 2.
	Is the resistance less than 5 ohms?
	Yes
	GO to AB6.
	No
	REPAIR the open circuit. For additional information, refer to wiring diagrams. CLEAR the DTC.
	TEST the system for normal operation.
AB6: CHECK	THE STARTER RELAY INPUT FROM THE ECM FOR SHORT TO GROUND
	1 Disconnect ignition switch electrical connector IP18.
	2 Measure the resistance between EN16 pin 41 (GO) 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
	GO to AB7.
B7. CHECK	THE STARTER RELAY INPUT FROM THE ECM FOR SHORT TO BATTERY
ADI. OLIEGIA	
	11 Mascuro the voltage between the starter relay base nin 2 and GDOLIND
	1 Measure the voltage between the starter relay base pin 2 and GROUND.
	Is the voltage greater than 1 volt?
	Is the voltage greater than 1 volt? Yes
	Is the voltage greater than 1 volt? Yes REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC.
	Is the voltage greater than 1 volt? Yes
	Is the voltage greater than 1 volt? Yes REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new starter relay. For additional information, refer to wiring diagrams. CLEAR the DTC
	Is the voltage greater than 1 volt? Yes REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new starter relay. For additional information, refer to wiring diagrams. CLEAR the DTC TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM.
	Is the voltage greater than 1 volt? Yes REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new starter relay. For additional information, refer to wiring diagrams. CLEAR the DTC TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDC
	Is the voltage greater than 1 volt? Yes REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new starter relay. For additional information, refer to wiring diagrams. CLEAR the DTC TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDC (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).
	Is the voltage greater than 1 volt? Yes REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No INSTALL a new starter relay. For additional information, refer to wiring diagrams. CLEAR the DTC TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14B Electronic Engine Controls - 2.2L Duratorq-TDC

PINPOINI	EST AC: PU561, PU562, PU563. SENSUR PUWER SUPPLY
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
AC1: CHECK THE POWER SUPPLY CIRCUIT TO THE IP SENSOR	

ı	
	1 Disconnect the IP sensor electrical connector, IJ7. 2 Turn the ignition switch to the ON position.
	3 Measure the voltage between IP sensor electrical connector IJ7 pin 1 (YG) and GROUND.
	Is the voltage greater than 4 volts?
	Yes
	GO to AC2.
	REPAIR the circuit between the IP sensor electrical connector IJ7 pin 1 (YG) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The fault could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For add t onal informat on, refer to wiring diagrams.)
AC2: CHECK	THE POWER SUPPLY CIRCUIT TO THE IP SENSOR FOR SHORT TO BATTERY
	1 Measure the voltage between IP sensor electrical connector IJ7 pin 1 (YG) and GROUND.
	Is the voltage greater than 6 volts?
	Yes
	REPAIR the circuit between the IP sensor electrical connector IJ7 pin 1 (YG) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The short could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For additional information, refer to wiring diagrams.)
	No GO to AC3.
AC3: CHECK	THE POWER SUPPLY CIRCUIT TO THE MAP SENSOR
	1 Disconnect the MAP sensor electrical connector EN8.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between MAP sensor electrical connector EN8 pin 2 (OY) and GROUND.
	Is the voltage greater than 4 volts?
	Yes GO to AC4.
	No
	REPAIR the circuit between the MAP sensor electrical connector EN8 pin 2 (OY) and the sensor 5
	volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The fault could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For add t onal informat on, refer to wiring diagrams.)
AC4: CHECK	THE POWER SUPPLY CIRCUIT TO THE MAP SENSOR FOR SHORT TO BATTERY
	1 Measure the voltage between MAP sensor electrical connector EN8 pin 2 (OY) and GROUND.
	Is the voltage greater than 6 volts?
	REPAIR the circuit between the MAP sensor electrical connector EN8 pin 2 (OY) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The short could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For additional information, refer to wiring diagrams.)
	No GO to AC 5.
AC5: CHECK	THE POWER SUPPLY CIRCUIT TO THE FTP SENSOR
• NOTE: Acces	ss to the FTP sensor involves the removal of the fuel tank. To reduce the amount of work necessary, a
carried out via	could be used. This can be connected at the access port beneath the rear seat. Tests can then be a the slave harness and sensor. If system operation is normal with the slave harness and sensor, the
fault lies in the	e vehicle's harness or sensor.
	1 Disconnect the FTP sensor electrical connector FT1. (See note above).
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between FTP sensor electrical connector FT1 pin 1 (OY) and GROUND.
	Is the voltage greater than 4 volts? Yes
	GO to AC6.
	No State of the st
	REPAIR the circuit between the FTP sensor electrical connector FT1 pin 1 (OY) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The fault could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For add t onal informat on, refer to wiring
AC4. CUECK	diagrams.) THE DOWED SUDDI V CLOCULT TO THE ETD SENSOD FOR SHORT TO PATTERY
ACO. CHECK	THE POWER SUPPLY CIRCUIT TO THE FTP SENSOR FOR SHORT TO BATTERY Measure the voltage between FTP sensor electrical connector FT1 pin 1 (OY) and GROUND.
	Is the voltage greater than 6 volts?
	Yes REPAIR the circuit between the FTP sensor electrical connector FT1 pin 1 (OY) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The short could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For additional information, refer to wiring diagrams.)
	No

I	GO to AC7.
AC7: CHECK	THE POWER SUPPLY CIRCUIT TO THE APP SENSOR
Atori orizok	1 Disconnect the APP sensor electrical connector.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between APP sensor electrical connector PA1 pin 5 (OY) and GROUND.
	Is the voltage greater than 4 volts?
	Yes
	GO to AC8.
	No
	REPAIR the circuit between the APP sensor electrical connector PA1 pin 5 (OY) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The fault could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For add t onal informat on, refer to wirin diagrams.)
AC8: CHECK	THE POWER SUPPLY CIRCUIT TO THE APP SENSOR FOR SHORT TO BATTERY
	1 Measure the voltage between APP sensor electrical connector PA1 pin 5 (OY) and GROUND.
	Is the voltage greater than 6 volts?
	Yes
	REPAIR the circuit between the APP sensor electrical connector PA1 pin 5 (OY) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The short could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For additional information, refer to wirin diagrams.)
	No GO to AC9.
AC9: CHECK	THE POWER SUPPLY CIRCUIT TO THE TP SENSOR
ACT CHILDR	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between TP sensor electrical connector EN13 pin 2 (OY) and GROUND.
	Is the voltage greater than 4 volts?
1	Yes
	GO to AC10.
	No No
	REPAIR the circuit between the TP sensor electrical connector EN13 pin 2 (OY) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The fault could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For add t onal informat on, refer to wirin diagrams.)
AC10: CHECK	THE POWER SUPPLY CIRCUIT TO THE TP SENSOR FOR SHORT TO BATTERY
	1 Measure the voltage between TP sensor electrical connector EN13 pin 2 (OY) and GROUND.
	Is the voltage greater than 6 volts?
	Yes
	REPAIR the circuit between the TP sensor electrical connector EN13 pin 2 (OY) and the sensor 5 volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The short could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For additional information, refer to wirin diagrams.)
	No GO to AC11.
AC11: CHECK	THE POWER SUPPLY CIRCUIT TO THE AIR CONDITIONING PRESSURE (ACP) SENSOR
	1 Turn the ignition switch to the ON position.
	2 Measure the voltage between ACP sensor electrical connector JB106 pin 2 (OY) and GROUND.
	Is the voltage greater than 4 volts?
1	Yes
1	GO to AC12.
	No REPAIR the circuit between the ACP sensor electrical connector JB106 pin 2 (OY) and the sensor
	volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The fault could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For add t onal informat on, refer to wirin diagrams.)
	THE POWER SUPPLY CIRCUIT TO THE AIR CONDITIONING PRESSURE SENSOR FOR SHORT TO
BATTERY	
	1 Measure the voltage between ACP sensor electrical connector JB106 pin 2 (OY) and GROUND.
	Is the voltage greater than 6 volts? Yes
	REPAIR the circuit between the ACP sensor electrical connector JB106 pin 2 (OY) and the sensor volt supply bus. CLEAR the DTC. TEST the system for normal operation. (The short could be in any of the other sensors in this circuit, or in any of the spurs in this circuit. For additional information, refer to wiring diagrams.)
	No No electrical fault in power supply circuit. Recheck DTCs using the Jaguar approved diagnostic system, or code reader. (This fault could also be a PSV failure w thin the ECM.)

PINPOINT T	PINPOINT TEST AD: P0851, P0852. P/N SWITCH STARTING/DRIVING MALFUNCTIONS.	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
AD1: CHECK	THE P/N INPUT TO THE ECM.	
	1 Select PARK.	
	2 Set the ignition switch to the ON position.	
	3 Measure the voltage at the ECM electrical connector EN16 pin 31 (B).	
	Is the voltage greater than 10 volts?	
	Yes	
	INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation). Before replacing a ECM, contact Dealer technical support. No REPAIR the circuit between the ECM electrical connector EN16 pin 31 (B) and the ignition switch. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (On automatic transmission vehicles, this circuit includes the TR sensor, central junction fuse box, ign t on relay, and inertia switch. On NAS	
	(On automatic transmission vehicles, this circuit includes the TR sensor, central junction fuse box, ign t on relay, and inertia switch. On NA manual transmiss on vehicles, this circuit also includes the clutch safety switch.)	

	manual transmiss on veh cles, this circuit also includes the clutch safety switch.)
<u> </u>	EST AE : P0646, P0647. AIR CONDITIONING CLUTCH RELAY DRIVE
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	•
AET: CHECK	THE GROUND SUPPLY TO THE AIR CONDITIONING CLUTCH
I WADNIN	G: This test involves working in proximity to rotating parts. Make sure due care is exercised.
WARRING	1 Turn the ignition switch to the ON position.
	2 Disconnect the ECM electrical connector EN16.
	3 Disconnect the air conditioning clutch electrical connector EN30.
	4 Measure the resistance between EN30 pin 2 (B) and GROUND.
	Is the resistance less than 5 ohms?
	Yes
	REPAIR the circuit between EN30 pin 2 (B) and GROUND. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No
	GO to AE2.
AE2: CHECK	THE CIRCUIT INTEGRITY BETWEEN THE ECM AND THE AIR CONDITIONING CLUTCH
	1 Apply a GROUND to the disconnected ECM electrical connector EN16 pin 34 (BG).
	2 Measure the voltage at air conditioning clutch electrical connector EN30 pin 1 (RG).
	Is the voltage greater than 10 volts?
	Yes
	GO to AE3.
	No
	GO to AE4.
AE3: CHECK	THE AIR CONDITIONING CLUTCH RELAY TO ECM CIRCUIT FOR SHORT TO GROUND
	1 Measure the resistance between EN16 pin 34 (BG) and GROUND.
	Is the resistance less than 10,000 ohms?
	Yes GO to AE4.
	No
	INSTALL a new air conditioning compressor clutch relay. For additional information, refer to the electrical guide. CLEAR the DTC. TEST the system for normal operation. If the DTC is repeated, INSTALL a new ECM. REFER to: Engine Control Module (ECM) (303-14A Electronic Engine Controls - 2.5L NA V6 -
	AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).
	Before replacing an ECM, contact dealer technical support.
	THE CIRCUIT BETWEEN THE AIR CONDITIONING COMPRESSOR CLUTCH AND THE RELAY FOR
SHORT TO BA	
	1 Measure the voltage between EN30 pin 1 (RG) and GROUND.
	Is the voltage greater than 1 volt?
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No GO to AE5.

OK SHOK	TTO GROUND 1 Measure the resistance between EN30 pin 1 (RG) 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 GO to AE6.
AE6: CHEC	K THE CIRCUIT BETWEEN FUSE 23 OF THE POWER DISTRIBUTION FUSE BOX AND THE ACCC
RELAY FOR	SHORT TO GROUND
	1 Remove Fuse 23.
	2 Measure the resistance between fuse box electrical connector JB34 pin 79 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 CO to AE7
157. CHEC	GO to AE7. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 3
AE7. CHEC	1 Refit Fuse 23.
	2 Measure the voltage between the ACCC relay base pin 3 and GROUND.
	Is the voltage greater than 10 volts?
	Yes
	GO to AE8.
	No
	Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 1. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
AF8: CHFC	K THE CIRCUIT BETWEEN PIN 1 OF THE ACCC RELAY BASE AND THE POWER DISTRIBUTION
	FOR SHORT TO GROUND
	1 Remove Fuse 36.
	2 Measure the resistance between the ACCC relay base pin 1 and GROUND.
	Is the resistance less than 10,000 ohms?
	V ₂ a
	Yes
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No
AEO. CHEC	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9.
AE9: CHEC	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1
AE9: CHEC	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36.
AE9: CHEC	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position.
AE9: CHEC	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND.
AE9: CHEC	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position.
AE9: CHEC	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10.
AE9: CHEC	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No
AE9: CHEC	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. Fradditional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. F additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circuit includes the EMS relay, and Fuses 9 and 31)
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circuit includes the EMS relay, and Fuses 9 and 31) CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR CONTINUITY
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circuit includes the EMS relay, and Fuses 9 and 31) CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR CONTINUITY 1 Remove the ACCC relay.
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. F additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circuit includes the EMS relay, and Fuses 9 and 31) CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR CONTINUITY 1 Remove the ACCC relay. 2 Measure the resistance between the ECM electrical connector EN16 pin 34 (BG) and ACCC relay.
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. F additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circuit includes the EMS relay, and Fuses 9 and 31) CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR CONTINUITY 1 Remove the ACCC relay. 2 Measure the resistance between the ECM electrical connector EN16 pin 34 (BG) and ACCC relay base pin 2. Is the resistance less than 5 ohms?
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	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. F additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circuit includes the EMS relay, and Fuses 9 and 31) CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR CONTINUITY 1 Remove the ACCC relay. 2 Measure the resistance between the ECM electrical connector EN16 pin 34 (BG) and ACCC relay base pin 2. Is the resistance less than 5 ohms? Yes GO to AE11. No
AE10: CHE	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. F. additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circuit includes the EMS relay, and Fuses 9 and 31) CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR CONTINUITY 1 Remove the ACCC relay. 2 Measure the resistance between the ECM electrical connector EN16 pin 34 (BG) and ACCC relay base pin 2. Is the resistance less than 5 ohms? Yes GO to AE11. No REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST till.
AE10: CHE	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circuit includes the EMS relay, and Fuses 9 and 31) CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR CONTINUITY 1 Remove the ACCC relay. 2 Measure the resistance between the ECM electrical connector EN16 pin 34 (BG) and ACCC relay base pin 2. Is the resistance less than 5 ohms? Yes GO to AE11. No REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
AE10: CHE	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circuit includes the EMS relay, and Fuses 9 and 31) CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR CONTINUITY 1 Remove the ACCC relay. 2 Measure the resistance between the ECM electrical connector EN16 pin 34 (BG) and ACCC relay base pin 2. Is the resistance less than 5 ohms? Yes GO to AE11. No REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR SHORT TO BATTERY
AE10: CHE	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. Fr. additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circu Includes the EMS relay, and Fuses 9 and 31) CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR CONTINUITY 1 Remove the ACCC relay. 2 Measure the resistance between the ECM electrical connector EN16 pin 34 (BG) and ACCC relay base pin 2. Is the resistance less than 5 ohms? Yes GO to AE11. No REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR SHORT TO BATTERY 1 Check for a voltage between the ECM electrical connector EN16 pin 34 (BG) and GROUND. Is the voltage greater than 1 volt? Yes
AE10: CHE	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to AE9. K THE ACCC RELAY BASE FOR BATTERY VOLTAGE AT PIN 1 1 Refit Fuse 36. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between ACCC relay base pin 1 and GROUND. Is the voltage greater than 10 volts? Yes GO to AE10. No Check/replace fuses. REPAIR the circuit between the relay base and the battery power bus 2. F additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. (This circuit includes the EMS relay, and Fuses 9 and 31) CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR CONTINUITY 1 Remove the ACCC relay. 2 Measure the resistance between the ECM electrical connector EN16 pin 34 (BG) and ACCC relay base pin 2. Is the resistance less than 5 ohms? Yes GO to AE11. No REPAIR the circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation. CK THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR SHORT TO BATTERY 1 Check for a voltage between the ECM electrical connector EN16 pin 34 (BG) and GROUND. Is the voltage greater than 1 volt?

	No
	GO to AF12
AE12: CHECK	THE CIRCUIT BETWEEN THE ECM AND THE ACCC RELAY BASE FOR SHORT TO GROUND
	1 Measure the resistance between the ECM electrical connector EN16 pin 34 (BG) 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
	INSTALL a new ACCC relay. For additional information, refer to the electrical guide. CLEAR the
	DTC. TEST the system for normal operation.

Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Powertrain Control Module (PCM) Long Drive Cycle Self-Test General Procedures

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.
 - 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.

Make sure the engine temperature is above 60 °C (140 °F).

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.
- 3. Stop the vehicle.
- 4. Release brake, allow the vehicle to move with no throttle for 1 minute.
- 5. 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.

Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Powertrain Control Module (PCM) Short Drive Cycle Self-Test General Procedures

• 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.

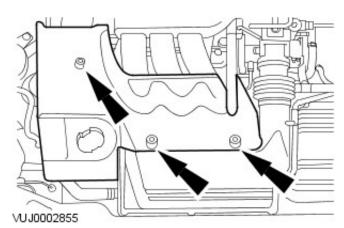
Follow on screen prompts and check for engine management fault codes.

6. Disconnect the diagnostic equipment from the vehicle.

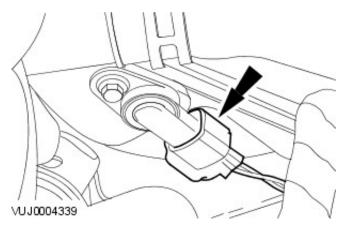
Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Camshaft Position (CMP) Sensor

Removal and Installation

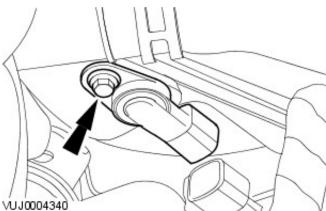
Removal



1. Remove the engine cover.



2. Disconnect the CMP sensor electrical connector.



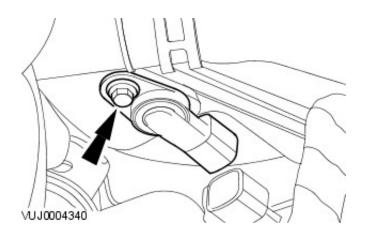
- 3. Remove the CMP sensor.
 - Remove and discard the O-ring seal.

Installation

1. NOTE: Install a new O-ring seal.

To install, reverse the removal procedure.

• Tighten to 7 Nm.

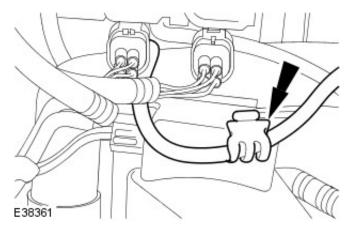


Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Catalyst Monitor Sensor LH

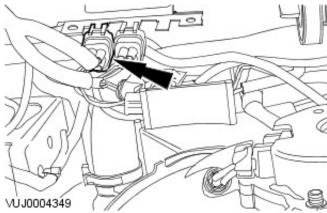
Removal and Installation

Removal

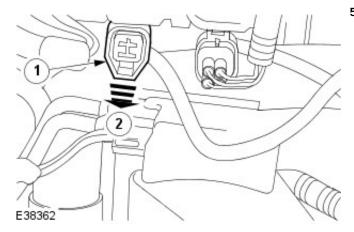
- Disconnect the battery ground cable.
 For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- Raise and support the vehicle. For additional information, refer to For additional information, refer to: <u>Jacking</u> (100-02 Jacking and Lifting, Description and Operation).
- **3.** Detach the catalyst monitor sensor harness from the securing clip.



4. Disconnect the catalyst monitor sensor electrical connector.



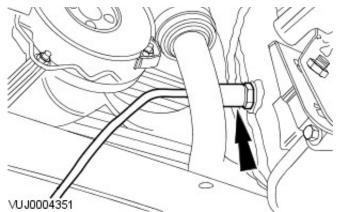
- **5.** Detach the catalyst monitor sensor electrical connector from the securing bracket.
 - 1. Release the retaining tang.
 - 2. Detach the catalyst monitor sensor electrical connector from the securing bracket.



6. CAUTIONS:



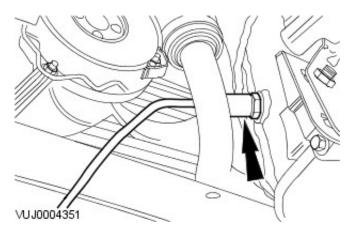
Do not cut the HO2S harness.



Make sure that the catalyst monitor sensor casing and harness is not damaged.

Using Snap-on socket S6176 remove the catalyst monitor sensor.





1. CAUTION: Make sure that the catalyst monitor sensor casing and cable are not damaged.

To install, reverse the removal procedure.

• Tighten to 40 Nm.

2. NOTE: For NAS vehicles only.

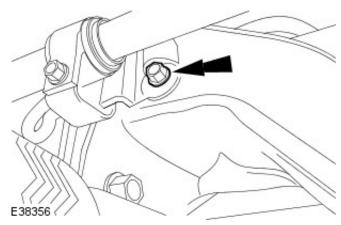
If required, carry out a long drive cycle.
For additional information, refer to: Powertrain Control
Module (PCM) Long Drive Cycle Self-Test (303-14A
Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 AJV6/3.0L NA V6 - AJ27, General Procedures).

Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Catalyst Monitor Sensor RH

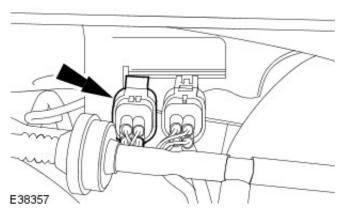
Removal and Installation

Removal

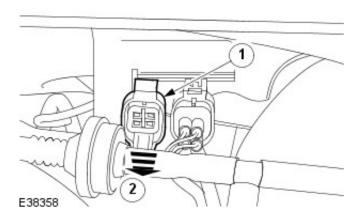
- Disconnect the battery ground cable.
 For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- Remove the intake manifold.
 For additional information, refer to: Intake Manifold (303-018 Engine 2.2L Duratorq-TDCi (110kW/150PS) Puma/2.0L Duratorq-TDCi, In-vehicle Repair).
- Raise and support the vehicle. For additional information, refer to For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- **4.** Undo and remove the exhaust shield securing bolt to allow access to the catalyst monitor sensor.

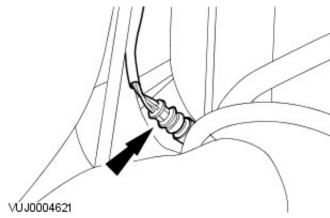


- **5.** Lower the vehicle.
- **6.** Disconnect the catalyst monitor sensor electrical connector.



- **7.** Detach the catalyst monitor sensor electrical connector from the securing bracket.
 - 1. Release the retaining tang.
 - 2. Detach the catalyst monitor sensor electrical connector from the securing bracket.





8. CAUTIONS:

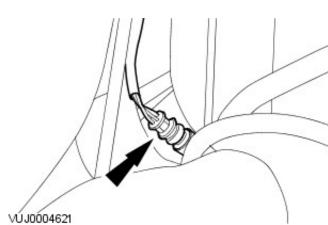


Do not cut the HO2S harness.

Make sure that the catalyst monitor sensor casing and cable are not damaged.

Using Snap-on socket YA8875 remove the catalyst monitor sensor.





1. CAUTION: Make sure that the catalyst monitor sensor casing and cable are not damaged.

To install, reverse the removal procedure.

• Tighten to 40 Nm.

2. NOTE: For NAS vehicles only.

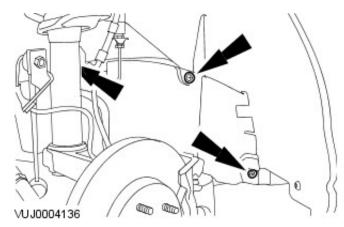
If required, carry out a long drive cycle.
For additional information, refer to: Powertrain Control
Module (PCM) Long Drive Cycle Self-Test (303-14A
Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 AJV6/3.0L NA V6 - AJ27, General Procedures).

Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Crankshaft Position (CKP) Sensor

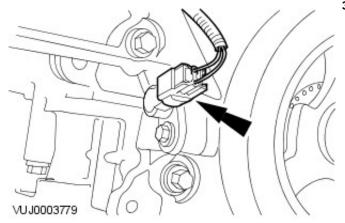
Removal and Installation

Removal

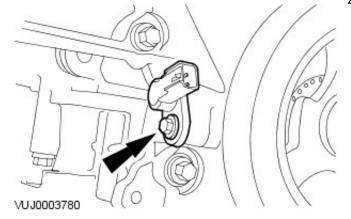
- 1. Remove the right-hand front road wheel. For additional information, refer to Section 204-04 Wheels and Tires.
- 2. Remove the wheel arch liner access cover.



3. Disconnect the CKP sensor electrical connector.



4. Remove the CKP sensor.



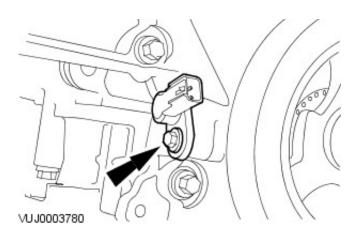
• Remove and discard the O-ring seal.

Installation

1. NOTE: Install a new O-ring seal.

To install, reverse the removal procedure.

• Tighten to 10 Nm.

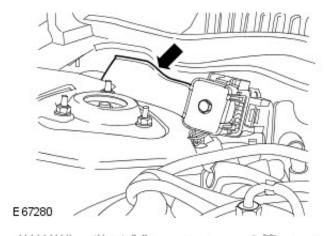


Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Engine Control Module (ECM)

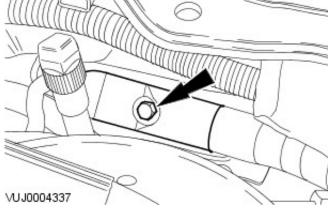
Removal and Installation

Removal

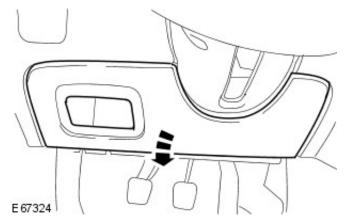
- 1. Disconnect the battery ground cable. For additional information, refer to For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Remove the engine wiring harness trim panel.



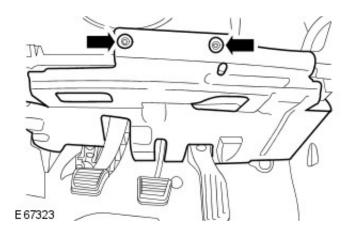
3. Disconnect the engine control module (ECM) electrical connector.

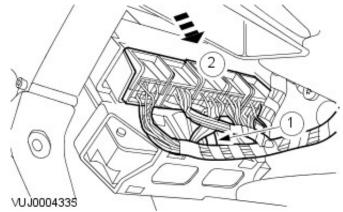


4. Remove the instrument cluster lower trim panel.

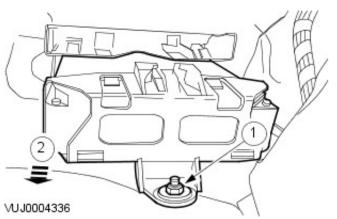


5. Remove the trim panel.

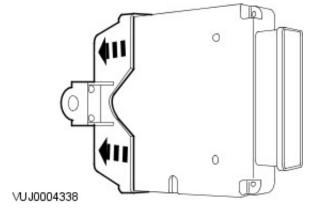




- **6.** Detach the generic electronic module (GEM) from the ECM.
 - 1. Release the GEM locking tang.
 - 2. Detach the GEM from the ECM.



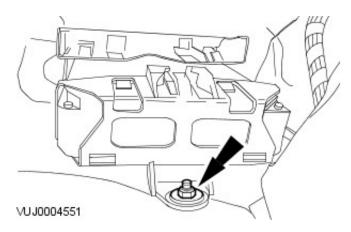
- 7. Remove the ECM.
 - 1. Remove the ECM retaining nut.
 - 2. Remove the ECM.

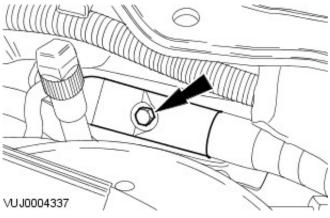


8. Remove the ECM from the ECM retaining bracket.

Installation

- **1.** To install, reverse the removal procedure.
 - Tighten to 10 Nm.

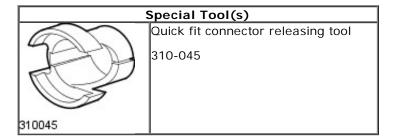




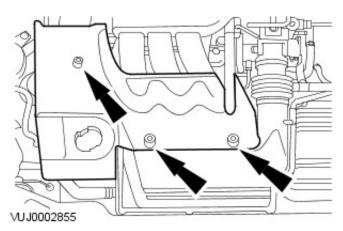
2. CAUTION: Make sure that the electrical connector locates correctly in the ECM. Do not force or overtighten the electrical connector.

Tighten to 10 Nm.

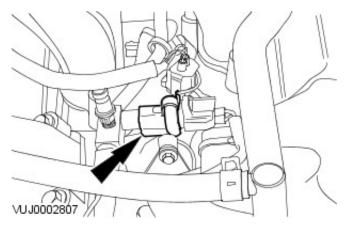
Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Fuel Temperature Sensor2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 Removal and Installation



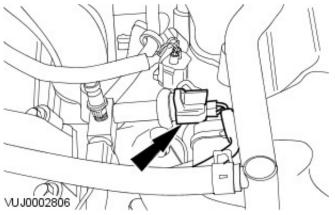
Removal



1. Remove the engine cover.

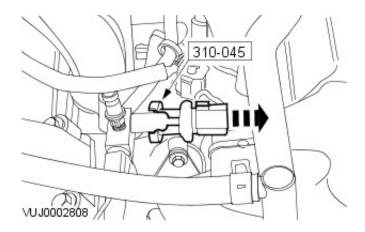


2. Remove the retaining clip from the spring lock coupling.



3. Disconnect the fuel temperature sensor electrical connector.

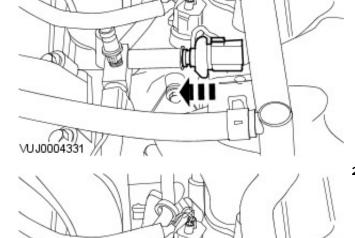
- **4.** Using the special tool, remove the fuel temperature sensor.
 - Remove and discard the O-ring seal.



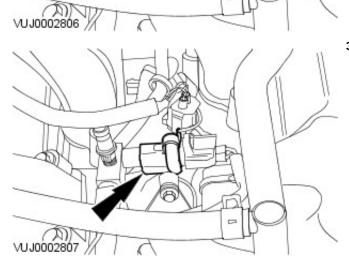
Installation

1. NOTE: Install a new O-ring seal.

Install the fuel temperature sensor.

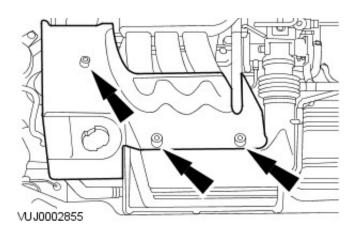


2. Connect the fuel temperature sensor electrical connector.



3. Install the retaining clip to the spring lock coupling.

4. Install the engine cover.



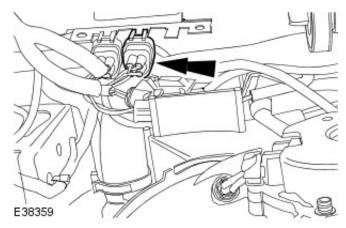
Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Heated Oxygen Sensor (HO2S) LH

Removal and Installation

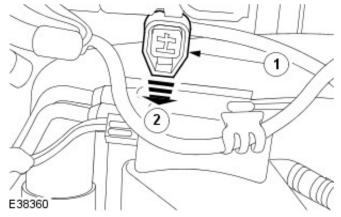
Removal

- Disconnect the battery ground cable.
 For additional information, refer to Section <u>414-01 Battery</u>, <u>Mounting and Cables</u>.
- 2. Raise and support the vehicle.

 For additional information, refer to Section 100-02 Jacking and Lifting.
- **3.** Disconnect the heated oxygen sensor (HO2S) electrical connector.



- Detach HO2S electrical connector from the securing bracket.
 - 1. Release the retaining tang.
 - 2. Detach HO2S electrical connector from the securing bracket.



5. CAUTIONS:

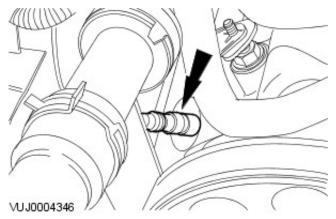


Do not cut the HO2S harness.

dama

Make sure that the HO2S casing and harness is not naged.

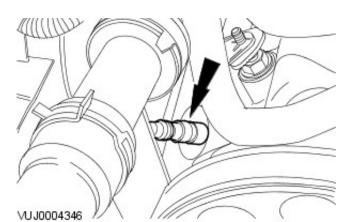
Using Snap-on socket S6176 remove the HO2S.



Installation

1. CAUTION: Make sure that the HO2S casing and cable are not damaged.

To install, reverse the removal procedure.



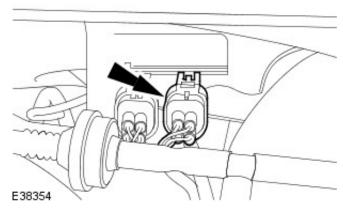
• Tighten to 40 Nm.

Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Heated Oxygen Sensor (HO2S) RH

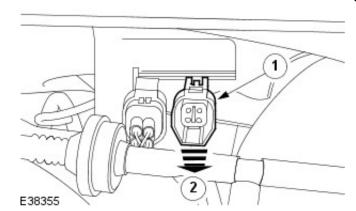
Removal and Installation

Removal

- Disconnect the battery ground cable.
 For additional information, refer to Section <u>414-01 Battery</u>, <u>Mounting and Cables</u>.
- 2. Disconnect the heated oxygen sensor (HO2S) electrical connector.



- 3. Detach HO2S electrical connector from the securing bracket.
 - 1. Release the retaining tang.
 - 2. Detach HO2S electrical connector from the securing bracket.



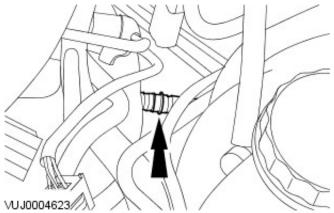
- 4. Turn the steering onto full right-hand lock.
- Raise and support the vehicle.
 For additional information, refer to Section 100-02 Jacking and Lifting.
- 6. CAUTIONS:



Do not cut the HO2S harness.

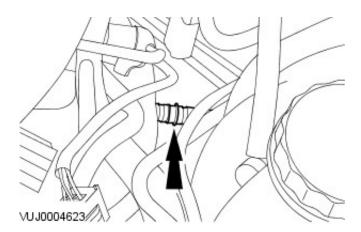
Make sure that the HO2S casing and harness is not damaged.

Using Snap-on socket S6176 remove the HO2S.



Installation

1. AUTION: Make sure that the HO2S casing and harness is not damaged.



To install, reverse the removal procedure.

• Tighten to 40 Nm.

Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Knock Sensor (KS)

Removal and Installation

Removal

All vehicles

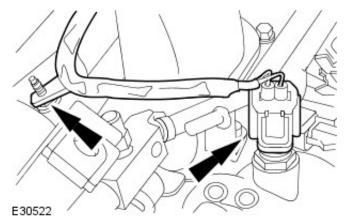
- Disconnect the battery ground cable.
 For additional information, refer to Section <u>414-01 Battery</u>, <u>Mounting and Cables</u>.
- 2. Disconnect the spring lock coupling.
 For additional information, refer to Section 310-00 Fuel System General Information.

Vehicles with 2.5L or 3.0L engine

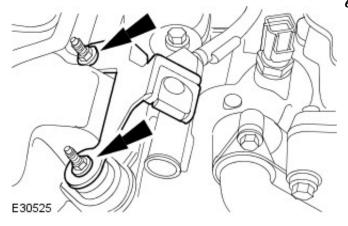
3. Remove the fuel charging wiring harness. For additional information, refer to Section 303-04A Fuel Charging and Controls Section 303-04B Fuel Charging and Controls Section 303-04C Fuel Charging and Controls - Turbocharger.

Vehicles with 2.0L engine

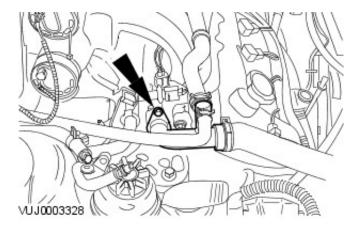
- Drain the cooling system. For additional information, refer to Section <u>303-03A Engine Cooling</u> / <u>303-03B Engine</u> Cooling.
- 5. Disconnect the electrical connector.
 - Detach the harness.



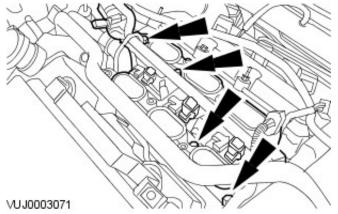
6. Remove the engine trim retaining bracket.



- 7. Detach the coolant pipe.
 - Remove and discard the seal.

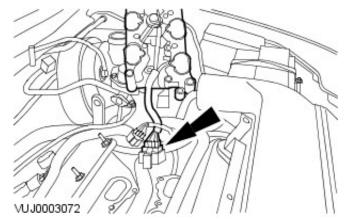


All vehicles

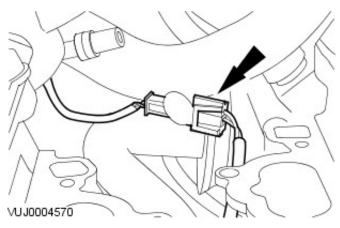


8. NOTE: Fuel may still be present in the fuel supply manifold.

Detach the fuel injection supply manifold and lower intake manifold and place to one side.

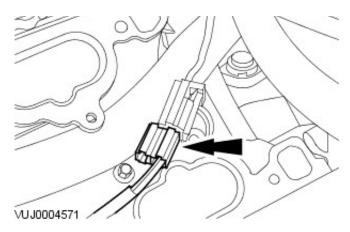


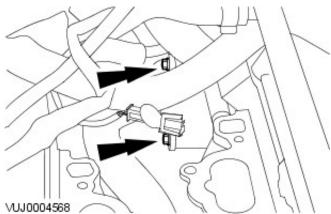
- **9.** Remove the fuel injection supply manifold and lower intake manifold.
 - Disconnect the electrical connector.
 - Remove and discard the lower intake manifold O-ring seals.



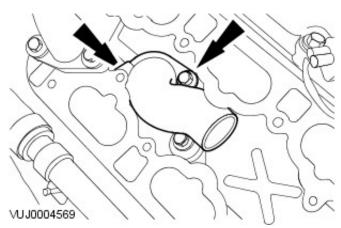
10. Detach the KS electrical connector from the retaining bracket.

11. Disconnect the KS electrical connector.

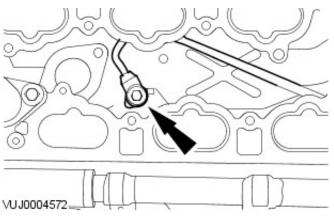




- 12. Remove the water pump outlet coolant pipe.
 - Remove and discard the seal.



- **13.** Remove the engine coolant inlet pipe.
 - Remove and discard the seal.

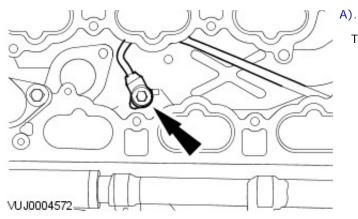


14. Remove the KS.

Installation

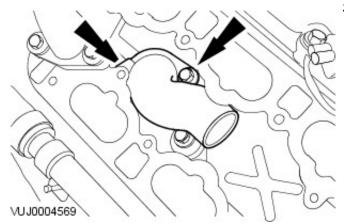
All vehicles

1. NOTE: Prior to installing the KS, clean the engine block and KS mating surfaces with metal surface cleaner (WSW-M5B392-

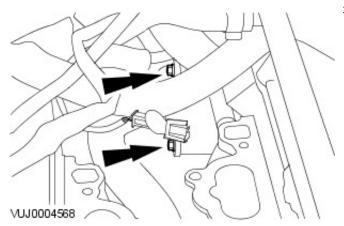


To install, reverse the removal procedure.

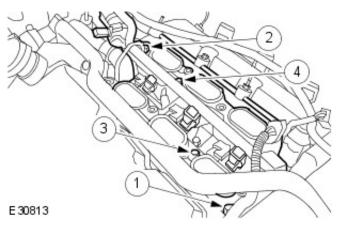
• Tighten to 19 Nm.



- 2. Install a new seal.
 - Tighten to 25 Nm.



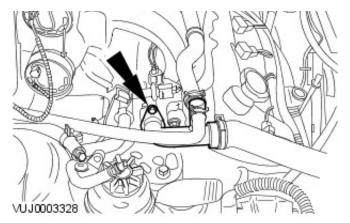
- 3. Install a new seal.
 - Tighten to 10 Nm.

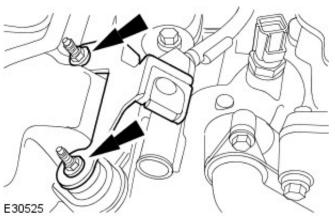


- **4.** Tighten in the sequence shown.
 - Tighten to 10 Nm.

Vehicles with 2.0L engine

- 5. Install a new seal.
 - Tighten to 9 Nm.





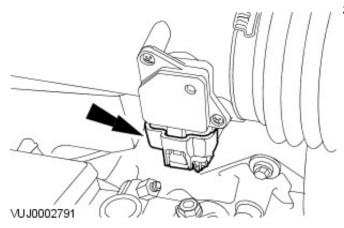
6. Tighten to 6 Nm.

Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Mass Air Flow (MAF) Sensor

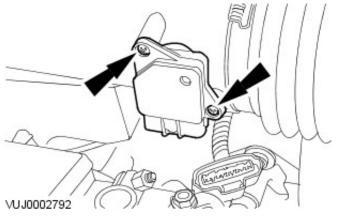
Removal and Installation

Removal

- 1. Remove the battery cover.
- 2. Disconnect the MAF sensor electrical connector.



3. Remove the MAF sensor.



Installation

- **1.** To install, reverse the removal procedure.
- 2. NOTE: For NAS vehicles only.

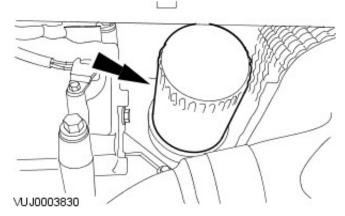
If required, carry out a short drive cycle. For additional information, refer to: Powertrain Control Module (PCM) Short Drive Cycle Self-Test (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).

Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Oil Temperature Sensor

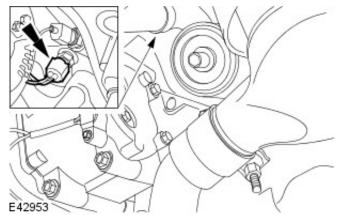
Removal and Installation

Removal

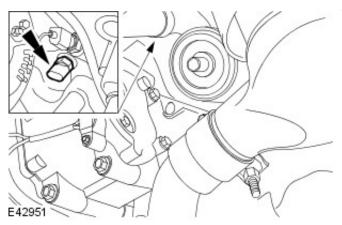
- Raise and support the vehicle.
 For additional information, refer to Section 100-02 Jacking and Lifting.
- 2. Remove and discard the oil filter.



3. Disconnect the oil temperature sensor electrical connector.



4. Remove the oil temperature sensor.

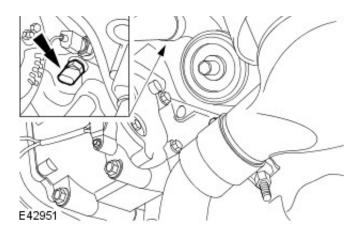


Installation

1. NOTE: Apply a small bead of sealant WSK-M4G328-A3 or equivalent sealant meeting Jaguar specification on the first three threads of the oil temperature sensor.

To install, reverse the removal procedure.

• Tighten to 15 Nm.



- 2. Install a new oil filter.
- ${\bf 3.}$ NOTE: Use oil WSE-M2C 908-A or equivalent meeting Jaguar specification.

Check and top up the engine with oil.

Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Throttle Position (TP) Sensor

Removal and Installation

Removal

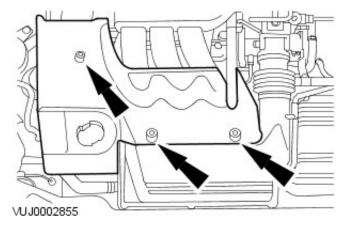
Vehicles with 2.5L or 3.0L engine

For additional information, refer to Section 303-04A Fuel Charging and Controls Section 303-04B Fuel Charging and Controls - Turbocharger

Vehicles with 2.0L engine

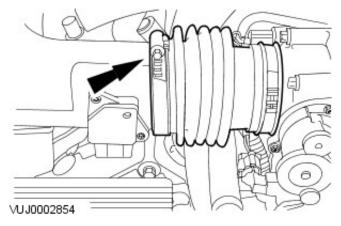
- Disconnect the battery
 For additional information, refer to Section 414-01 Battery, Mounting and Cables.
- 3. NOTE: 2.5L and 3.0L shown, 2.0L similar.

Remove the engine cover.

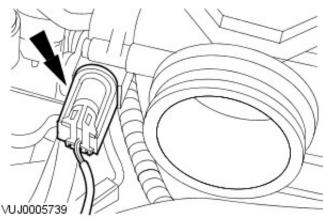


4. NOTE: 2.5L and 3.0L shown, 2.0L similar.

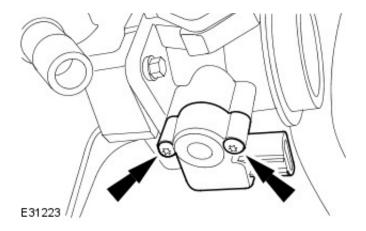
Disconnect the air cleaner outlet pipe.



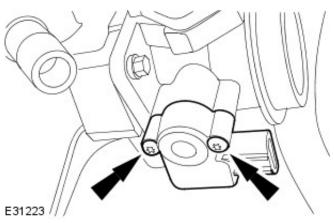
5. Disconnect the electrical connector.



6. Remove the the throttle position (TP) sensor.



- **1.** To install, reverse the removal procedure.
- 2. Tighten to 7 Nm.



Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 - Variable Camshaft Timing (VCT) Oil Control Solenoid

Removal and Installation

Removal

Right-Hand Bank

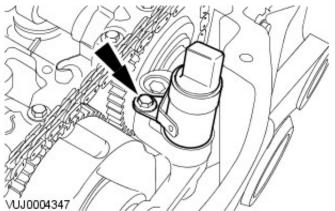
Remove the right-hand valve cover. For additional information, refer to
 For additional information, refer to: <u>Valve Cover RH</u> (303-01A Engine - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, In-vehicle Repair).

Left-Hand Bank

Remove the left-hand valve cover. For additional information, refer to
 For additional information, refer to: <u>Valve Cover RH</u> (303-01A Engine - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, In-vehicle Repair).

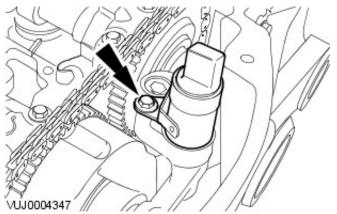
Right-Hand and Left-Hand Banks

3. 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.

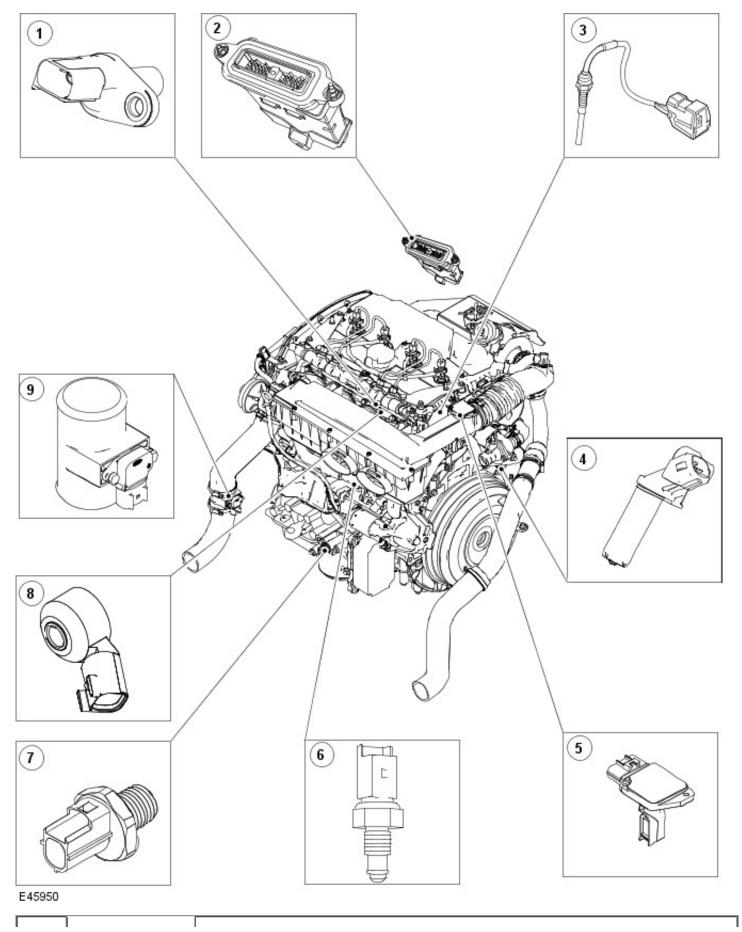
If required, carry out a long drive cycle. For additional information, refer to: Powertrain Control Module (PCM) Long Drive Cycle Self-Test (303-14A <a href="Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).

Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi -

Torque Specifications

Description	Nm	lb-ft	lb-in
Camshaft position sensor retaining bolt	9	<u> -</u>	80
Crankshaft position sensor retaining bolt	7	<u> -</u>	62
Cylinder head temperature sensor	10	<u> -</u>	89
Power steering pump belt cover retaining nut	10	<u> -</u>	89
Engine oil pressure sensor	15	11	-
Fuel temperature sensor	15	11	-
Knock sensor	20	15	-
Fuel injection supply manifold high-pressure pipe retaining nut	10	<u> -</u>	89
Manifold absolute pressure and temperature sensor retaining clips	4	<u> -</u>	35
Radiator support bar retaining bolts	25	18	-
Charge air cooler upper hose retaining clip	4	<u> -</u>	35
Charge air cooler lower hose retaining clip	4	<u> -</u>	35
Catalytic converter temperature sensor	35	26	-
Diesel particulate filter temperature sensor	35	26	_
Manifold absolute pressure sensor retaining bolt	4	-	35

Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Electronic Engine Controls Description and Operation



Item	Part Number	Description		
1	_	Camshaft position (CMP) sensor		
2	_	Engine control module (ECM)		
3	_	Cylinder head temperature (CHT) sensor		
4	_	Crankshaft position (CKP) sensor		
5	_	Mass airflow (MAF) sensor		
6	_	Fuel temperature sensor		
7	_	Engine oil pressure (EOP) sensor		
8	_	Knock (KS) sensor		
9	_	Manifold absolute pressure and temperature (MAP-T) sensor		

Camshaft Position (CMP) Sensor

The camshaft position (CMP) sensor is located on the front of the cylinder head and it is a hall effect type sensor. The CMP sensor takes its signal from the inlet camshaft lobe. The signal is used to identify cylinder number three and thus allowing the individual cylinders to be identified. Should the CMP sensor fail the engine will not start.

Engine Control Module (ECM)

The engine control module (ECM) is located in the same position as the petrol version. The engine management system (EMS) uses signals from the various sensors as inputs to the ECM which contains a series of maps for the engine parameters. Based on the inputs from the sensors regarding current engine conditions and loads, the ECM determines the optimum settings to use for the EMS, and so gives the best performance and/or economy for a given set of conditions. The ECM also manages the speed control system, again based on information from the vehicle sensors to provide the optimum settings.

Cylinder Head Temperature (CHT) Sensor

The cylinder head temperature (CHT) sensor is located at the rear of the engine behind the rear end accessory drive camshaft pulley. The CHT sensor measures the temperature of the cylinder head and then provides the ECM and the instrument cluster with the engine temperature.

Crankshaft Position (CKP) Sensor

The crankshaft position (CKP) sensor is located at the rear of the engine mounted to the cylinder block. It is used to detect the engine position and speed of the crankshaft. It is a permanent inductive type sensor. Should the CKP sensor fail, the engine will not start.

Mass Airflow (MAF) Sensor

The mass airflow (MAF) sensor is mounted on the clean air side of the air filter and upstream of the turbocharger air compressor. The function of the MAF sensor is to measure the amount of air flow drawn into the engine. This airflow is used by the ECM to control the exhaust gas recirculation (EGR) operation.

Engine Oil Pressure (EOP) Sensor

The engine oil pressure (EOP) sensor is located on the left-hand side of the engine in the oil filter housing. The EOP is connected to the instrument cluster and is not directly part of the electronic engine control system.

Knock Sensor (KS)

The knock sensor (KS) is located on the left-hand side of the engine mounted on the cylinder head between cylinders two and three. The KS allows the ECM to analyze the quality of combustion by measuring the increase in vibration. The ECM will use this signal to calculate the quantity of fuel to be injected during phased injection. The correction to the fueling for the phased injection minimizes the combustion noise. Should the KS fail the result would be no phased injection and thus an increase in diesel knock when idling and accelerating.

Manifold Absolute Pressure and Temperature (MAP-T) Sensor

The manifold absolute pressure and temperature (MAP-T) sensor combines the manifold pressure sensor and inlet air temperature sensor in one component. It is located in the inlet boost pressure pipe, right side front after the charge air cooler. Its function and operation is to measure the positive charge pressure developed by the turbocharger and its temperature, and to inform the ECM.

Fuel Temperature Sensor

The fuel temperature sensor can be identified by a blue connector located in the low pressure fuel supply circuit on the back of the high pressure pump. The fuel temperature sensor is a negative thermal coefficient type sensor which measures the fuel temperature in the low pressure circuit. Should the fuel temperature sensor fail the cold running characteristic will be affected.

Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Electronic Engine Controls

Diagnosis and Testing

Overview

This section covers the components of the engine management system.

The changes to the engine management for this model year include the addition of a diesel particulate filter system, and this section includes information on the diagnosis and testing of this system and links to sections dealing specifically with particulate filter checks.

For additional information on the description and operation of the engine management system: REFER to: <u>Electronic Engine Controls</u> (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Description and Operation).

For additional information on the description and operation of the diesel particulate filter system: REFER to: Exhaust System (309-00 Exhaust System, Description and Operation).

Inspection and Verification

- 1. 1. Verify the customer concern.
- 2. **2.** Visually inspect for obvious mechanical or electrical faults.

Visual inspection

Mechanical	Electrical
 Engine oil level Cooling system coolant level Fuel level/contamination Fuel leaks Fuel pumps Intake air system Accessory drive belt Sensor fitment/condition Diesel particulate filter (DPF) 	 Fuses Wiring harness Electrical connector(s) Injectors Glow plugs 5 volt sensor supply 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. **4.** Use the approved diagnostic system or a scan tool to retrieve any diagnostic trouble codes (DTCs) before moving onto the symptom chart or DTC index.
 - Make sure that all DTCs are cleared following rectification.

Symptom Chart

	Symptom (specific)	Possible source	Action
Non-Start	Engine does not crank	Security system /Immobilizer engagedBattery condition/charge	Make sure that the immobilizer system is disarmed. Check the battery condition and state of charge. Check that the engine turns by hand. Check the starting system and circuits. Refer to the electrical guides. Check for DTCs indicating an ECM relay or park/neutral switch fault. Rectify as necessary.
	Engine cranks, but does not start	 /Immobilizer engaged Low/Contaminated fuel Air ingress Blocked air cleaner Blocked fuel filter 	Make sure that the immobilizer system is disarmed. Check the fuel level and condition. Draw off approximately 1 ltr (2.11 pints) of fuel and allow to stand for 1 minute. Check to make sure there is no separation of the fuel indicating water or other liquid in the fuel. Check the low-pressure fuel system for leaks/damage, check for air ingress. Check the air cleaner element. Check that fuel flows through the fuel filter. Check DTCs indicating a fuel metering valve or injector fault. Check

		 Fuel metering valve blocked/contaminated Injector(s) fault/programming Intake air 	for DTCs indicating an engine management sensor fault. Che the valve train, check the compressions, REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing). Check the catalytic converter condition, etc. Check for diese particulate filter (DPF)DTCs. Refer to the warranty policy and procedures manual if an ECM is suspect.
Difficult to start	Difficult to start cold	fault Contaminated fuel Air ingress Blocked air cleaner Blocked fuel filter Low-pressure circuit fault Fuel metering valve blocked/contaminated Fuel pressure sensor fault Intake air temperature (IAT)	Check the glow plugs and circuits. Refer to the electrical guides. Check the fuel level and condition. Draw off approximately 1 ltr (2.11 pints) of fuel and allow to stand for minute. Check to make sure there is no separation of the furindicating water or other liquid in the fuel. Check the low-pressure fuel system for leaks/damage, check for air ingres: Check the air cleaner element. Check that fuel flows through the fuel filter. Check for DTCs indicating a fuel metering valvor injector fault. Check for DTCs indicating an engine management sensor fault. Check the valve train, check the compressions, REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing). Check the catalytic converter condition, etc. Check for diese particulate filter DTCs.
	Difficult to start hot	 Air ingress Blocked air cleaner Blocked fuel filter Low-pressure circuit fault Fuel metering valve blocked/contaminated Exhaust gas recirculation (EGR) valve fault Fuel pressure sensor 	Check the fuel level and condition. Draw off approximately 1 (2.11 pints) of fuel and allow to stand for 1 minute. Check to make sure there is no separation of the fuel indicating water other liquid in the fuel. Check the low-pressure fuel system f leaks/damage, check for air ingress. Check the air cleaner element. Check that fuel flows through the fuel filter. Check DTCs indicating a fuel metering valve or injector fault. Check for DTCs indicating an engine management sensor fault. Check the valve train, check the compressions, REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing). Check the catalytic converter condition, etc. Check for diese particulate filter DTCs.

		sensor fault Camshaft position (CMP) sensor fault Crankshaft position (CKP) sensor fault Injector(s) fault/programming Pump fault Blocked catalyst Valve train fault Low compression	
	Engine cranks too fast/slow	Battery condition/chargeStarting system faultLow compression	Check the battery condition and state of charge. Check the starting system circuits. Refer to the electrical guides. Rectify as necessary. Check the compressions, REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).
Driveability	Rough idle		Check the fuel level and condition. Draw off approximately 1 lf (2.11 pints) of fuel and allow to stand for 1 minute. Check to make sure there is no separation of the fuel indicating water o other liquid in the fuel. Check the low-pressure fuel system for leaks/damage, check for air ingress. Check for DTCs indicatin an injector programming or EGR fault. Check the air cleaner element. Check that fuel flows through the fuel filter. Check fo DTCs indicating a fuel metering valve fault. Check for DTCs indicating an engine management sensor fault. Check the dual mass flywheel.
	Idle speed high or low	 Accelerator pedal position (APP) sensor fault Intake air temperature (IAT) sensor fault 	Check for DTCs indicating an APP or IAT sensor fault. Rectify as necessary.
	Engine speed out of control	 Engine oil level too high Excessive blow-by Accelerator pedal position (APP) sensor fault Turbocharger bearing/seal failure 	Check/correct the engine oil level. Check the engine condition Check for DTCs indicating an APP sensor fault. Rectify as necessary. Check the turbocharger bearing/seal condition by assessing the movement in the turbocharger shaft and the amount of oil in the turbocharger body. Note that a small amount of oil is normal.
	Lack of power when accelerating	 Contaminated fuel Air intake circuit fault Low fuel pressure Exhaust gas recirculation (EGR) valve fault Fuel filter blocked Fuel lines kinked/restricted Pump fault Injector(s) fault/programming 	Check the fuel level and condition. Draw off approximately 1 lt (2.11 pints) of fuel and allow to stand for 1 minute. Check to make sure there is no separation of the fuel indicating water o other liquid in the fuel. Check the air intake system and low-pressure fuel circuit. Rectify as necessary. Check for DTCs indicating an EGR fault. Check for DTCs indicating an engine management sensor or injector programming fault. Check the turbocharger condition and operation. Check the catalytic converter condition. Rectify as necessary. For valve timing and compression information, REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).

	 Vehicle speed sensor fault Cylinder head temperature (CHT) sensor fault Intake air temperature (IAT) sensor fault Manifold absolute pressure (MAP) sensor fault Accelerator pedal position (APP) sensor fault Fuel rail temperature (FRT) sensor fault Fuel rail pressure (FRP) sensor fault Fuel metering valve fault Turbocharger fault Catalyst blocked Valve timing fault Low compression
Engine stops/stalls	 Low/Contaminated fuel Air cleaner element blocked Fuel metering valve blocked/contaminated Pump fault High-pressure leak Low-pressure circuit fault (air ingress) Relay fault Crankshaft position (CKP) sensor fault Cylinder head temperature (CHT) sensor fault Fuel rail pressure (FRP) sensor fault Dual-mass flywheel fault Engine control module (ECM) fault
Engine judders	 Low/Contaminated fuel Fuel metering valve blocked/contaminated High-pressure leak Air intake circuit fault Low-pressure circuit fault (air ingress) Pump fault Exhaust gas recirculation (EGR) valve fault Accelerator pedal position (APP) sensor fault Cylinder head temperature (CHT) sensor fault Camshaft position (CMP) sensor fault Check the fuel level and condition. Draw off approximately 1 ltr (2.11 pints) of fuel and allow to stand for 1 minute. Check to make sure there is no separation of the fuel indicating water or other liquid in the fuel. Check the air intake system and low-pressure fuel circuit. Rectify as necessary. Check for DTCs indicating an engine management sensor or injector programming fault. Check the catalytic converter and turbocharger condition. Rectify as necessary. Check the dual-mass flywheel. For cylinder head, compression and camshaft information, Diagnosis and Testing). REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing). Camshaft position (CMP) sensor fault

		 (CKP) sensor fault Intake air temperature (IAT) sensor fault Manifold absolute pressure (MAP) sensor fault Knock sensor fault Fuel rail pressure (FRP) sensor fault Injector(s) fault/programming Catalyst blocked Turbocharger fault Dual-mass flywheel fault Cylinder head gasket fault Camshafts/Valve clearances Low compression 	
	Engine will not stop	 Engine oil level too high Turbocharger fault Engine control module (ECM) fault 	Check/correct the engine oil level. Check the turbocharger condition and operation. Check for DTCs indicating an ECM fault. Refer to the warranty policy and procedures manual if an ECM is suspect.
General	Excessive fuel consumption	 Air intake circuit fault 	Make sure that the correct grade of oil is used in the engine. Check the air intake and low-pressure circuits. Check for DTCs indicating an EGR, injector programming or engine management sensor fault. Check the turbocharger condition and operation. Check the dual-mass flywheel. For valve timing and compression information, REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).
	Excessive black smoke	 Exhaust gas recirculation (EGR) valve fault Injector(s) fault/programming Accelerator pedal 	Check the air intake circuit. Check for DTCs indicating an EGR, injector programming or engine management sensor fault. Check the turbocharger bearing/seal condition by assessing the movement in the turbocharger shaft and the amount of oil in the turbocharger body. Note that a small amount of oil is normal. For valve timing information, REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).

	 Tur's a bearings/seals fault Valve timing fault
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DTC index

DTC	Condition	Possible source	Action
B1864	Battery power supply		Check the ECM power and ground circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs and check for normal operation.
	Engine control module (ECM) ID does not match	 Data mismatch between ECM and passive anti- theft system (PATS) 	Check the configuration of the ECM and anti-theft system. Reconfigure as necessary using the approved diagnostic system.
	Anti-lock brake system (ABS) control module fault		Refer to the warranty policy and procedures manual if a module is suspect.
	Right-hand front wheel speed sensor input circuit fault		Check the wheel speed sensor and circuits. Refer to the electrical guides. If no fault is found in the circuits, install a new sensor.
	Left-hand front wheel speed sensor input circuit fault	 Wheel speed sensor input circuit: high resistance Wheel speed sensor input circuit: short circuit to ground Wheel speed sensor input circuit: short circuit to ground 	
	Right-hand rear wheel speed sensor input circuit fault	 Wheel speed sensor input circuit: high resistance Wheel speed sensor input circuit: short circuit to ground Wheel speed sensor input circuit to ground 	
	Left-hand rear wheel speed sensor input circuit fault	 Wheel speed sensor input circuit: high resistance Wheel speed sensor input 	

	circuit: snort circuit to ground • Wheel speed sensor input circuit: short circuit to power	
Ambient air temperature (AAT) sensor circuit malfunction	 AAT sensor circuit: high resistance AAT sensor circuit: short circuit to ground AAT sensor circuit: short circuit to power AAT sensor fault 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the ambient air temperature sensor and circuits Refer to the electrical guides. If no fault is found in the circuits, install a new sensor. Clear the DTCs, test for normal operation.
Mass air flow (MAF) sensor circuit malfunction	circuit to ground	Refer to the approved diagnostic system for a guided diagnostic routine. Check the MAF sensor and circuits. Refer to the electrical guides. If no fault is found in the circuits, install a new sensor. REFER to: Mass Air Flow (MAF) Sensor (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Clear the DTCs, test for normal operation.
Manifold absolute pressure temperature (MAPT) sensor circuit malfunction	MAPT sensor	Refer to the approved diagnostic system for a guided diagnostic routine. This DTC can be set as a result of other codes. If P1665 is also set, investigate this first. Check the MAPT sensor and circuits. Refer to the electrical guides. If no fault is found in the circuits, install a new sensor. Clear the DTCs, test for normal operation.
Intake air temperature (IAT) sensor circuit malfunction (the intake air temperature sensor is part of the manifold absolute pressure and temperature (MAPT) sensor)	circuit: high resistance IAT sensor circuit: short circuit to ground IAT sensor circuit: short	Refer to the approved diagnostic system for a guided diagnostic routine. Check the MAPT sensor and circuits. Refer to the electrical guides. If no fault is found in the circuits, install a new sensor. REFER to: Manifold Absolute Pressure and Temperature (MAPT) Sensor (303-14B Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Clear the DTCs, test for normal operation.
Accelerator pedal position (APP) sensor circuit A range/performance	 APP sensor circuit A: high resistance APP sensor circuit A: short circuit to ground APP sensor circuit A: short circuit A: short circuit to signal return APP sensor fault 	Check the APP sensor and circuits. Refer to the electrical guides. If no fault is found in the circuits, install a new sensor. REFER to: Accelerator Pedal (310-02 Acceleration Control, Removal and Installation). Clear the DTCs, test for normal operation.
Fuel temperature sensor A range malfunction	sensor circuit: high resistance	Check the fuel temperature sensor and circuits. Refer to the electrical guides. If no fault is found in the circuits, install a new sensor. REFER to: Fuel Temperature Sensor (303-14B Electronic Engine

		connection	Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Clear the DTCs, test for normal operation.
	Fuel pressure sensor A circuit	sensor circuit: high resistance • Fuel pressure sensor: faulty	Refer to the approved diagnostic system for a guided diagnostic routine. Check the fuel pressure sensor and circuits. Refer to the electrical guides. If no fault is found in the circuits, install a new fuel injection supply manifold (the pressure sensor cannot be serviced separately). REFER to: Fuel Injection Supply Manifold (303-04B Fuel Charging and Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Clear the DTCs, test for normal operation.
	Fuel pressure sensor A circuit range/performance	fuel Leaking fuel rail Fuel pressure sensor circuit fault	Check for contaminated fuel. Draw off approximately 1 liter (2.11 pints) of fuel into a clear container and allow to settle for 1 minute. Examine the fuel for separation indicating contamination. Check the fuel rail for leaks, etc. Check the fuel pressure sensor and circuits. Refer to the electrical guides. If no fault is found in the circuits, install a new fuel injection supply manifold (the pressure sensor cannot be serviced separately). REFER to: Fuel Injection Supply Manifold (303-04B Fuel Charging and Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Clear the DTCs, test for normal operation.
P0200	Injector circuit fault	return lines	Check the fuel return lines for damage, etc. Check the injector circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation. Refer to the warranty policy and procedures manual if an ECM is suspect.
	Injector circuit open, cylinder 1	short circuit to ground Injector 1 circuit: short circuit to power	Check the injector circuits. Refer to the electrical guides. Rectify as necessary. If no fault is found in the circuits, install a new injector. REFER to: Fuel Injector (303-04B Fuel Charging and Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Clear the DTCs, test for normal operation.
	Injector 4 (cylinder 2) circuit malfunction	 Injector 4 circuit: short circuit to ground Injector 4 circuit: short circuit to power Injector 4 circuit: high resistance Injector failure 	
	Injector 2 (cylinder 3) circuit malfunction	 Injector 2 circuit: short circuit to ground Injector 2 circuit: short circuit to power Injector 2 circuit: high resistance 	

	metering control valve	fuel Air ingress Pump fault Excessive injector leakage Swarf in system Inlet metering valve fault	(2.11 pints) of fuel into a clear container and allow to settle for 1 minute. Examine the fuel for separation indicating contamination. Check the low-pressure fuel system for air ingress, check the fuel pump for evidence of swarf, etc. Check for injector leakage and DTCs indicating an inlet metering valve fault.
P0263	Injector 1 (cylinder 1) contribution/balance	● Injector fault	Carry out the injector leakage procedure. Rectify as necessary. Clear the DTCs, test for normal operation.
P0266	Injector 4 (cylinder 2) contribution/balance	 Injector fault 	
1	Injector 2 (cylinder 3) contribution/balance	 Injector fault 	
1	Injector 3 (cylinder 4) contribution/balance	 Injector fault 	
	Knock sensor (KS) signal invalid	KS circuit fault	Check the KS and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Crankshaft position (CKP) sensor	 Teeth missing from the crank input, indicating poor output from the crankshaft reference sensor Extra crank teeth seen, indicating the presence of noise No crank events have been detected within a calibratable time (when events have previously been detected) The gap in the flywheel tooth pattern has not been seen where expected, indicating the presence of noise CKP sensor circuit fault 	Check the CKP sensor fitment and condition. Check the CKP sensor and circuits. Refer to the electrical guides. Clear the DTCs, test for normal operation.
P0340	Camshaft position (CMP) sensor	CMP sensor circuit: high resistance CMP sensor circuit: short circuit to ground CMP sensor fault	Refer to the approved diagnostic system for a guided diagnostic routine. Check the CMP sensor and circuits. Refer to the electrical guides. Clear the DTCs, test for normal operation.
	Glow plug control circuit	 Glow plug control circuit: high resistance Glow plug control circuit: short circuit to ground Glow plug control circuit: short circuit to power Glow plug relay fault 	for normal operation.

	recirculation (EGR) insufficient flow detected	blocked or leaking pipes Disconnected hose between the air intake (after the mass air flow sensor) and the turbocharger inlet EGR valve stuck closed If P0405 is also set	necessary. If P0405 is also set, check the EGR valve and rectify as necessary. Clear the DTCs and drive the vehicle at a steady state at 30 mph (48 Km/h) (1,500 - 1,800 rpm) for more than 20 minutes to confirm the repair.
	Exhaust gas recirculation (EGR) excessive flow detected	• EGR valve stuck open	Check the EGR valve and rectify as necessary. Clear the DTCs and drive the vehicle at a steady state at 30 mph (48 Km/h) (1,500 - 1,800 rpm) for more than 20 minutes to confirm the repair.
	Exhaust gas recirculation (EGR) valve control circuit malfunction	EGR valve control circuit: high resistance - There has been a high number of unplugged connectors in service EGR valve control circuit: short circuit to ground EGR valve control circuit: short circuit to ground	Refer to the approved diagnostic system for a guided diagnostic routine. Note that this code does not indicate a fault in the EGR valve nor the engine control module (ECM), but possibly in the connectors to these components. Check the connectors and circuits. Refer to the electrical guides. Also note that the EGR system will often set groups of codes rather than a single code. Check out P0403 first. Clear the DTCs and drive the vehicle at a steady state at 30 mph (48 Km/h) (1,500 - 1,800 rpm) for more than 20 minutes to confirm the repair.
	Exhaust gas recirculation (EGR) valve control circuit range/performance	 Excessive soot build-up on the EGR valve seat 	Refer to the approved diagnostic system for a guided diagnostic routine. Install a new EGR valve if necessary, clear the DTCs, test for normal operation.
	Exhaust gas recirculation (EGR) sensor A circuit low	 Vacuum hose fault EGR valve connector fault EGR valve stuck closed 	Refer to the approved diagnostic system for a guided diagnostic routine. Note that this code may be set with P0401, indicating a faulty EGR valve. Check the connections and circuits first. Refer to the electrical guides. Check the hoses and connections and the operation of the vacuum regulator before replacing a valve. Clear the DTCs, test for normal operation.
	Exhaust gas recirculation (EGR) sensor A circuit high	 EGR valve connector fault EGR valve stuck open 	Refer to the approved diagnostic system for a guided diagnostic routine. Note that this code may be set with P0402, indicating a faulty EGR valve. Check the connections and circuits first. Refer to the electrical guides. Check the EGR valve. If it is stuck open, install a new valve. Clear the DTCs, test for normal operation.
P0409	Exhaust gas recirculation (EGR) sensor A circuit	 EGR valve connector fault EGR valve to engine control module (ECM) circuit: high resistance EGR valve to ECM circuit: short circuit to ground EGR valve to ECM circuit short circuit to ground EGR valve to ECM circuit: short circuit to power 	
P0480	Fan 1 control circuit	 Fan control module circuit: high resistance 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the fan circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs. test for normal

		 Fan control module circuit: short circuit to ground Fan control module circuit: short circuit to power Fan motor circuit: high resistance Fan motor circuit: short circuit to ground Fan motor circuit: short circuit to ground Fan motor circuit: short circuit to power 	
P0481	Fan 2 control circuit	 High fan control primary circuit 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the fan circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Fan power/ground circuit	 Fan control module circuit: high resistance Fan control module circuit: short circuit to ground Fan control module circuit: short circuit to power 	Check the fan circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Exhaust gas recirculation (EGR) sensor B circuit	 EGR valve connector fault EGR valve to engine control module (ECM) circuit: high resistance EGR valve to ECM circuit: short circuit to ground EGR valve to ECM circuit to ground 	
	Exhaust gas recirculation (EGR) throttle position control circuit	resistance • EGR circuit: short	Refer to the approved diagnostic system for a guided diagnostic routine. Check the EGR valve connections and circuits first. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Exhaust gas recirculation (EGR) throttle position control range/performance	resistance	Refer to the approved diagnostic system for a guided diagnostic routine. Check the EGR valve connections and circuits first. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
P0500	Vehicle speed sensor A	The engine control module (ECM) cannot determine the vehicle speed from the antilock brake system (ABS) or transmission	Check for DTCs indicating a fault in the ABS or transmission. Rectify as necessary. Clear the DTCs, test for normal operation.
	Air conditioning refrigerant pressure sensor circuit	 Air conditioning pressure sensor circuit: high resistance 	Check the air conditioning refrigerant pressure sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.

		 Air conditioning pressure sensor circuit: short circuit to ground Air conditioning pressure sensor circuit: short circuit short circuit to power Air conditioning pressure sensor fault 	
	Exhaust gas temperature sensor circuit, right-hand bank, upstream sensor	 Exhaust gas temperature sensor circuit: short circuit to ground Exhaust gas temperature sensor circuit: open circuit: open circuit Exhaust gas temperature sensor circuit: short circuit to power Exhaust gas temperature sensor fault 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Exhaust gas temperature sensor circuit low, right- hand bank, upstream sensor	 Exhaust gas temperature sensor circuit: short circuit to ground Exhaust gas temperature sensor circuit: open circuit Exhaust gas temperature sensor fault 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Exhaust gas temperature sensor circuit high, right- hand bank, upstream sensor	 Exhaust gas temperature sensor circuit: short circuit to power Exhaust gas temperature sensor fault 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
P0571	System voltage - range failure of the battery voltage input Speed control brake switch circuit failure	Battery voltage high or low Speed control brake switch circuit: high resistance Speed control brake switch circuit: short circuit to ground Speed control brake switch circuit: short circuit: short circuit: short circuit: short circuit to power Speed control	Check the battery condition and state of charge. Check the charging system. Rectify as necessary. Clear the DTCs, test for normal operation. Check the speed control brake switch and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.

		brake switch failure	
	Speed control input circuit		Check the speed control steering wheel switch and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Engine control module (ECM) keep- alive memory error	ECM power supply circuit faultECM fault	Check the power supplies to the ECM. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Engine control module (ECM) read- only-memory (ROM) error	 ECM flash memory error - Internal ECM fault 	Refer to the warranty policy and procedures manual if an ECM is suspect
	Internal control module analogue to digital processing performance		Refer to the warranty policy and procedures manual if an ECM is suspect
P0611	Fuel injector control module performance	 Fuel injectors have not been programmed Fuel injector programming is corrupt and the injectors have reset to their default values 	Programme the injectors using the approved diagnostic system. Clear the DTCs, test for normal operation.
	Generator field terminal circuit	monitor circuit:	Check the generator and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
P0623	Generator warning lamp circuit		Check the generator and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.

		 Warning lamp circuit: short circuit to power 	
	Sensor reference voltage A circuit	 This code indicates an internal engine control module (ECM) fault 	Refer to the warranty policy and procedures manual if an ECM is suspect
	Air conditioning (A/C) clutch relay control circuit	control circuit:	Check the A/C clutch and circuits. Refer to the electrical guides. Check the operation of the air conditioning clutch relay. Rectify as necessary. Clear the DTCs, test for normal operation.
	Immobilizer lamp control circuit	control circuit:	
	Engine control module (ECM) main relay control circuit open		
	Transmission control system (MIL Request)	 TCM reports unspecified error to ECM and requests MIL illumination 	Check the TCM for DTCs. Clear the DTCs, test for normal operation.
	Not all diagnostic monitors have run		This code does not indicate a fault, just that additional drive cycles are required.
	Injector Range/Performance		This DTC would be accompanied by the code P2336, P2337, P2338 or P2339 indicating which injector is faulty. Install a new injector(s) as necessary. REFER to: Fuel Injector (303-04B Fuel Charging and Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation). Clear the DTCs, test for normal operation.
P1211	Injector control	 Contaminated fuel 	Check for contaminated fuel. Draw off approximately 1 liter

	contamination	 Fuel pressure sensor/circuit fault Fuel metering valve/circuit fault Fuel pump fault 	contamination. Check the low-pressure fuel system for air ingress. Check for evidence of a high-pressure fuel leak. Rectify as necessary. Check the fuel pressure sensor, metering valve and circuits. Refer to the electrical guides. Check for DTCs indicating a pump fault.
1	Cylinder head temperature (CHT) sensor out of selftest range		Check the coolant level and condition, check the thermostat operation. Rectify as necessary. Check the CHT sensor and circuits. Refer to the electrical guides. Clear the DTCs, test for normal operation.
	Turbocharger boost system performance	 Turbocharger actuator fault 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the turbocharger actuator and circuits. Refer to the electrical guides. If no fault is found in the circuits, install a new turbocharger. REFER to: <u>Turbocharger</u> (303-04C Fuel Charging and Controls - Turbocharger, Removal and Installation). Clear the DTCs, test for normal operation.
	Turbocharger boost system performance	 Memory check failure during initialization Turbocharger vanes sticking 	Refer to the approved diagnostic system for a guided diagnostic routine. Clear the DTCs. Cycle the ignition and recheck the DTCs. If the DTCs are still present after 3 attempts, check the turbocharger vanes for deposit build-up. If there is no build-up, install a new turbocharger. REFER to: Turbocharger , (303-04C Fuel Charging and Controls - Turbocharger, Removal and Installation). Clear the DTCs, test for normal operation.
	Turbocharger boost system voltage	 Battery voltage out of range 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the battery condition and state of charge. Check the turbocharger circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Turbocharger boost system temperature too high	overheating as a result of exhaust	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust manifold for leakage/carbon deposits. Clear the DTCs, test for normal operation. If the fault persists, install a new turbocharger. REFER to: Turbocharger (303-04C Fuel Charging and Controls - Turbocharger, Removal and Installation). Clear the DTCs, test for normal operation.
	Differential pressure feedback sensor hoses reversed	 DPF pressure sensor (delta pressure sensor) crossed hose fault 	Check the correct connection of the hoses to the DPF pressure sensor. Rectify as necessary. Clear the DTCs, test for normal operation.
	Engine coolant heater A control circuit		Refer to the approved diagnostic system for a guided diagnostic routine. Check the coolant heater and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Engine coolant heater B control circuit	 Engine coolant heater B control circuit: high resistance 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the coolant heater and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Pedal position not available (accelerator pedal position (APP) sensor failed on more than	circuit fault	Refer to the approved diagnostic system for a guided diagnostic routine. Check the APP sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.

Engine control module (ECM) internal voltage reference Smart generator output circuit	Generator circuit:	Refer to the approved diagnostic system for a guided diagnostic routine. Refer to the warranty policy and procedures manual if an ECM is suspect.
		5
		Refer to the approved diagnostic system for a guided diagnostic routine. Check the generator and circuits. Refer to the electrica guides. Rectify as necessary. Clear the DTCs, test for normal operation.
Tire/Axle ratio out of acceptable range	 The tire size stored in the vehicle identification (VID) block is out of range 	Check that the tires fitted to the vehicle are of the correct specification. Rectify as necessary.
CAN link engine control module/transmission control module circuit/network	 CAN H open circuit failure between ECM and TCM CAN L open circuit failure between ECM and TCM 	Check the CAN circuits between the engine control module (ECM) and the TCM. Rectify as necessary. Clear the DTCs, test for normal operation.
Injector Data Incompatible	 Injector corrections download failed 	Re-enter the injector codes using the approved diagnostic system. Clear the DTCs, test for normal operation.
Transmission indeterminate failure (failed to neutral)	failure, the ECM is required to	Check the TCM for DTCs. Clear the DTCs, test for normal operation.
Controller area network (CAN) link, turbocharger boost control system	 CAN feedback messages not received 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the CAN circuits between the engine control module (ECM) and the turbocharger. Rectify as necessary. Clear the DTCs, test for normal operation.
Transmission Neutral Safety Switch Circuit Failure	plausibility failureStart lock STLK	Check the Start lock switch and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation. Refer to the warranty policy and procedures manual if an ECM / TCM is suspect
Fuel fired heater (FFH) control circuit	ground circuit fault	Refer to the approved diagnostic system for a guided diagnostic routine. Check the FFH and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
_	CAN link engine control module/transmission control module circuit/network Injector Data Incompatible Transmission indeterminate failure (failed to neutral) Controller area network (CAN) link, turbocharger boost control system Transmission Neutral Safety Switch Circuit Failure	Vehicle identification (VID) block is out of range CAN link engine control module/transmission control module circuit/network Injector Data Incompatible Controller area network (CAN) link, turbocharger boost control system Transmission Neutral Safety Switch Circuit Failure Start lock STLK circuit: short to ground Start lock STLK circuit: short to power Fuel fired heater (FFH) control circuit Fuel fired heater (FFH) control circuit Fillure CAN H open circuit failure between ECM and TCM Injector CAN L open circuit failure between ECM and TCM CAN L open circuit failure between ECM and TCM CAN L open circuit failure corrections download failed CAN Heedback messages not received CAN feedback messages not received Start lock STLK circuit: open circuit Start lock STLK circuit: short to ground Start lock STLK circuit: short to ground Start lock STLK circuit: short to power Failure of ECM Failure of TCM FFH supply or ground circuit fault FFH control circuit: high resistance

		 circuit to ground FFH control circuit: short circuit to power FFH control module fault 	
	Right-hand bank exhaust gas temperature sensor circuit, sensor 2	temperature sensor circuit:	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Right-hand bank exhaust gas temperature sensor circuit low, sensor 2	temperature sensor circuit:	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Right-hand bank exhaust gas temperature sensor circuit high, sensor 2	temperature sensor circuit:	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Right-hand bank exhaust gas temperature sensor circuit range/performance, sensor 1	temperature sensor circuit:	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Right-hand bank exhaust gas temperature sensor circuit intermittent, sensor 1	temperature sensor circuit:	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
2085	Right-hand bank	• Exhaust gas	Refer to the approved diagnostic system for a guided diagnostic

exnaust gas temperature sensor circuit intermittent, sensor 2	temperature sensor circuit: intermittent high resistance Exhaust gas temperature sensor fault	r u'' . ^' ''' x' ust gas temper 'ure r ' circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
Injector control pressure too high	 Fuel contaminated Fuel pressure sensor circuit: high resistance Fuel pressure sensor circuit: short circuit to ground Fuel pressure sensor circuit: short circuit to ground 	Check for contaminated fuel. Draw off approximately 1 liter (2.11 pints) of fuel into a clear container and allow to settle for 1 minute. Examine the fuel for separation indicating contamination. Rectify as necessary. Check the fuel pressure sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
Injector control pressure too low - engine cranking	 Low fuel level Blocked, kinked or crushed fuel lines Fuel pressure sensor circuit fault Inlet metering valve fault Injector leaking Fuel pump fault Engine control module (ECM) fault 	Check the fuel level. Check the fuel lines for damage, etc. Rectify as necessary. Check the fuel pressure sensor and circuits. Refer to the electrical guides. Check for DTCs indicating an inlet metering valve, injector or pump fault. Rectify as necessary. Clear the DTCs, test for normal operation. Refer to the warranty policy and procedures manual if an ECM is suspect.
Cylinder 1 above knock threshold - knock sensor trim for cylinder 1 invalid	 Natural wear of the injector Fuel contaminated Blocked or dirty fuel injector(s) Injector circuit fault Injector fault 	Re-enter the injector codes using the approved diagnostic system. If after reprogramming and clearing the DTCs the DTC reoccurs, check for contaminated fuel. Draw off approximately 1 liter (2.11 pints) of fuel into a clear container and allow to settle for 1 minute. Examine the fuel for separation indicating contamination. Rectify as necessary. Carry out the cylinder balance check. Check the injector circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
Cylinder 2 above knock threshold - knock sensor trim for cylinder 2 (injector 4) invalid	 Natural wear of the injector Fuel contaminated Blocked or dirty fuel injector(s) Injector circuit fault Injector fault 	
Cylinder 3 above knock threshold - knock sensor trim for cylinder 3 (injector 2) invalid	 Natural wear of the injector Fuel contaminated Blocked or dirty fuel injector(s) Injector circuit fault Injector fault 	
Cylinder 4 above knock threshold - knock sensor trim for cylinder 4	Natural wear of the injectorFuel contaminated	

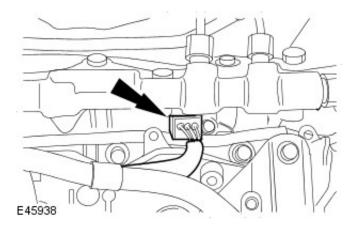
(injector 3) invalid	 Blocked or dirty fuel injector(s) Injector circuit fault Injector fault 	
Diesel particulate filter (DPF) restriction - ash accumulation	 ◆ DPF blocked 	Install a new DPF as necessary. REFER to: Diesel Particulate Filter (DPF) (309-00 Exhaust System, Removal and Installation). Clear the DTCs, test for normal operation.
Diesel particulate filter (DPF) differential pressure too low	◆ DPF leaking	Install a new DPF as necessary. REFER to: <u>Diesel Particulate Filter (DPF)</u> (309-00 Exhaust System, Removal and Installation). Clear the DTCs, test for normal operation.
Diesel particulate filter (DPF) differential pressure too high	DPF overloaded	Carry out the regeneration procedure. Clear the DTCs, test for normal operation.
Exhaust temperature too low for particulate filter regeneration	 Insufficient mileage/speed for regeneration 	Carry out the regeneration procedure. Clear the DTCs, test for normal operation.
Diesel particulate filter (DPF) pressure sensor A circuit	 DPF pressure sensor (delta pressure sensor) circuit fault DPF pressure sensor (delta pressure sensor)fault 	Check the DPF pressure sensor (delta pressure sensor)and circuits. Refer to the electrical guides. Rectify as necessary.
Diesel particulate filter (DPF) pressure sensor A circuit range/performance	 DPF pressure sensor (delta pressure sensor) hose fault DPF pressure sensor (delta pressure sensor)fault 	Refer to the approved diagnostic system for a guided diagnostic routine. Check the condition and fitment of the DPF pressure sensor (delta pressure sensor) and hoses. Rectify as necessary.
Injector control pressure regulator open	Inlet metering valve faultInlet metering valve circuit fault	Check the inlet metering valve and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.

Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Camshaft Position (CMP) Sensor

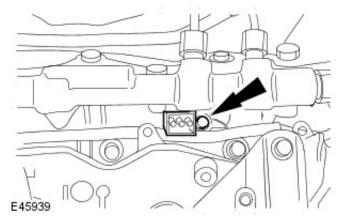
Removal and Installation

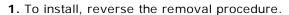
Removal

- Remove the air cleaner.
 For additional information, refer to: <u>Air Cleaner</u> (303-12B Intake Air Distribution and Filtering 2.2L Duratorq-TDCi (110kW/150PS) Puma/2.0L Duratorq-TDCi, Removal and Installation).
- **2.** Disconnect the electrical connector.

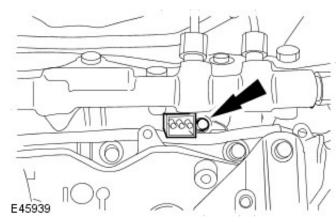


3. Remove the camshaft position (CMP) sensor.



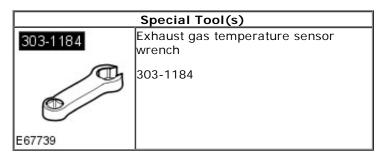






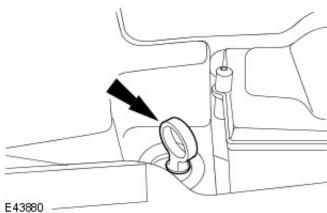
Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Catalytic Converter Temperature Sensor

Removal and Installation

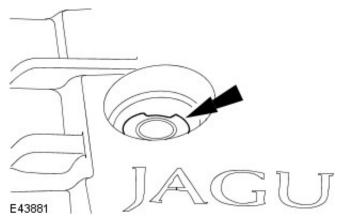


Removal



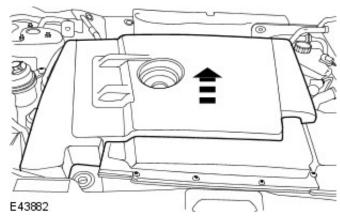


2. Remove the oil filler cap.

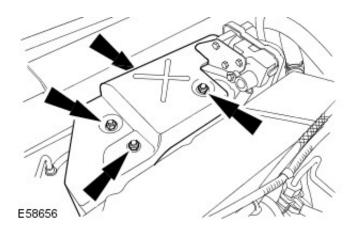


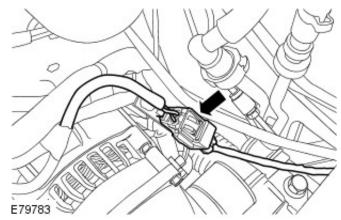
3. NOTE: Install the oil filler cap and oil level indicator to prevent foreign material entering the valve cover.

Remove the engine cover.

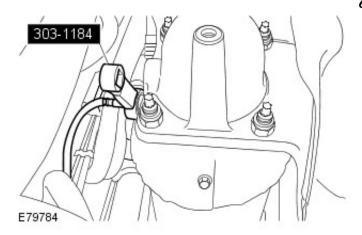


4. Remove the turbocharger heatshield.



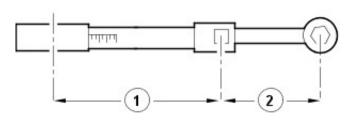


5. Disconnect the catalytic converter temperature sensor electrical connector.



6. Remove the catalytic converter temperature sensor.



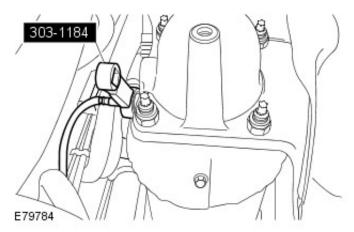


1. CAUTION: Make sure the torque wrench setting procedure is followed correctly. Failure to follow this instruction may result in damage to the vehicle.

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
- Stage 4: Set the torque wrench to the figure arrived at in stage 3.

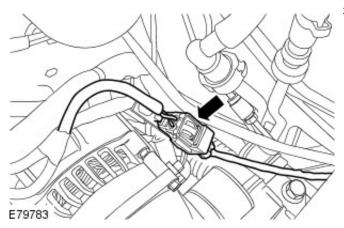
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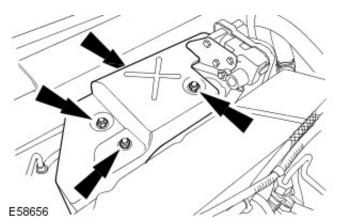
2. CAUTION: Make sure the torque wrench setting procedure is followed correctly. Failure to follow this instruction may result in damage to the vehicle.

Install the catalytic converter temperature sensor.

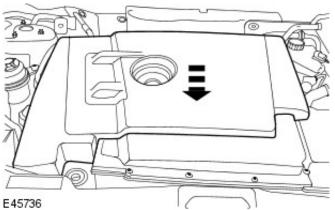
• Tighten to 35 Nm.



3. Connect the catalytic converter temperature sensor electrical connector.

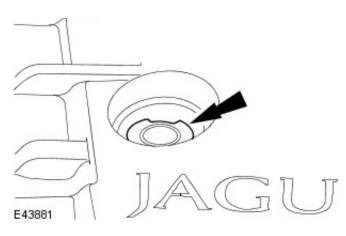


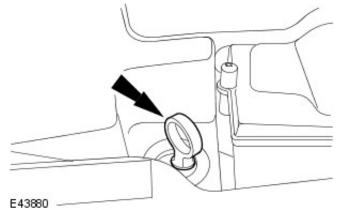
- 4. Install the turbocharger heatshield.
 - Tighten to 9 Nm.



5. NOTE: Remove the oil filler cap and oil level indicator. Install the engine cover.

6. Install the oil filler cap.





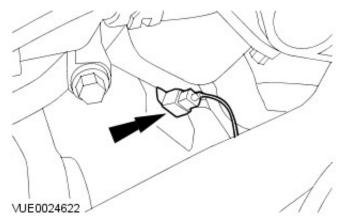
7. Install the oil level indicator.

Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Crankshaft Position (CKP) Sensor

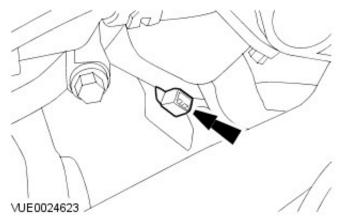
Removal and Installation

Removal

1. Disconnect the electrical connector.

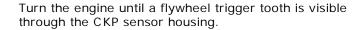


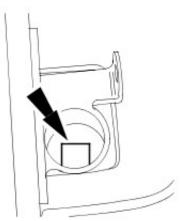
2. Remove and discard the crankshaft position (CKP) sensor.



Installation

1. NOTE: Only turn the engine in the normal direction of rotation



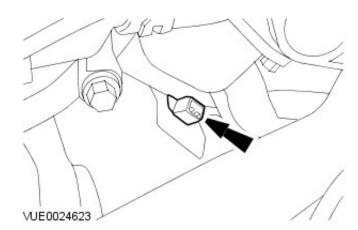


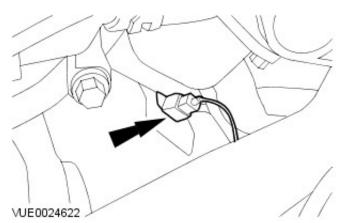
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- 2. CAUTION: The CKP sensor tip must rest on a flywheel trigger tooth. Incorrect installation may result in the CKP sensor being damaged.
- \bullet NOTE: Make sure that the CKP sensor housing is clean and free from foreign material.

Install the CKP sensor.

• Tighten to 7 Nm.

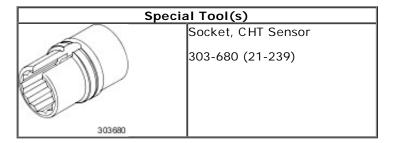




3. Connect the CKP sensor electrical connector.

Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Cylinder Head Temperature (CHT) Sensor

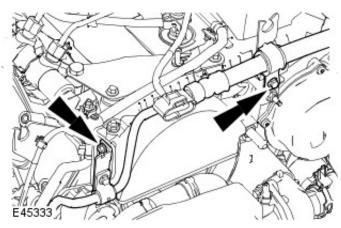
Removal and Installation



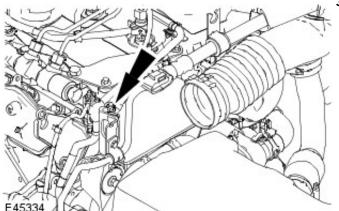
Removal

Remove the air cleaner.
 For additional information, refer to: <u>Air Cleaner</u> (303-12B Intake Air Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).

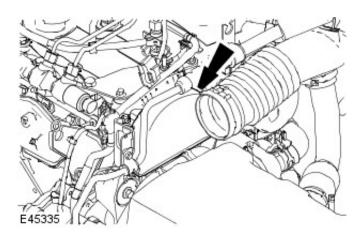
2. Detach the power assisted steering fluid pipe.

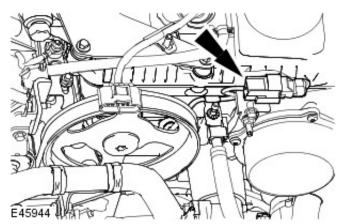


3. Remove the power steering pump belt cover retaining nut.

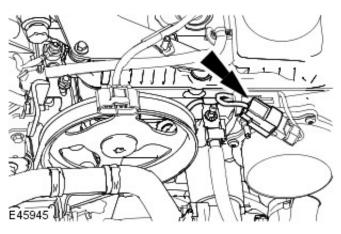


4. Remove the power steering pump belt cover.

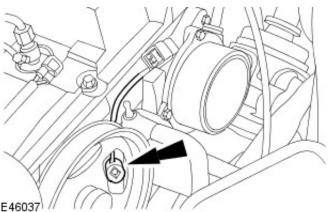




5. Detach the cyclinder head temperature (CHT) sensor electrical connector.

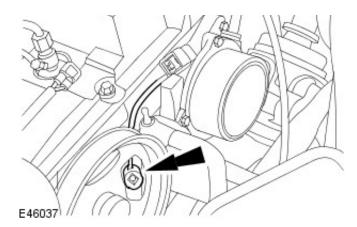


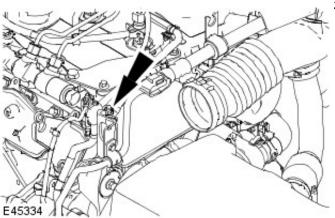
6. Disconnect the CHT sensor electrical connector.



7. Using the special tool 303-680, remove the CHT sensor.

- **1.** To install, reverse the removal procedure.
 - Tighten to 10 Nm.





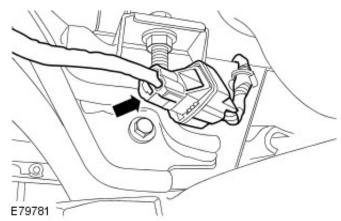
2. Tighten to 10 Nm.

Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Diesel Particulate Filter (DPF) Temperature Sensor

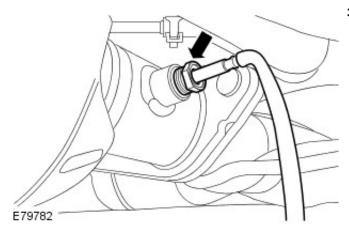
Removal and Installation

Removal

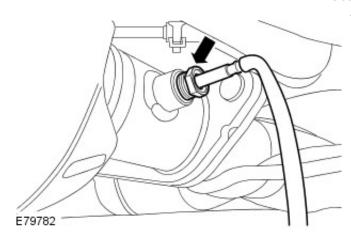
- Remove the air deflector.
 For additional information, refer to: <u>Air Deflector 2.2L Duratorq-TDCi (110kW/150PS) Puma/2.0L Duratorq-TDCi (501-02 Front End Body Panels, Removal and Installation).</u>
- 2. Disconnect the diesel particulate filter (DPF) temperature sensor electrical connector.



3. Remove the DPF temperature sensor.



- **1.** To install, reverse the removal procedure.
 - Tighten to 35 Nm.

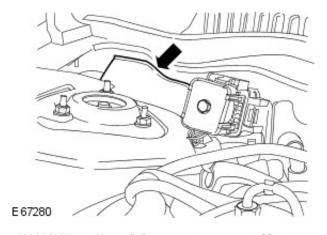


Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Engine Control Module (ECM)

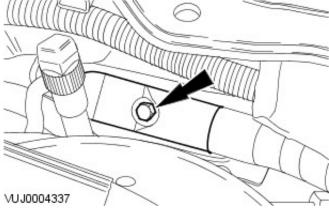
Removal and Installation

Removal

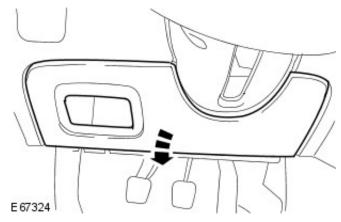
- Disconnect the battery ground cable. For additional information, refer to
 For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Remove the engine wiring harness trim panel.



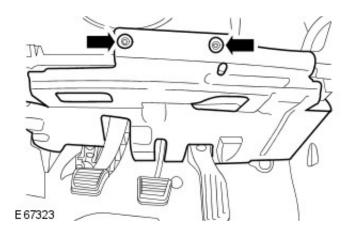
3. Disconnect the engine control module (ECM) electrical connector.

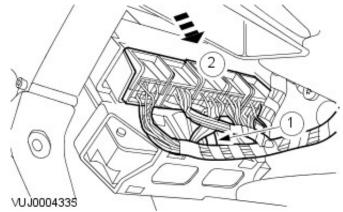


4. Remove the instrument cluster lower trim panel.

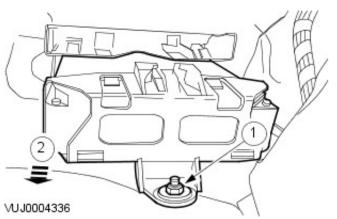


5. Remove the trim panel.

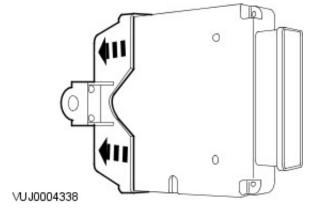




- **6.** Detach the generic electronic module (GEM) from the ECM.
 - 1. Release the GEM locking tang.
 - 2. Detach the GEM from the ECM.



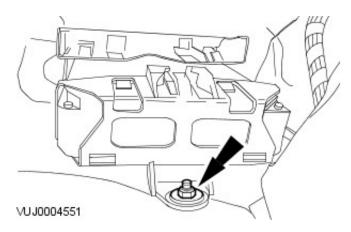
- 7. Remove the ECM.
 - 1. Remove the ECM retaining nut.
 - 2. Remove the ECM.

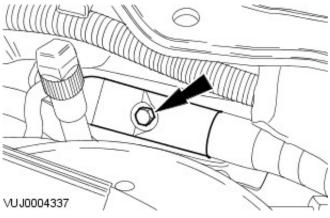


8. Remove the ECM from the ECM retaining bracket.

Installation

- **1.** To install, reverse the removal procedure.
 - Tighten to 10 Nm.





2. CAUTION: Make sure that the electrical connector locates correctly in the ECM. Do not force or overtighten the electrical connector.

Tighten to 10 Nm.

Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Engine Oil Pressure (EOP) Sensor

Removal and Installation

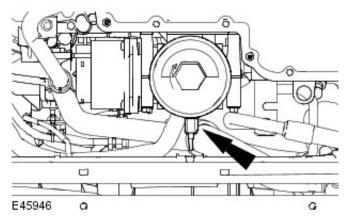
Removal

- Raise and support the vehicle.
 For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- 2. Remove the engine undertray.

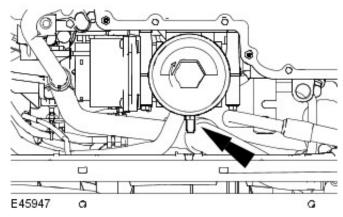
 For additional information, refer to: Air Deflector 2.2L

 <u>Duratorg-TDCi (110kW/150PS) Puma/2.0L Duratorg-TDCi</u>

 (501-02 Front End Body Panels, Removal and Installation).
- 3. Disconnect the engine oil pressure (EOP) sensor electrical connector.

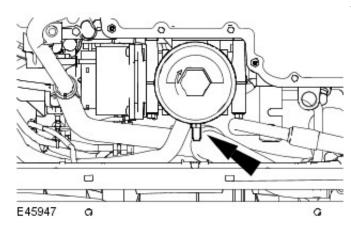


4. Remove the EOP sensor.



Installation

- 1. To install, reverse the removal procedure.
 - Tighten to 15 Nm.

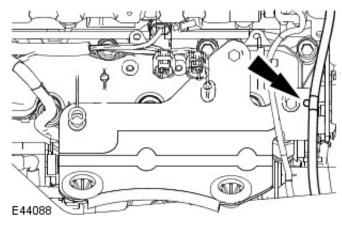


Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Fuel Temperature Sensor

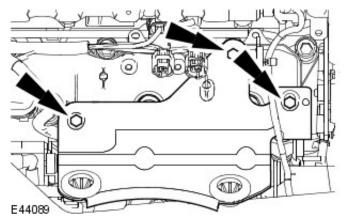
Removal and Installation

Removal

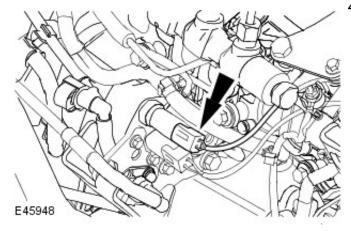
- Remove the air cleaner.
 For additional information, refer to: <u>Air Cleaner</u> (303-12B Intake Air Distribution and Filtering 2.2L Duratorq-TDCi (110kW/150PS) Puma/2.0L Duratorq-TDCi, Removal and Installation).
- 2. Detach the wiring harness.



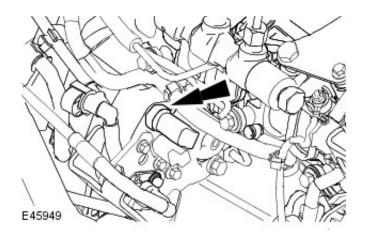
3. Remove the air cleaner mount bracket.



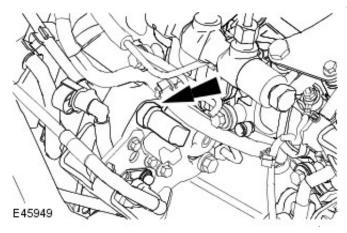
4. Disconnect the electrical connector.



5. Remove the fuel temperature sensor.



Installation



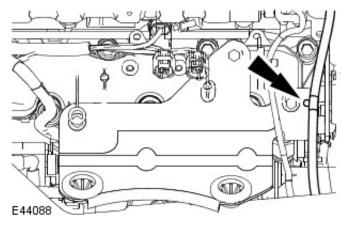
- **1.** To install, reverse the removal procedure.
 - Tighten to 15 Nm.

Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Knock Sensor (KS)

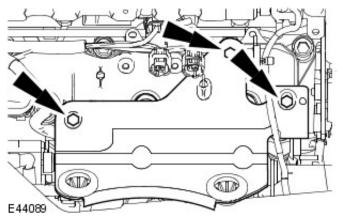
Removal and Installation

Removal

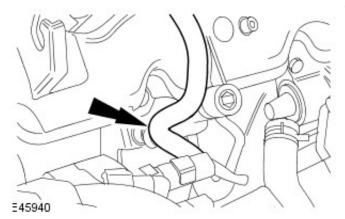
- Remove the air cleaner.
 For additional information, refer to: <u>Air Cleaner</u> (303-12B Intake Air Distribution and Filtering 2.2L Duratorq-TDCi (110kW/150PS) Puma/2.0L Duratorq-TDCi, Removal and Installation).
- 2. Detach the wiring harness.



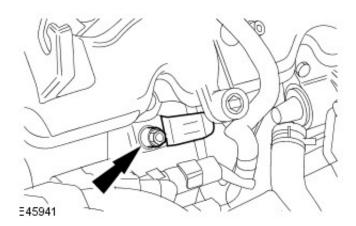
3. Remove the air cleaner mount bracket.

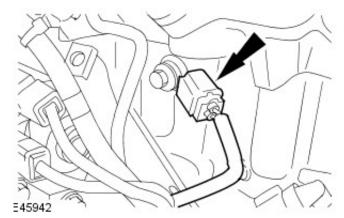


4. Detach the wiring harness.

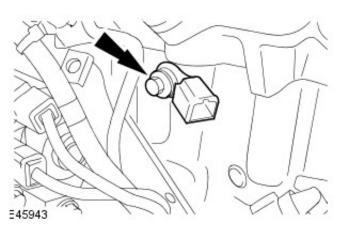


5. Remove the fuel pump to fuel injection supply manifold high pressure pipe retaining bracket.





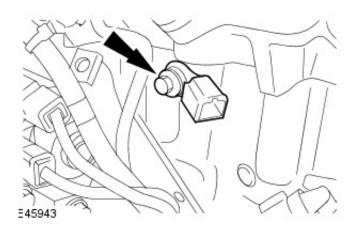
6. Disconnect the electrical connector.



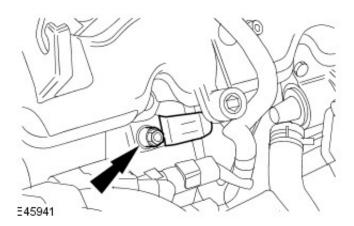
7. Remove the knock sensor (KS).

Installation

- **1.** To install, reverse the removal procedure.
 - Tighten to 20 Nm.

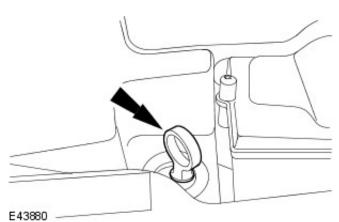


2. Tighten to 10 Nm.

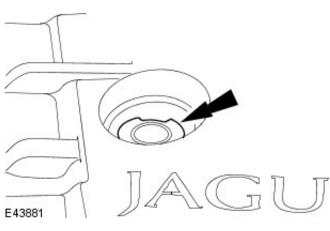


Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Manifold Absolute Pressure and Temperature (MAPT) Sensor Removal and Installation

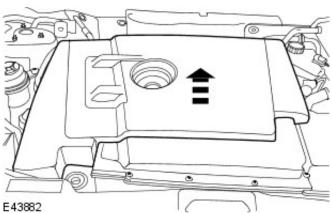
Removal



1. Remove the oil level indicator.

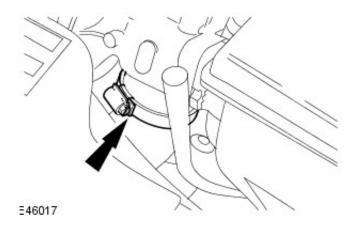


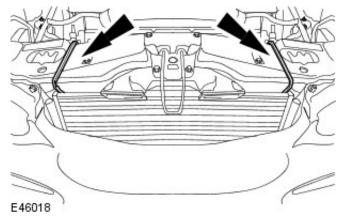
2. Remove the oil filler cap.



3. Remove the engine cover.

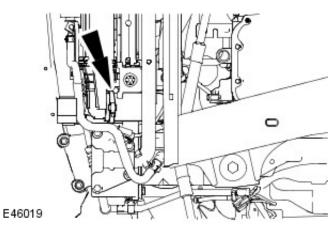
4. Detach the charge air cooler hose.





5. CAUTION: Make sure that the radiator is not damaged when installing the retaining straps.

Fit suitable retaining straps to the radiator.

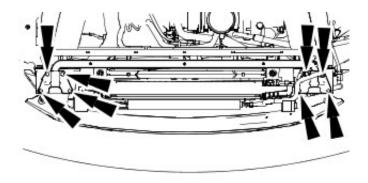


- **6.** Raise and support the vehicle. For additional information, refer to: <u>Jacking</u> (100-02 Jacking and Lifting, Description and Operation).
- 7. Remove the radiator splash shield.

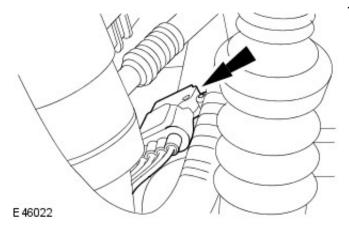
 For additional information, refer to: Radiator Splash Shield (501-02 Front End Body Panels, Removal and Installation).
- **8.** Detach the charge air cooler hose.

9. Remove the radiator support bar.

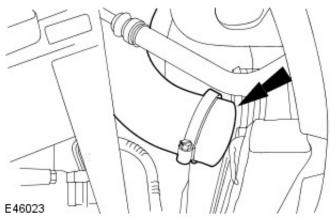
er on extent ex or man south when re-



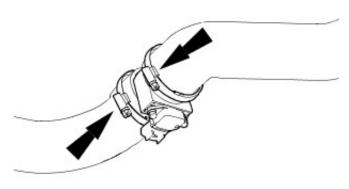
E46021



10. Disconnect the electrical connector.



11. Remove the charge air cooler hoses and manifold absolute pressure and temperature (MAPT) sensor assembly.

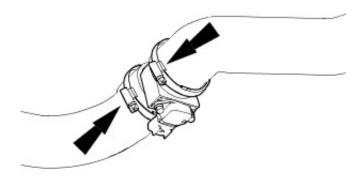


12. Remove the MAPT sensor.

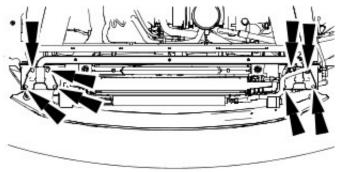
E46024

Installation

- **1.** To install, reverse the removal procedure.
 - Tighten to 4 Nm.

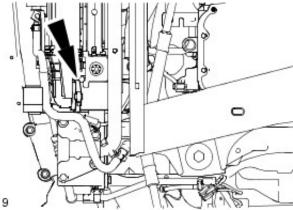


E46024



2. Tighten to 25 Nm.

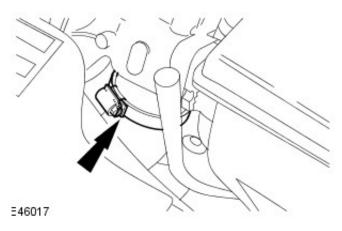
E46021



3. Tighten to 4 Nm.



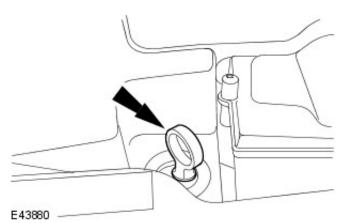
4. Tighten to 4 Nm.



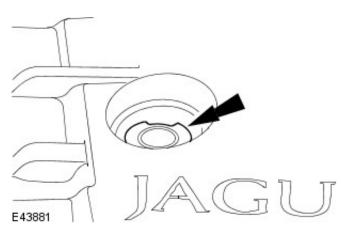
Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Manifold Absolute Pressure (MAP) Sensor

Removal and Installation

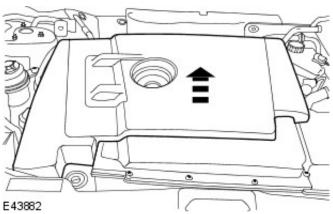
Removal



1. Remove the oil level indicator.



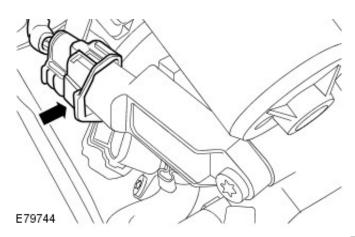
2. Remove the oil filler cap.

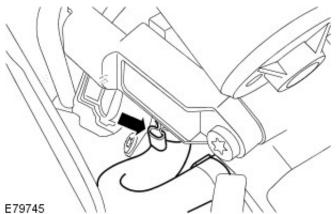


3. NOTE: Install the oil filler cap and oil level indicator to prevent foreign material entering the valve cover.

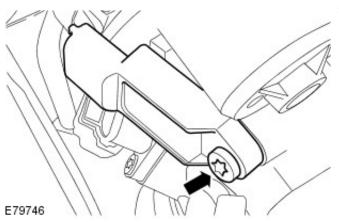
Remove the engine cover.

4. Disconnect the manifold absolute pressure (MAP) Sensor electrical connector.





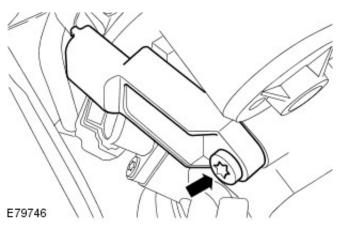
- **5.** Disconnect the hose.
 - Detach the retaining clip.



- 6. Remove the MAP sensor.
 - Remove the retaining bolt.

Installation

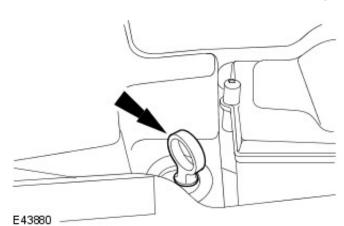
- **1.** To install, reverse the removal procedure.
 - Tighten to 4 Nm.



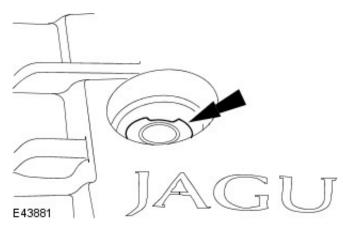
Electronic Engine Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi - Mass Air Flow (MAF) Sensor

Removal and Installation

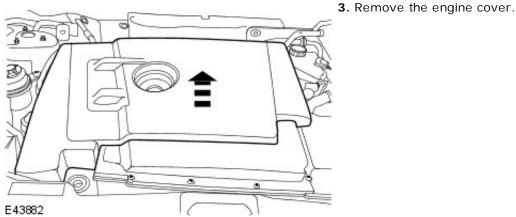
Removal



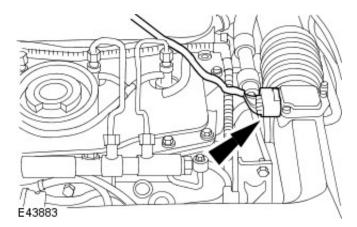
1. Remove the oil level indicator.

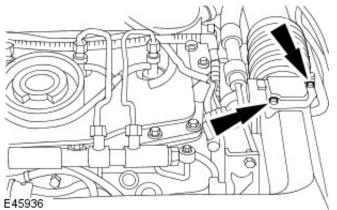


2. Remove the oil filler cap.



4. Disconnect the mass air flow sensor electrical connector.





5. Remove the mass air flow (MAF) sensor.

Installation

1. To install, reverse the removal procedure.

Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO -

Lubricant, Sealers and Solvents

Description	Specification
High-temperature grease	ESD-M1C220-A
Metal surface cleaner	WSW-M5B392-A
Sealant	WSS-M4G323-A6

Fluid Maint enance

CAUTION: Use only WSS-M2C922-A1 automatic transmission fluid. Use of any other fluids may result in a transmission malfunction or failure.

Intervals		
Normal Maintenance	Not necessary. Filled for life.	
Severe Duty Maintenance	Change the fluid at 48,000 km (30,000 miles) intervals.	

General Specifications

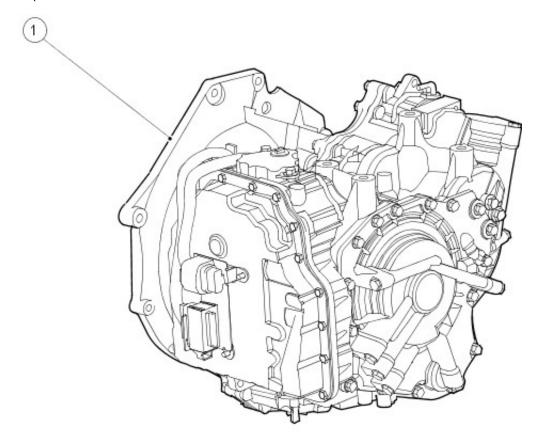
		Refill Capacity	
Engine	Approximate Liters	U.S. Quarts	Fluid Type
2.0I, 2.5L and 3.0L	8.8	8.32	WSS-M2C9 22-A1

¹ 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.

Description	Nm	lb-ft	lb-in
Main control valve body screws	8	-	71
Torque converter access cover retaining bolts	10	-	89
Torque converter retaining bolts	55	41	-
Transaxle retaining bolts	48	35	-
Transaxle dust cover retaining bolt	10	-	89
Solenoid retaining bolt	8	-	71
Transaxle support insulator retaining nut	133	98	-
Transaxle mount bracket retaining bolts	80	59	-
Transmission control module retaining nuts	10	-	89
Transmission fluid drain plug	45	33	-
Transmission fluid level plug	15	11	-
Transmission mount to body retaining bolts	80	59	-
Transmission range sensor retaining bolts	10	-	89
Valve body cover retaining bolts	8	-	71
Starter motor retaining bolts	35	26	-
Starter motor solenoid electrical connector retaining nut	6	-	53
Starter motor electrical connector retaining nut	12	9	-
Wiring harness to camshaft cover retaining stud, retaining nut	6	-	53
Intake manifold support bracket retaining bolts	10	-	89
Air cleaner mount bracket retaining nuts and bolt	6	-	53
Left-hand driveshaft retaining nuts - vehicles with 2.0L and 2.0L diesel engine	25	18	-
Shock absorber and spring assembly securing nuts	25	18	-
Transaxle ground lead	25	18	-
Support bar retaining bolts	25	18	-

Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transmission DescriptionVehicles With: 5-Speed Automatic Transaxle - JATCO

Description and Operation



VUJ0004671

Automatic transmission JF506E - Up To 2009MY

The newly developed JF506E automatic transmission has been developed for use by Jaguar. The JF506E is built in Japan by JATCO (Japan Automatic Transmission Company). The JF506E has 5-speed lock-up which provides smooth and fast operation and employs a Transmission Control Module (TCM), three speed sensors and nine gear change solenoids to realize finer gear change control which provides excellent response to changing driving conditions.

Automatic transmission JF506E

JF506E:

- J = Japan automatic transmission company
- F = front wheel drive
- 5 = 5 Forward gears
- 06 = Version number
- E = Electronic control

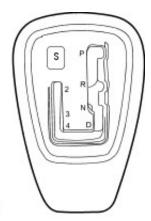
The transmission ID is stamped on the transmission, E.G.: PL002 = 2.0 litre, PL001 = 2.5 litre and PL000 = 3.0 litre. This is followed by the production year and month and a 5 digit serial number -08 XXXXX.

Range Selection

Depending on the vehicle options selected the automatic transmission range selector may have different range positions.

The standard range selector has seven positions: P, R, N, D, 4, 3 and 2.

J-Gate Range Selection



VUJ0004672

"P"

In the PARK position:

- there is no power flow through the automatic 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 automatic 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 1-5 and 5-1.
- apply and release of the torque converter clutch.
- maximum fuel economy during normal operation.
- 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:

- third gear start and hold.
- the torque converter clutch may apply and release.
- improved traction on slippery roads.
- · engine braking.

"2"

The 2 position provides:

- second gear start and hold. the torque converter clutch may apply and release.
- improved traction on slippery roads.
- engine braking.

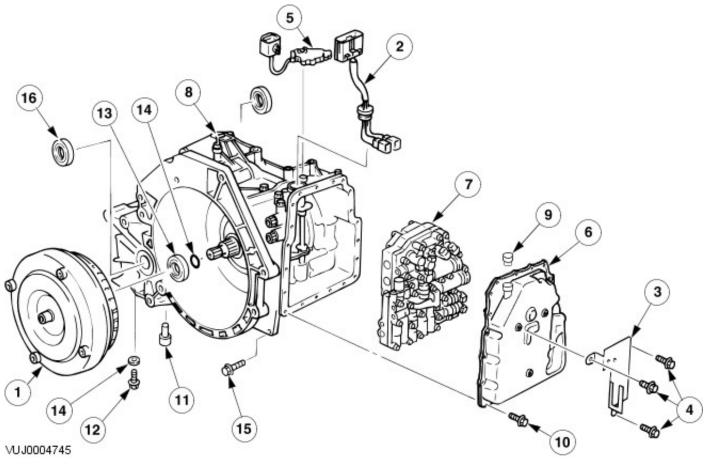
"S"

The Sport mode switch allows:

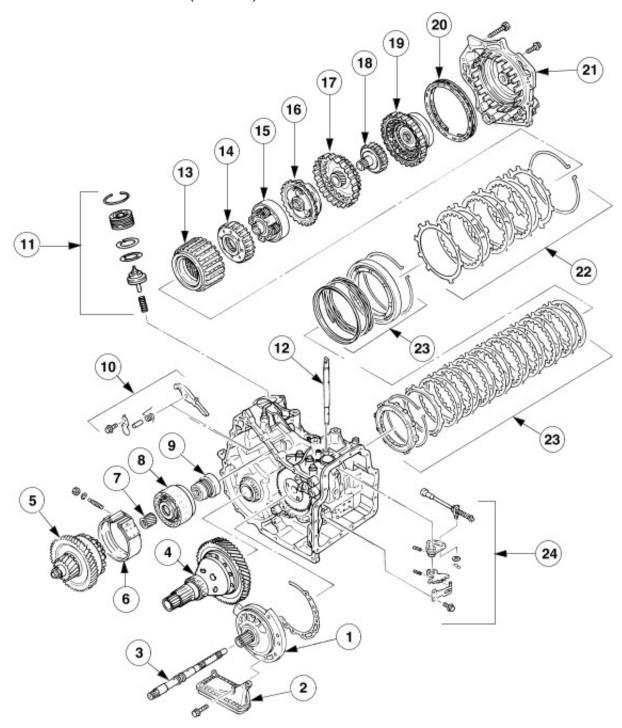
- the driver to select or de-select the automatic transmission sport mode.
- the automatic transmission to operate normally when the sport mode is selected, but under acceleration the gear shift points are extended to make full use of the engine's power reserves.
- the driver to drive the vehicle in the "D" position with full automatic transmission shift or manually shift gears in the "2, 3 and 4" positions.

Disassembled Views

Transmission disassembled Views



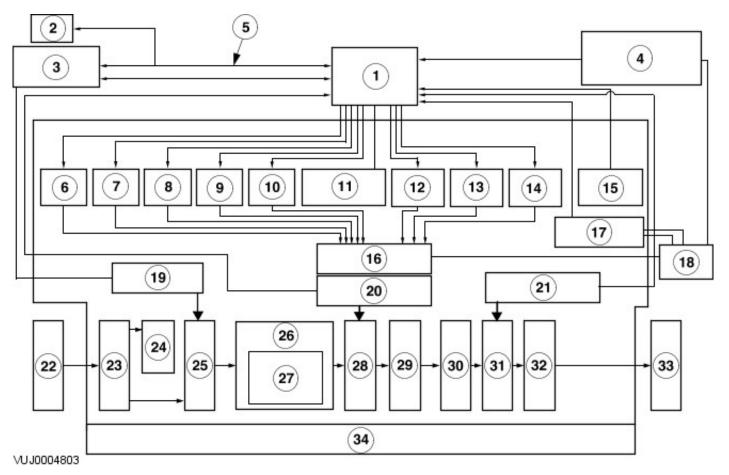
Item	Part Number	Description
1	_	Torque converter
2	_	Terminal assembly
3	_	Plate
4	_	Retaining bolt
5	_	Inhibitor switch
6	_	Main control valve body cover
7	_	Main control valve body
8	_	Air breather
9	_	Automatic transmission fluid charging pipe cap.
10	_	Main control valve body cover retaining bolt
11	_	Automatic transmission fluid level tube
12	_	Magnet plug
13	_	Oil seal
14	_	O-ring
15	_	Transmission retaining bolts



Item	Part Number	Description
1	_	Oil pump
2	_	Oil strainer
3	_	Input shaft
4	_	Differential gear
5	_	Reduction gear
6	_	Reduction brake band
7	_	Sun gear

8	_	Direct clutch
9	_	One-way clutch inner race
10	_	Parking mechanism
11	_	Band servo
12	_	Manual shaft
13	_	Low clutch
14	_	Internal gear
15	_	Rear planetary carrier
16	_	Front planetary carrier
17	_	Low clutch hub
18	_	High clutch hub
19	_	Reverse and high clutch assembly
20	_	Return spring
21	_	Side cover
22	_	2-4 brake
23	_	Low and reverse brake
24	_	Parking component

Overview



Item	Part Number	Description
1	_	TCM
2	_	Anti-lock Braking System (ABS)
3	_	Engine Control Module (ECM)
4	_	D/4 switch, (test switch), sports mode switch
5	_	CAN (including torque down switch)
6	_	Line pressure solenoid
7	_	Lock-up solenoid
8	_	Shift solenoid A
9	_	Shift solenoid B
10	_	Shift solenoid C
11	<u> </u>	Low clutch timing solenoid

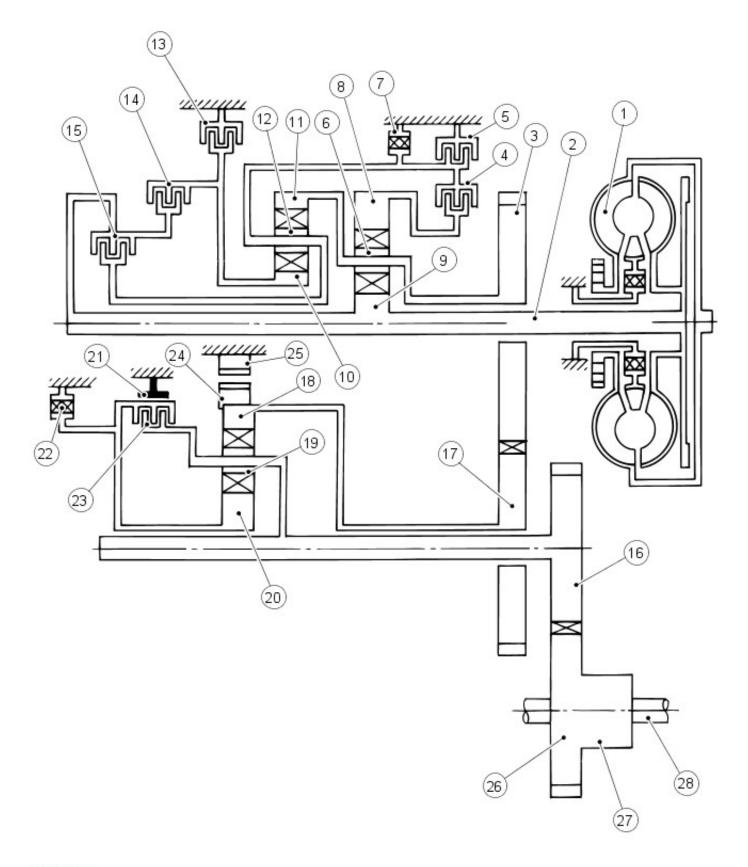
L 12	<u> </u>	Reduction timing solenoid	
13	<u> </u>	2-4 brake timing solenoid	
14	<u> </u>	2-4 brake duty solenoid	
15	<u> </u>	Transmission Fluid Temperature (TFT) sensor	
16	<u> </u>	Control valve	
17	<u> </u>	Inhibitor switch	
18	<u> </u>	Select lever	
19	<u> </u>	Turbine Shaft Speed (TSS) sensor	
20	<u> </u>	Intermediate Shaft Speed (ISS) sensor	
21	<u> </u>	Vehicle Speed (VSS) sensor	
22	<u> </u>	Engine	
23	_	Torque converter	
24	_	Fluid pump	
25	_	Input shaft	
26	_	Four-speed geartrain	
27	_	Clutch, brake, planetary gear etc	
28	_	Output gear	
29	_	Idler gear	
30	_	Reduction geartrain	
31	<u> </u>	Parking gear	
32	<u> </u>	Final gear and differential	
33	_	Transfer case	
34	_	Automatic transmission assembly	

The transmission gear changes, oil pressure and lock-up operation are all electronically controlled. The TCM located in the left hand A-pillar receives electrical signals from sensors indicating vehicle speed and throttle opening. In response to these signals the TCM selects the appropriate gear and regulates other related conditions.

Actual transmission control changes are made by actuators (solenoids) that respond to input signals received from the TCM. These solenoids operate in response to electrical signals they regulate the control valve operation. The control valves cause changes in the fluid flow passages. This results in pressure changes within the transmission.

Transmission Construction

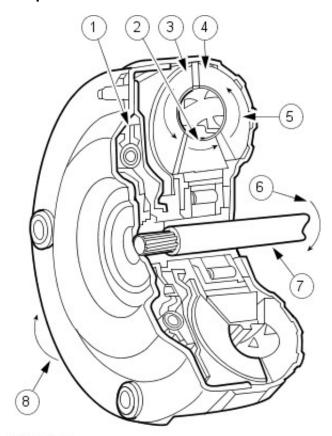
A cross-sectional view of the automatic transmission.



Item	Part Number	Description
1	_	Torque converter
2	_	Input shaft
3	_	Output gear
4	_	Low clutch
5	_	Low and reverse brake
6	_	Rear planetary pinion gear

7	l –	Low one-way clutch
8	_	Rear internal gear
9	_	Rear sun gear
10	_	Front sun gear
11	_	Front internal gear
12	_	Front planetary pinion gear
13	_	2-4 brake
14	_	Reverse clutch
15	_	High clutch
16	_	Reduction gear
17	_	Idler gear
18	_	Reduction internal gear
19	_	Reduction planetary pinion gear
20	_	Reduction sun gear
21	_	Reduction brake band
22	_	Reduction one-way clutch
23	_	Direct clutch
24	_	Parking gear
25	_	Parking pawl
26	_	Final gear
27	_	Differential gear
28		Driveshaft

Torque Converter



Item	Part Number	Description
1	_	Converter clutch and damper
2	_	Reactor
3	_	Turbine damper
4	_	Impeller
5	_	Fluid motion
6	_	Transmission input rotation
7	_	Input shaft

Torque Converter

The torque converter delivers the engine drive power to the transmission. When the lock-up clutch is released, the power delivery is depended on automatic transmission fluid (ATF). When the lock-up clutch is engaged the engine power is delivered to the transmission through the lock-up clutch.

The lock-up clutch is controlled electronically and operates in 4th and 5th gears.

A symmetrical element 1-step 2-phase torque converter is used with JF506E automatic transmission. The term "1-step" refers to the single turbine and runner assembly and "2-step" refers to the turbine runner speed relative to the pump impeller speed. When the turbine runner speed is lower than the pump impeller speed, the mechanism operates as a simple torque converter. When the turbine runner speed is higher than pump impeller speed, the mechanism acts as a fluid coupling.

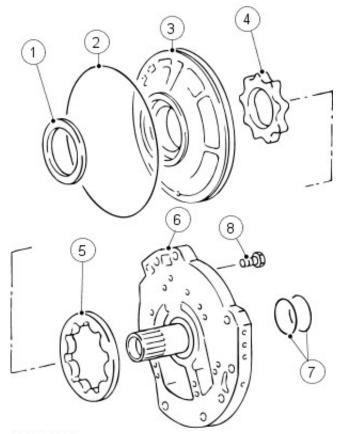
The torque converter transmits and multiplies torque. The torque converter is a four-element device:

- impeller assembly
- turbine and damper assembly
- reactor assembly
- clutch

The standard torque converter components operate as follows:

- Rotation of the converter housing and impeller set the fluid in motion.
- The turbine reacts to the fluid motion from the impeller, transferring rotation to the geartrain through the input shaft.
- The reactor redirects fluid going back into the impeller, allowing for torque multiplication.
- The clutch and damper assembly dampens powertrain torsional vibration and provides a direct mechanical connection for improved efficiency.
- Power is transmitted from the torque converter to the planetary gearsets and other components through the input shaft.

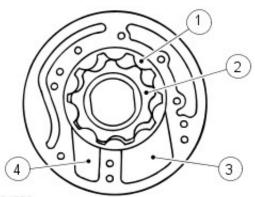
Oil Pump



Item	Part Number	Description
1	_	Oil seal
2	_	O-ring

3	_	Oil pump housing
4	_	Inner rotor
5	_	Outer rotor
6	_	Oil pump cover
7	_	Seal ring
8	_	Bolts

A trochoid oil pump is used with JF506E automatic transmission. The trochoid oil pump has the advantage of very low power loss.



VUJ0004752

Item	Part Number	Description
1	_	Outer rotor
2	_	Inner rotor
3	_	Suction port
4	_	Discharge port

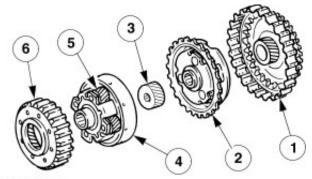
The oil pump is driven by the engine. The inner rotor connects to the torque converter sleeve.

Geartrain

Power is transmitted from the torque converter to the planetary gearsets through the input shaft. Bands and clutches are used to hold and drive certain combinations of gearsets. This results in five forward ratios and one reverse ratio, which are transmitted to the output shaft and differential.

	Gear Ratio
1st	3.801 to 1
2nd	2.131 to 1
	1.364 to 1
4th	0.935 to 1
5th	0.685 to 1
Reverse	2.970 to 1

Planetary Gears



VUJ0004754

Item	Part Number	Description
1	_	Front sun gear
2	_	Front pinion gear
3	_	Rear sun gear
4	_	Front internal gear
		<u> </u>

5	<u> </u>	Rear pinion gear
6	_	Rear internal gear

There are 3 planetary gear sets. Front, rear and reduction.

Clutches

There are 4 wet type multi disc clutches (low clutch, high clutch, reverse clutch and direct clutch).

Each clutch has two primary rotating parts (the clutch drum and the clutch hub). Power transmission is effected and controlled by these two parts.

The clutch drum and hub are connected to a clutch plate. Pressure applied to the clutch plate results in power transfer. When this pressure is released from the clutch plate, power does not transfer.

The clutch plates at the clutch drum side function as the driven plates. The clutch plates at the clutch hub side function as the drive plates. The drive plates have friction materials on the faces.

Clutch engagement occurs when oil pressure is applied to the piston in the clutch drum. The dish plate acts as a cushion to prevent sudden and violent force applied to the clutch plates which may causes a rough clutch engagement.

The retaining plate is attached to the driven plate. The retaining plate also serves as a spacer when the clutch is disengaged. It ensures specified clutch clearance.

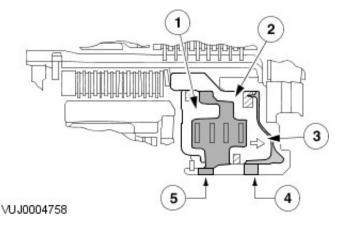
The piston is returned by return spring forces to ordinal position when the oil pressure is removed through the drain hole. As a result the clutch is disengaged.

The check ball is forced to seal the oil circuit by oil pressure against the oil input hole when the clutch is engaged. When the clutch is released the check ball moves back from the input hole to open the circuit and air is led into the oil chamber. This prevents residual oil pressure build-up in the clutch drum.

The clutch drum and the clutch hub are connected to the planetary gears respectively. Planetary gear rotation acts as the controlling element of the clutch.

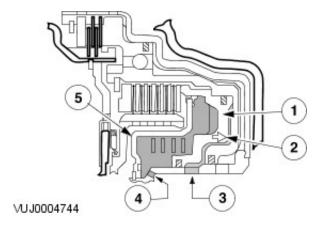
Cancel Force Cover

Low Clutch



Item	Part Number	Description
1	_	Cancel force cover
2	_	Low clutch piston
3	_	Cancel force
4	_	Low clutch pressure
5	_	Lubricating pressure

High Clutch



Item	Part Number	Description
1	_	High clutch piston
2	_	Cancel force
3	_	High clutch pressure
4	_	Lubricating pressure
5	_	Cancel force cover

The JF506E automatic transmission is equipped with the centrifugal oil pressure cancel room in low clutch and high clutch.

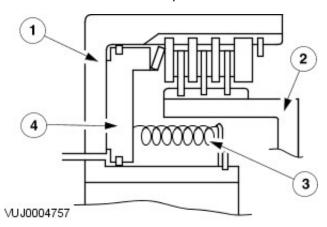
The centrifugal oil pressure cancel room improves clutch release time by applying force to the low clutch and the high clutch.

This system improves operating performance of the piston compared with the check ball system.

The piston returns to the original position by centrifugal force that is kept at the pressure room located at the other side of the piston cylinder.

Therefore, the response of the clutch release operation is improved and quick gear change is obtained.

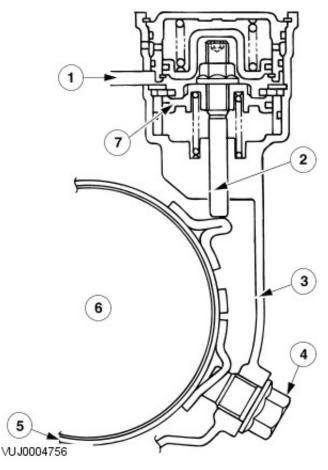
Low and Reverse Brake, 2-4 Brake



Item	Part Number	Description
1	_	Transmission case
2	_	Brake hub
3	_	Return spring
4	_	Piston

The low & reverse brake and the 2-4 brake are multi-disc type brakes. Basic brake operation is similar to the clutch. The clutch drum is mounted to an appropriate position on the transmission case. The low & reverse brake and the 2-4 brake act to stop the clutch hub rotation when the clutch plate is engaged.

Reduction Brake Band and Band Servo



Item	Part Number	Description
1	_	Brake band engagement pressure
2	_	Piston stem
3	_	Transmission case
4	_	Anchor end bolt
5	_	Brake band
6	_	Direct clutch drum
7	_	Brake piston

The brake band acts in response to the servo to stop the direct clutch drum rotation.

The servo has a piston that operates in response to changes in oil pressure. The piston expands in P and N ranges, 1st, 2nd, 3rd, 4th, and reverse gears to stop the direct clutch drum rotation.

When the line pressure reaches to the band servo the servo piston works. The downward piston stroke causes the piston stem to tighten the brake band. The direct clutch drum rotation stops.

The anchor end bolt is used to maintain appropriate clearance between the brake band and the direct clutch drum when the brake band is released. This clearance can be adjusted with the adjusting nut on the anchor end bolt.

One Way Clutches

The transmission uses two one way clutches.

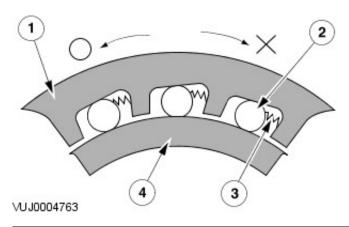
Low One Way Clutch

The front planetary carrier is fixed by the inner race which runs free during 1st gear operation.

Reduction One Way Clutch

The reduction sun gear is fixed by the inner race which runs free during 1st, 2nd, 3rd and 4th gear operations.

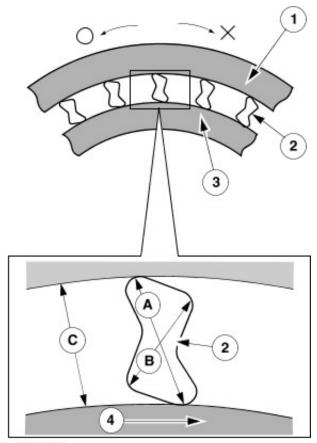
Roller-Type One-Way Clutch



Item	Part Number	Description
1	_	Outer race
2	_	Roller
3	_	Spring
4	_	Inner race

Normally, rollers are energized to the narrower section via a spring. Therefore, in the direction where the rollers are engaged between the cam and inner race they are united to transmit torque. In the reverse direction, because the rollers move in the direction where the clearance is larger, clearances occur between races and the inner and outer races can rotate to each other.

Sprag-Type One-Way Clutch

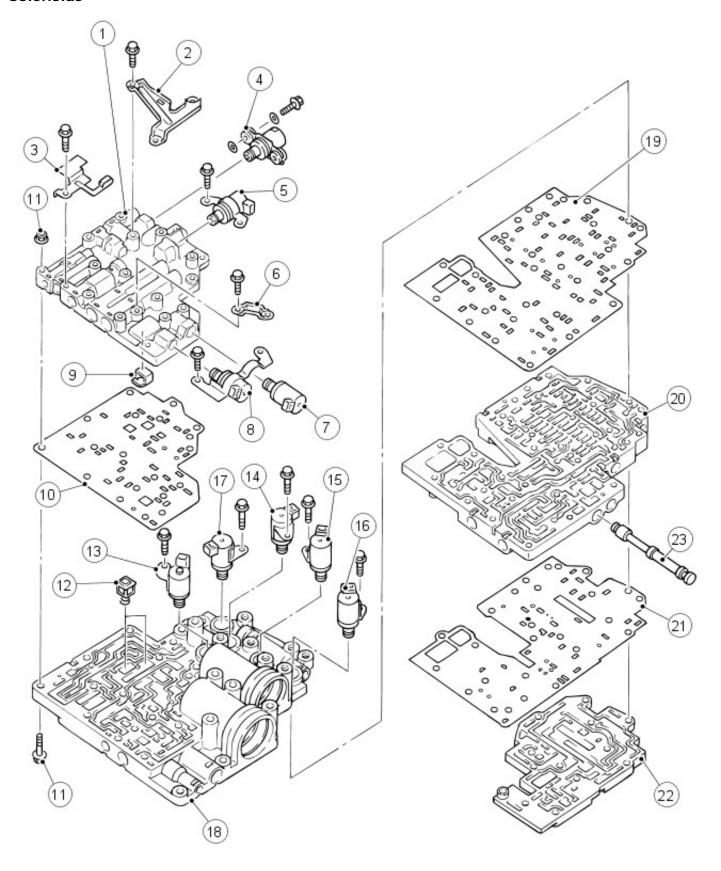


VUJ0004764

Item	Part Number	Description
1	_	Outer race
2	_	Sprag
3	_	Inner race
4	_	Rotation direction

Note the difference between sprag diameters "A" and "B" If the inner race tries to turn toward the left, radius "B" (longer than gap "C") firmly locks the sprag to prevent the sprag from moving to the left.

Solenoids



Item	Part Number	Description
1	_	Sub lower body
2	_	Bracket

3	_	Clip
4	_	Line pressure duty solenoid
5	_	Low clutch timing solenoid
6	_	Bracket
7	_	2-4 brake duty timing solenoid
8	_	2-4 brake timing solenoid
9	_	Pilot filter
10	_	Separate plate A
11	_	Locating bolt
12	_	Filter
13	_	Lock-up solenoid
14	_	Reduction timing solenoid
15	_	Shift solenoid B
16	_	Shift solenoid C
17	_	Shift solenoid A
18	_	Lower body
19	_	Separate plate B
20	_	Internal body
21	_	Separate plate C
22	_	Upper body
23	_	Manual valve

There are 9 solenoids which can be classified as two types by the way in which they operate. Three of them are duty solenoids, the other six are on/off types. The solenoids are actuated by the TCM output signals.

On/Off Solenoids

Shift solenoids A, B, C, low clutch solenoid, reduction timing solenoid and the 2/4 brake timing solenoid

The on/off solenoids close the pressure circuit in response to current flow.

Each solenoid has a internal coil. Current passes through coil and actuates the needle valve. The needle valve then opens and closes the fluid pressure circuits.

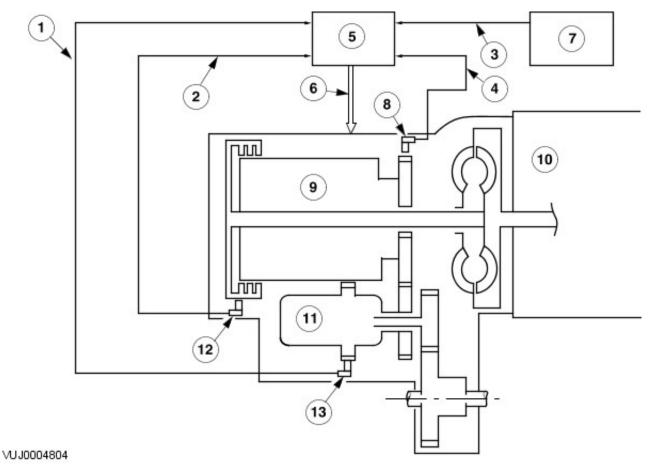
Duty Solenoids

Line pressure solenoid, lock-up solenoid and the 2/4 brake duty solenoid.

The duty solenoids repeatedly turn on/off in 50Hz cycles, this opens and closes the fluid pressure circuits.

Sensors

Sensor Schematic



Item	Part Number	Description
1	_	Output shaft rotational speed sensor
2	_	Input shaft rotational speed sensor
3	_	Engine speed signal
4	_	Output gear rotational signal
5	_	TCM
6	_	Transmission control
7	_	Engine Control Module (ECM)
8	_	Intermediate sensor
9	_	Geartrain
10	_	Engine
11	_	Reduction geartrain
12	_	Turbine sensor
13	_	Vehicle Speed Sensor (VSS)

Transmission Fluid Temperature (TFT) Sensor

The TFT sensor is installed in the transmission case, it constantly monitors the fluid temperature resistance varies with fluid temperature.

Automatic transmission internal operational resistance varies with automatic transmission fluid temperature change. The TCM detects the automatic transmission fluid temperature according to the voltage produced by the TFT sensor.

Speed Sensors

There are 3 sensors installed in the transmission casing. They are all of the inductive type.

Turbine Shaft Speed Sensor

The Turbine Shaft Speed Sensor (TSS) detects the reverse clutch drum revolution speed. The reverse clutch drum is connected to the input shaft and rotates at the same speed. The TCM calculates the input shaft speed to determine the turbine speed.

The TSS uses a magnetic coil. As the input shaft rotates, the sensor detects a pulse signal according to the gear teeth on the outside of the reverse clutch drum and sends it to the TCM.

Vehicle Speed Sensor

The vehicle speed sensor (VSS) detects the parking gear rotation speed. The TCM calculates the vehicle speed based on the parking gear rotation speed.

The VSS uses a magnetic coil. As the parking gear rotates the sensor detects a pulse signal according to the gear teeth rotation speed and then sends it to the TCM.

Intermediate Shaft Speed Sensor

The Intermediate Shaft Speed Sensor (ISS) detects the output gear rotation speed which is calculated by the TCM.

The ISS uses a magnetic coil. As the output gear rotates the sensor detects a pulse signal according to the gear teeth rotation and sends it to the TCM.

Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Diagnostic StrategyVehicles With: 5-Speed Automatic Transaxle - JATCO

Diagnosis and Testing

The complexity of the electronics involved with the automatic transmission/transaxle preclude the use of workshop general electrical test equipment. Therefore, reference should be made to the Jaguar approved diagnostic system for detailed instructions on testing the automatic transmission/transaxle.

Where a fault involving the automatic transmission/transaxle is indicated by the Jaguar approved diagnostic system, some basic diagnostic methods may be necessary to confirm that connections are good and that the wiring is not damaged, before installing new components.

- Verify the customer concern by operating the vehicle. Refer to the automatic transmission diagnostic drive cycle in the DTC summary section.
- 2. 2. Check the fluid levels and condition of the fluid.
- 3. 3. Check for non-factory fitted items.
- Check the shift linkages for correct adjustment. REFER to Section <u>307-05A Automatic</u> <u>Transmission/Transaxle External Controls</u> / <u>307-05B Automatic Transmission/Transaxle External Controls</u>.
- 5. 5. Visually inspect for obvious signs of mechanical, electrical or hydraulic damage.

Visual Inspection Chart

Mechanical	Electrical	Hydraulic
 Damaged shift mechanism/linkages Damaged automatic transmission/transaxle casing 	 Blown fuse Wiring harness Damaged transmission control module (TCM) Damaged rotary switch Damaged, loose or corroded connectors 	 Fluid level too high/low Poor condition of fluid Fluid leak

Basic diagnosis

Check Fluid Level and Condition



CAUTION: The vehicle should not be driven if the fluid level is low as internal failure can result.

• NOTE: The transmission oil temperature must not be allowed to exceed 40°C whilst checking level. Should the temperature rise above this figure, abort the check and allow the transmission oil to cool to below 30°C.

This vehicle is not equipped with a fluid level indicator. An incorrect level may affect the transmission operation and could result in transmission damage. To correctly check and add fluid to the transmission, REFER to Iransmission Fluid Level Check in this section.

High Fluid Level

A fluid level that is too high may cause the fluid to become aerated due to the churning action of the rotating internal parts. This will cause erratic control pressure, foaming, loss of fluid from the vent tube and possible transmission damage. If an overfill reading is indicated,

REFER to <u>Transmission Fluid Drain and Refill</u> in this section.

Low Fluid Level

A low fluid level could result in poor transmission engagement, slipping, or damage. This could also indicate a leak in one of the transmission seals or gaskets.

REFER to <u>Transmission Fluid Level Check</u> in this section.

Adding Fluid



CAUTION: The use of any other type of transmission fluid than specified can result in transmission damage.

If fluid needs to be added, add fluid in 0.50 liter increments through the fill hole opening. Do not overfill the fluid. For fluid type, refer to the General Specification chart in this section.

REFER to Transmission Fluid Level Check in this section.

Fluid Condition Check

- Check the fluid level. For additional information, REFER to <u>Transmission Fluid Drain and Refill</u> in this section.
- 2. **2.** Observe the color and the odor. The color under normal circumstances should be reddish, not brown or black.
- 3. **3.** Allow the fluid to drip onto a facial tissue and examine the stain.
- 4. **4.** If evidence of solid material is found, the transmission fluid pan should be removed for further inspection.

NOTE: Being thermostatically controlled, the lubrication system cannot be completely flushed. In the event of a transmission unit replacement for internal failure, the oil cooler and pipes must also be replaced.

Shift Linkage Check

Hydraulic leakage at the manual control valve can cause delay in engagements and/or slipping while operating if the linkage is not correctly adjusted; REFER to Section 307-05A Automatic Transmission/Transaxle External Controls / 307-05B Automatic Transmission/Transaxle External Controls. for shift linkage adjustment.

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: Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.
- 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.

DTC	Component	Description	Condition	Action
P0731, P0732, P0733, P0734, P0735	· · · · · · · · /	Gear ratio errors	Gear ratio out of range. Mechanical failure	REFER to pinpoint tests for individual sensors and shift solenoids.
P1573	component	Sympathetic DTCs from modules in CAN network	CAN throttle angle signal fail	REFER to Section 418-00 Module Communications Network.
P1601		Incorrect configuration	Incorrect configuration	Reconfigure module.
P1603		TCM EEPROM failure	TCM has lost it's adaptive values	REFER to Section 418-00 Module Communications Network.
P1796		Wire or connection in the CAN network malfunction	The module does not respond to the Jaguar approved diagnostic system — No modules function	REFER to Section 418-00 Module Communications Network.
P1745		Solenoid or circuit malfunction	Harsh gear shifts	GO to Pinpoint Test A.
P1746	Reduction timing solenoid	Solenoid or circuit malfunction	Erratic engine braking	GO to Pinpoint Test B.
P1747	2/4 Brake timing solenoid	Solenoid or circuit malfunction	Erratic 2 and 4 ratios	GO to Pinpoint Test C.
P0706	range (TR)	TR sensor or circuit malfunction	TR sensor out of range	GO to Pinpoint Test D.
P1777	This DTC does		CAN torque reduction fail	REFER to Section 418-00 Module Communications Network.
P1780 (To	D-4 switch	Switch or	D-4 switch inoperative or out of range	GO to Pinpoint Test

VIN	1	circuit		<u>E.</u>
P17931)	switched power power distribution malfunction fuse box			GO to Pinpoint Test <u>F.</u>
P1797 Engine control module (ECM)		connection in the CAN network	The module does not respond to the Jaguar approved diagnostic system — engine control module (ECM). No TCM communication to the ECM	Communications Network
P1799 Anti-Lock Brake Control Module or DSC		connection in the CAN network	diagnostic system — Anti-Lock Brake Control Module or DSC. No TCM communication to Anti-Lock Brake System (ABS)	REFER to Section 418-00 Module Communications Network.
VIN C 79328)	Intermediate speed sensor	ISS or circuit	Erratic gear shifts	GO to Pinpoint Test <u>G.</u>
P0791 (From VIN C 79329)	Intermediate speed sensor (ISS)	ISS or circuit	Erratic gear shifts	GO to Pinpoint Test <u>S.</u>
	Output speed sensor (OSS)	OSS or circuit	Erratic gear shifts	GO to Pinpoint Test H.
C 79328)	sensor (OSS)		Erratic gear shifts	GO to Pinpoint Test T.
	Turbine speed sensor (TSS)	TSS or circuit	Erratic gear shifts	GO to Pinpoint Test <u>I.</u>
P0715 (From VIN C 79329)	Turbine speed sensor (TSS)	TSS or circuit	Erratic gear shifts	GO to Pinpoint Test <u>U.</u>
P0710	Oil temperature sensor (OTS)	OTS or circuit	Erratic gear shifts, temperature malfunction	GO to Pinpoint Test <u>J.</u>
P0753	A (SSA)	or circuit malfunction	Erratic gear shifts, 4th gear engaged	GO to Pinpoint Test <u>K.</u>
P0758	B (SSB)	SSB Solenoid or circuit malfunction	Erratic gear shifts, 3rd/5th gear engaged	GO to Pinpoint Test L.
P0763	Shift solenoid C (SSC)	SSC Solenoid or circuit malfunction	Erratic gear shifts, 4th gear engaged	GO to Pinpoint Test M.
P0743	Torque converter clutch (TCC) solenoid	TCC Solenoid or circuit malfunction	No lock-up	GO to Pinpoint Test <u>N.</u>
P0740	Torque converter clutch	Torque converter clutch failure	No lock-up/permanent lock-up	INSTALL a new torque convertor.
P0748	Line pressure		Erratic transmission operation	GO to Pinpoint Test O.
P0778			GO to Pinpoint Test P.	
P1710			Erratic gear shifts	GO to Pinpoint Test O.
P0915	J-Gate input	J-Gate or circuit malfunction	Left-hand side of the J-Gate inoperative	GO to Pinpoint Test <u>R.</u>

PINPOINT TEST A: P1745. LOW CLUTCH TIMING SOLENOID MALFUNCTION			
TEST	DETAILS/RESULTS/ACTIONS		
CONDITIONS			

A1: CHECK	THE LOW CLUTCH TIMING SOLENOID GROUND CIRCUIT.
	1 Disconnect transmission electrical connector JB155.
	2 Measure the resistance between JB155, pin 18 (B) and GROUND.
	Is the resistance greater than 5 ohms?
	Yes
	GO to A3.
	No
	<u>GO to A2</u> .
A2: CHECK	THE LOW CLUTCH TIMING SOLENOID RESISTANCE.
	1 Measure the resistance between transmission electrical connector JB155 pin 18 and pin 12 at the transmission.
	Is the resistance 16 ohms?
	Yes
	GO to A3.
	No
	INSTALL a new timing solenoid. CLEAR the DTC. TEST the system for normal operation.
A3: CHECK	THE LOW CLUTCH TIMING SOLENOID GROUND WIRE FOR CONTINUITY.
	1 Disconnect TCM electrical connector JB131.
	2 Measure the resistance between JB155, pin 18 (B) and JB131, pin 17 (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
	Contact dealer technical support for advice on possible module failure.
A4: CHECK 1	THE LOW CLUTCH TIMING SOLENOID SIGNAL WIRE FOR CONTINUITY.
	1 Measure the resistance between JB155, pin 12 (Y) and JB131, pin 53 (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 module failure.

	Contact dealer technical support for advice on possible module failure.
PINPOINT T	EST B : P1746. REDUCTION TIMING SOLENOID MALFUNCTION
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: CHECK TI	HE REDUCTION TIMING SOLENOID GROUND CIRCUIT.
	1 Disconnect transmission electrical connector JB155.
	2 Measure the resistance between JB155, pin 18 (B) and GROUND.
	Is the resistance greater than 5 ohms?
	Yes
	GO to B3. No
	GO to B2.
B2: CHECK TI	HE REDUCTION TIMING SOLENOID RESISTANCE.
	1 Measure the resistance between JB155, pin 18 and pin 14 at the transmission.
	Is the resistance 16 ohms?
	Yes
	GO to B3.
	INSTALL a new timing solenoid. CLEAR the DTC. TEST the system for normal operation.
B3: CHECK TI	HE REDUCTION TIMING SOLENOID GROUND WIRE FOR CONTINUITY.
	1 Disconnect TCM electrical connector JB131.
	2 Measure the resistance between JB155, pin 18 (B) and JB131, pin 17 (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 Contact dealer technical support for advice on possible module failure.
B4: CHECK TI	HE REDUCTION TIMING SOLENOID SIGNAL WIRE FOR CONTINUITY.
	1 Measure the resistance between JB155, pin 14 (W) and JB131, pin 10 (W).
	Is the resistance greater than 5 ohms?
	Yes
	REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR
	REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR

	the DTC. TEST the system for normal operation.
	No
ı	Contact dealer technical support for advice on possible module failure.

PINPOINT TI	EST C: P1747. 2/4 BRAKE TIMING SOLENOID MALFUNCTION		
TEST	DETAILS/RESULTS/ACTIONS		
CONDITIONS			
C1: CHECK TH	IE 2/4 BRAKE TIMING SOLENOID GROUND CIRCUIT.		
	1 Disconnect transmission electrical connector JB155.		
	2 Measure the resistance between JB155, pin 18 (B) and GROUND.		
	Is the resistance greater than 5 ohms?		
	Yes		
	GO to C3.		
	GO to C2.		
C2: CHECK TH	IE 2/4 BRAKE TIMING SOLENOID RESISTANCE.		
	1 Measure the resistance between JB155 pin 18 and pin 13 at the transmission.		
	Is the resistance 16 ohms?		
	Yes		
	GO to C3.		
	No		
22 21 21 21	INSTALL a new timing solenoid. CLEAR the DTC. TEST the system for normal operation.		
C3: CHECK IH	IE 2/4 BRAKE TIMING SOLENOID GROUND WIRE FOR CONTINUITY.		
	1 Disconnect TCM electrical connector JB131.		
	2 Measure the resistance between JB155, pin 18 (B) and JB131, pin 17 (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		
	Contact dealer technical support for advice on possible module failure.		
C4: CHECK TH	IE 2/4 BRAKE TIMING SOLENOID SIGNAL WIRE FOR CONTINUITY.		
	1 Measure the resistance between JB155, pin 13 (U) and JB131, 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		
	Contact dealer technical support for advice on possible module failure.		

PINPOINT T	EST D : P0706. TRANSMISSION RANGE SENSOR MALFUNCTION
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
D1: CHECK TE	RANSMISSION RANGE SENSOR CONTINUITY IN PARK.
	1 Disconnect TR sensor electrical connector JB156.
	2 Select PARK.
	3 Check for continuity between pins 08 and 09 of the sensor.
	Is the circuit continuous?
	Yes GO to D2.
	Carry out the adjustment procedure for the transmission range sensor. REFER to Transmission Range (TR) Sensor Adjustment in this section. Recheck the circuit. If still open circuit, INSTALL a new transmission range sensor. REFER to Transmission Range (TR) Sensor in this section. CLEAR the DTC. TEST the system for normal operation. RANSMISSION RANGE SENSOR CONTINUITY IN REVERSE.
	1 Select REVERSE.
	2 Check for continuity between pins 08 and 07 of the sensor. Is the circuit continuous? Yes GO to D3. No Carry out the adjustment procedure for the transmission range sensor. REFER to Transmission Range (TR) Sensor Adjustment in this section. Recheck the circuit. If still open circuit, INSTALL a new transmission range sensor.

		REFER to <u>Transmission Range (TR) Sensor</u> in this section. CLEAR the DTC. TEST the system for normal operation.
D3: CHECK T	RAN	ISMISSION RANGE SENSOR CONTINUITY IN NEUTRAL.
	1	Select NEUTRAL.
	2	Check for continuity between pins 08 and 02 of the sensor.
		the circuit continuous?
	Yes	s
		<u>GO to D4</u> .
	No	
		Carry out the adjustment procedure for the transmission range sensor.
		REFER to <u>Transmission Range (TR) Sensor Adjustment</u> in this section. Recheck the circuit. If still open circuit, INSTALL a new transmission range sensor.
		REFER to <u>Transmission Range (TR) Sensor</u> in this section.
		CLEAR the DTC. TEST the system for normal operation.
D4: CHECK T	RAN	ISMISSION RANGE SENSOR CONTINUITY IN D.
	1	Select D.
	2	Check for continuity between pins 08 and 01 of the sensor.
	ls t	the circuit continuous?
	Ye	S
		GO to D5.
	No	
		Carry out the adjustment procedure for the transmission range sensor. REFER to <u>Transmission Range (TR) Sensor Adjustment</u> in this section.
		Recheck the circuit. If still open circuit, INSTALL a new transmission range sensor.
		REFER to <u>Transmission Range (TR) Sensor</u> in this section.
<u></u>		CLEAR the DTC. TEST the system for normal operation.
D5: CHECK T	RAN	ISMISSION RANGE SENSOR CONTINUITY IN 2 (TO VIN D15361).
	1	Select 2.
	2	Check for continuity between pins 08 and 03 of the sensor.
	ls t	the circuit continuous?
	Ye	S
	L.	GO to D6.
	No	
		Carry out the adjustment procedure for the transmission range sensor. REFER to Transmission Range (TR) Sensor Adjustment in this section.
		Recheck the circuit. If still open circuit, INSTALL a new transmission range sensor.
		REFER to <u>Transmission Range (TR) Sensor</u> in this section.
		CLEAR the DTC. TEST the system for normal operation.
D6: CHECK T	RAN	ISMISSION RANGE SENSOR CONTINUITY IN 3 (TO VIN D15361).
	1	Select 3.
	2	Check for continuity between pins 08 and 04 of the sensor.
	ls t	the circuit continuous?
	Yes	
	<u>L</u> .	<u>GO to D7</u> .
	No	
		Carry out the adjustment procedure for the transmission range sensor. REFER to Iransmission Range (TR) Sensor Adjustment in this section.
		Recheck the circuit. If still open circuit, INSTALL a new transmission range sensor.
		REFER to <u>Transmission Range (TR) Sensor</u> in this section.
		CLEAR the DTC. TEST the system for normal operation.
D7: CHECK T	RAN	ISMISSION RANGE SENSOR GROUND CIRCUIT.
	1	Measure the resistance between JB156, pin 08 (B) and GROUND.
	_	the resistance greater than 5 ohms?
	Yes	•
		REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR
	<u> </u> .	the DTC. TEST the system for normal operation.
	No	
DO. CLIECK T	DAA	GO to D8.
DO: CHECK I		ISMISSION RANGE SENSOR PARK SIGNAL WIRE FOR CONTINUITY. Disconnect the TCM electrical connector IP121
	1	Disconnect the TCM electrical connector JB131. Massure the registeres between JB131 pin 30 (II) and the TD conser electrical connector JB154.
	2	Measure the resistance between JB131, pin 30 (U) and the TR sensor electrical connector JB156,
	10.4	pin 09 (U).
	Ye:	the resistance greater than 5 ohms?
	' 'e'	s REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR
		the DTC. TEST the system for normal operation.
	No	· · · · · · · · · · · · · · · · · · ·
1	I	

1 1	GO to D9.
D9: CHECK TR	ANSMISSION RANGE SENSOR REVERSE SIGNAL WIRE FOR CONTINUITY.
	1 Measure the resistance between JB131, pin 26 (G) and JB156, pin 07 (G).
[I	s the resistance greater than 5 ohms?
	/es
	REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	GO to D10.
D10: CHECK T	RANSMISSION RANGE SENSOR NEUTRAL SIGNAL WIRE FOR CONTINUITY.
	1 Measure the resistance between JB131, pin 25 (W) and JB156, pin 02 (W).
[s the resistance greater than 5 ohms?
	/es
	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 D11.
D11: CHECK T	RANSMISSION RANGE SENSOR DRIVE SIGNAL WIRE FOR CONTINUITY.
	1 Measure the resistance between JB131, pin 27 (Y) and JB156, pin 01 (Y).
	s 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
D12. CHECK T	GO to D12. RANSMISSION RANGE SENSOR 2 SIGNAL WIRE FOR CONTINUITY (TO VIN D15361).
D12: CHECK II	
<u> </u>	1 Measure the resistance between JB131, pin 08 (R) and JB156, pin 03 (R).
	s 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 .
D 10 000 = 000	GO to D13.
	RANSMISSION RANGE SENSOR 3 SIGNAL WIRE FOR CONTINUITY (TO VIN D15361).
	1 Measure the resistance between JB131, pin 07 (O) and JB156, pin 04 (O).
	s the resistance greater than 5 ohms?
	Yes DEPAID the high registance circuit. For additional information, refer to the wiring diagrams. CLEAD
	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 TCM.
	REFER to <u>Transmission Control Module (TCM) -</u> in this section. CLEAR the DTC. TEST the system for normal operation.
DINIDOINT TE	ST F : P1780, D-4 SWITCH MAI FUNCTION (TO VIN D15361)

PINPOINT TEST E: P1780. D-4 SWITCH MALFUNCTION (TO VIN D15361)

Is the resistance greater than 5 ohms? Yes

• NOTE: Incorrect adjustment of the selector cable could result in this DTC being set with no electrical fault being present. REFER to Section _307-05A Automatic Transmission/Transaxle External Controls / 307-05B Automatic

present. REFE	R to Section 307-05A Automatic Transmission/Transaxie External Controls / 307-05B Automatic
Transmission/	<u>Transaxle External Controls</u> .
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
E1: CHECK PO	OWER SUPPLY TO THE J-GATE.
	1 Disconnect the J-Gate electrical connector, IP14.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between IP14, pin 01 (WR) and GROUND.
	Is the voltage less than 10 volts? Yes REPAIR the circuit between IP14, pin 01 (WR) and the ignition switch (this circuit includes the central junction fuse box, ignition relay, and inertia switch). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to E2.
E2: CHECK GI	ROUND SUPPLY TO THE J-GATE.
	1 Turn the ignition switch to the OFF position.
	2 Measure the resistance between IP14, pin 02 (B) and GROUND.

	REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No
E2: CHECK D	O to E3 4 SWITCH SIGNAL WIRE FOR HIGH RESISTANCE.
E3: CHECK D	4 SWITCH SIGNAL WIRE FOR HIGH RESISTANCE.
	1 Measure the resistance between IP14, pin 05 (BW) and JB131, pin 45 (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 J-Gate. REFER to Section 307-05A Automatic Transmission/Transaxle External
	Controls / 307-05B Automatic Transmission/Transaxle External Controls.

PINPOINT T	EST F: P1793. TCM IGNITION SWITCHED POWER MALFUNCTION
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
F1: CHECK TI	RANSMISSION CONTROL MODULE IGNITION SWITCHED POWER SUPPLY CIRCUIT.
	1 Disconnect TCM electrical connector, JB131.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between JB131, pin 36 (WU) and GROUND.
	Is the voltage less than 10 volts?
	Yes
	REPAIR the circuit between TCM electrical connector JB131, pin 36 (WU) and the battery power bus 1 (this circuit includes the TCM relay and power distribution fuse box). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No
	<u>GO to F2</u> .
F2: CHECK TI	RANSMISSION CONTROL MODULE IGNITION SWITCHED POWER SUPPLY CIRCUIT.
	1 Measure the voltage between JB131, pin 54 (WU) and GROUND.
	Is the voltage less than 10 volts?
	Yes REPAIR the circuit between JB131, pin 54 (WU) and the battery power bus 1 (this circuit includes the TCM relay and power distribution fuse box). 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 module failure.

1	EST G : P0791. INTERMEDIATE SPEED SENSOR MALFUNCTION (ONLY UP TO VIN
C79328)	
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
GT: CHECK IF	HE INTERMEDIATE SPEED SENSOR GROUND CIRCUIT.
	1 Disconnect the transmission electrical connector, JB155.
	2 Measure the resistance between JB155, pin 03 (B) and GROUND (shielded cable).
	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 OO LOO
	GO to G3.
G2: CHECK TH	HE INTERMEDIATE SPEED SENSOR GROUND CIRCUIT FOR CONTINUITY.
	1 Disconnect the TCM electrical connector, JB131.
	2 Measure the resistance between transmission electrical connector JB155, pin 03 (B) and TCM
	electrical connector JB131, pin 20 (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 Ook oo
	GO to G3.
G3: CHECK TH	HE INTERMEDIATE SPEED SENSOR SIGNAL WIRE FOR CONTINUITY.
	1 Measure the resistance between JB155, pin 04 (N) and JB131, pin 21 (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	- 1
<u>GO to G4</u> .	
: CHECK THE RESISTANCE OF THE INTERMEDIATE SPEED SENSOR.	
1 Measure the resistance between JB155, pin 03 and pin 04 at the transmission.	
Is the resistance 550 ohms?	
Yes	
Contact dealer technical support for advice on possible module failure.	
No	
INSTALL a new transaxle.	
REFER to <u>Transaxle - in this section.</u>	
CLEAR the DTC. TEST the system for normal operation.	

PINPOINT T	EST H: P0720. OUTPUT SPEED SENSOR MALFUNCTION (TO VIN C79328)
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
H1: CHECK TH	HE OUTPUT SPEED SENSOR GROUND CIRCUIT.
	1 Disconnect the transmission electrical connector, JB155.
	2 Measure the resistance between JB155, pin 05 (B) and GROUND (shielded cable).
	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 H3.
H2: CHECK TH	HE OUTPUT SPEED SENSOR GROUND CIRCUIT FOR CONTINUITY.
112. CHECK 11	Disconnect the TCM electrical connector, JB131.
	2 Measure the resistance between JB155, pin 05 (B) and JB131, pin 20 (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
	GO to H3.
H3: CHECK TH	HE OUTPUT SPEED SENSOR SIGNAL WIRE FOR CONTINUITY.
	1 Measure the resistance between JB155, pin 06 (N) and JB131, pin 05 (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 CO to 114
LIA. CHECK TI	GO to H4. HE RESISTANCE OF THE OUTPUT SPEED SENSOR.
H4: CHECK IF	
	1 Measure the resistance between JB155, pin 05 and pin 06 at the transmission. Is the resistance 550 ohms?
	Yes
	Contact dealer technical support for advice on possible module failure.
	No
	INSTALL a new transaxle.
	REFER to <u>Transaxle - in this section</u> .
	CLEAR the DTC. TEST the system for normal operation.

PINPOINT T	PINPOINT TEST I: P0715. TURBINE SPEED SENSOR MALFUNCTION (TO VIN C79328)	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
I1: CHECK THE TURBINE SPEED SENSOR GROUND CIRCUIT.		
	1 Disconnect the transmission electrical connector, JB155.	
	2 Measure the resistance between JB155, pin 01 (B) and GROUND (shielded cable).	
	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 13.	
12: CHECK THE TURBINE SPEED SENSOR GROUND CIRCUIT FOR CONTINUITY.		
	1 Disconnect the TCM electrical connector, JB131.	

	2 Measure the resistance between IR155 pin 01 (R) and IR131 pin 20 (R)
	2 . Measure the resistance between JB155, pin 01 (B) and JB131, pin 20 (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
	GO to 13.
13: CHECK T	HE TURBINE SPEED SENSOR SIGNAL WIRE FOR CONTINUITY.
	Measure the resistance between JB155, pin 02 (N) and TCM electrical connector, JB131, pin 24 (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 14.
14: CHECK T	HE RESISTANCE OF THE OUTPUT SPEED SENSOR.
	1 Measure the resistance between JB155, pin 01 and pin 02 at the transmission.
	Is the resistance 550 ohms?
	Yes
	Contact dealer technical support for advice on possible module failure.
	No
	INSTALL a new transaxle.
	REFER to Transaxle - in this section.
	CLEAR the DTC. TEST the system for normal operation.

PINPOINT T	EST J : P0710. OIL TEMPERATURE SENSOR MALFUNCTION
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
J1: CHECK TH	IE OIL TEMPERATURE SENSOR GROUND CIRCUIT.
	1 Disconnect the transmission electrical connector, JB155.
	2 Measure the resistance between JB155, pin 08 (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
	GO to J3.
J2: CHECK TH	IE OIL TEMPERATURE SENSOR GROUND CIRCUIT FOR CONTINUITY.
	1 Disconnect the TCM electrical connector, JB131.
	2 Measure the resistance between JB155, pin 08 (B) and JB131 pin 20 (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 CO to 13
12. CHECK TH	GO to J3. IE OIL TEMPERATURE SENSOR SIGNAL WIRE FOR CONTINUITY.
D3. CHECK IF	Measure the resistance between JB155, pin 07 (W) and JB131, pin 39 (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
	<u>GO to J4</u> .
J4: CHECK TH	IE OIL TEMPERATURE SENSOR RESISTANCE.
	1 Measure the resistance between JB155, pin 07 and pin 08 at the transmission.
	Is the resistance 2,000-5,000 ohms at room temperature?
	Yes Contact dealer technical support for advice on possible module failure.
	No
	INSTALL a new transaxle.
	REFER to Transaxle - in this section.
	CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST K: P0753. SHIFT SOLENOID A MALFUNCTION	
TEST	DETAILS/RESULTS/ACTIONS

CONDITIONS
K1: CHECK THE SHIFT SOLENOID A GROUND CIRCUIT.
1 Disconnect the transmission electrical connector, JB155.
2 Measure the resistance between JB155, pin 18 (B) and GROUND.
Is the resistance greater than 5 ohms?
Yes
GO to K3.
No GO to K2.
K2: CHECK THE SHIFT SOLENOID A RESISTANCE.
1 Measure the resistance between JB155, pin 09 and pin 18 at the transmission.
Is the resistance 16 ohms?
Yes
GO to K3.
No
INSTALL a new shift solenoid.
REFER to Shift Solenoids (SS) - in this section. CLEAR the DTC. TEST the system for normal operation.
K3: CHECK THE SHIFT SOLENOID A GROUND WIRE FOR CONTINUITY.
1 Disconnect the TCM electrical connector, JB131.
2 Measure the resistance between JB155, pin 18 (B) and JB131, pin 17 (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.
Contact dealer technical support for advice on possible module failure.
K4: CHECK THE SHIFT SOLENOID A SIGNAL WIRE FOR CONTINUITY.
1 Measure the resistance between JB155, pin 09 (B) and TCM electrical connector JB131, pin 15 (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 Contact dealer technical support for advice on possible module failure
Contact dealer technical support for advice on possible module failure.

PINPOINT TEST L : P0758. SHIFT SOLENOID B MALFUNCTION	
TEST DETAILS/RESULTS/ACTIONS	
CONDITIONS	
L1: CHECK THE SHIFT SOLENOID B GROUND CIRCUIT.	
1 Disconnect the transmission electrical connector, JB155.	
2 Measure the resistance between JB155, pin 18 (B) and GROUND.	
Is the resistance greater than 5 ohms?	
Yes	
GO to L3.	
No GO to L2.	
L2: CHECK THE SHIFT SOLENOID B RESISTANCE.	
Is the resistance 16 ohms?	
Yes	
GO to L4.	
No No	
INSTALL a new shift solenoid.	
REFER to Shift Solenoids (SS) - in this section.	
CLEAR the DTC. TEST the system for normal operation.	
L3: CHECK THE SHIFT SOLENOID B GROUND WIRE FOR CONTINUITY.	
1 Disconnect the TCM electrical connector, JB131.	
2 Measure the resistance between JB155, pin 18 (B) and JB131, pin 17 (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	
Contact dealer technical support for advice on possible module failure.	
L4: CHECK THE SHIFT SOLENOID B SIGNAL WIRE FOR CONTINUITY.	

1 Measure the resistance between JB155, pin 10 (N) and JB131, pin 14 (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
Contact dealer technical support for advice on possible module failure.

	EST M : P0763. SHIFT SOLENOID C MALFUNCTION
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
MIT: CHECK I	HE SHIFT SOLENOID C GROUND CIRCUIT.
	1 Disconnect the transmission electrical connector, JB155.
	Measure the resistance between JB155, pin 18 (B) and GROUND.
	Is the resistance greater than 5 ohms? Yes
	GO to M3.
	No
	GO to M2.
M2: CHECK T	HE SHIFT SOLENOID C RESISTANCE.
	1 Measure the resistance between JB155, pins 11 and 18 at the transmission.
	Is the resistance 16 ohms?
	Yes
	GO to M4.
	No
	INSTALL a new shift solenoid.
	REFER to Shift Solenoids (SS) - in this section. CLEAR the DTC. TEST the system for normal operation.
M3. CHECK T	HE SHIFT SOLENOID C GROUND WIRE FOR CONTINUITY.
IVIS. CITEOR I	1 Disconnect the TCM electrical connector, JB131.
	2 Measure the resistance between JB155, pin 18 (B) and JB131, pin 17 (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
	Contact dealer technical support for advice on possible module failure.
M4: CHECK T	HE SHIFT SOLENOID C SIGNAL WIRE FOR CONTINUITY.
	1 Measure the resistance between JB155, pin 11 (G) and JB131, pin 52 (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.
	Contact dealer technical support for advice on possible module failure.
<u> </u>	To the decide to the final support for device on possible modele failure.

PINPOINT T	EST N : P0743. TORQUE CONVERTER CLUTCH SOLENOID MALFUNCTION
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
N1: CHECK TH	HE TORQUE CONVERTER CLUTCH SOLENOID GROUND CIRCUIT.
	1 Disconnect the transmission electrical connector, JB155.
	2 Measure the resistance between JB155, pin 18 (B) and GROUND.
	Is the resistance greater than 5 ohms?
	Yes
	GO to N3.
	No
	GO to N2.
N2: CHECK TH	HE TORQUE CONVERTER CLUTCH SOLENOID RESISTANCE.
	1 Measure the resistance between JB155, pin 17 and pin 18 at the transmission.
	Is the resistance 12.6 ohms?
	Yes
	GO to N4.
	No
	INSTALL a new TCC solenoid. CLEAR the DTC. TEST the system for normal operation.
N3: CHECK TI	HE TORQUE CONVERTER CLUTCH SOLENOID GROUND WIRE FOR CONTINUITY.
	1 Disconnect the TCM electrical connector, JB131.

	2 Measure the resistance between JB155, pin 18 (B) and JB131, pin 17 (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
	Contact dealer technical support for advice on possible module failure.
N4: CHECK T	HE TORQUE CONVERTER CLUTCH SOLENOID SIGNAL WIRE FOR CONTINUITY.
	1 Measure the resistance between JB155, pin 17 (O) and JB131, pin 16 (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
	Contact dealer technical support for advice on possible module failure.

PINPOINT T	EST 0 : P0748. LINE PRESSURE CONTROL SOLENOID MALFUNCTION
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
O1: CHECK TH	HE LINE PRESSURE CONTROL SOLENOID GROUND CIRCUIT.
	1 Disconnect the transmission electrical connector, JB155.
	2 Measure the resistance between JB155, pin 18 (B) and GROUND.
	Is the resistance greater than 5 ohms?
	Yes
	GO to O3.
	No GO to O2.
O2: CHECK TI	HE LINE PRESSURE CONTROL SOLENOID RESISTANCE.
OZ. CHECK II	Measure the resistance between JB155, pin 15 and pin 18 at the transmission.
	Is the resistance 2.9 ohms?
	Yes
	GO to O4.
	No
	INSTALL a new LPC solenoid. CLEAR the DTC. TEST the system for normal operation.
O3: CHECK TH	HE LINE PRESSURE CONTROL SOLENOID GROUND WIRE FOR CONTINUITY.
	1 Disconnect the TCM electrical connector, JB131.
	2 Measure the resistance between JB155, pin 18 (B) and JB131, pin 17 (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
	Contact dealer technical support for advice on possible module failure.
O4: CHECK TI	HE LINE PRESSURE CONTROL SOLENOID SIGNAL WIRE FOR CONTINUITY.
	1 Measure the resistance between JB155, pin 15 (R) and JB131, pin 18 (R).
	Is the resistance greater than 5 ohms?
	Yes
	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 module failure.

PINPOINT T	EST P : P0778. 2/4 BRAKE DUTY PRESSURE CONTROL SOLENOID MALFUNCTION
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
P1: CHECK TH	HE 2/4 BRAKE DUTY PRESSURE CONTROL SOLENOID GROUND CIRCUIT.
	1 Disconnect the transmission electrical connector, JB155.
	2 Measure the resistance between JB155, pin 18 (B) and GROUND.
	Is the resistance greater than 5 ohms?
	Yes
	<u>GO to P3</u> .
	No
	<u>GO to P2</u> .
P2: CHECK TH	IE 2/4 BRAKE DUTY PRESSURE CONTROL SOLENOID RESISTANCE.
	1 Measure the resistance between JB155, pin 16 and pin 18 at the transmission.

	Is the resistance 2.9 ohms? Yes
	INSTALL a new 2/4 brake duty pressure control solenoid. CLEAR the DTC. TEST the system for normal operation. No
P3: CHECK	THE 2 BRAKE DUTY PRESSURE CONTROL SOLENOID GROUND WIRE FOR CONTINUITY.
	1 Disconnect the TCM electrical connector, JB131.
	2 Measure the resistance between JB155, pin 18 (B) and JB131, pin 17 (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 Contact dealer technical support for advice on possible module failure.
P4: CHECK	THE 2/4 BRAKE DUTY PRESSURE CONTROL SOLENOID SIGNAL WIRE FOR CONTINUITY.
	1 Measure the resistance between JB155, pin 16 (G) and JB131, pin 03 (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
	Contact dealer technical support for advice on possible module failure.

PINPOINT T	EST Q : P1710. CONTROL VALVE SOLENOID GROUND.
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
Q1: CHECK CC	ONTROL VALVE SOLENOID GROUND CIRCUIT.
	1 Disconnect transmission electrical connector, JB155.
	2 Measure the resistance between JB155, pin 18 (B) and GROUND.
	Is the resistance greater than 5 ohms?
	Yes
	GO to Q2.
	No
	No electrical fault in GROUND circuit. Possible internal fault. Recheck DTCs.
Q2: CHECK CC	ONTROL VALVE SOLENOID GROUND WIRE FOR CONTINUITY.
	1 Disconnect TCM electrical connector, JB131.
	2 Measure the resistance between JB155, pin 18 (B) and JB131, pin 17 (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
	Contact dealer technical support for advice on possible module failure.

PINPOINT T	EST R : P0915 J-GATE SIGNAL INPUTS TO THE TCM.	
	rect adjustment of the selector cable could result in this DTC being set with no electrical fault being	
present. REFE	R to Section 307-05A Automatic Transmission/Transaxle External Controls / 307-05B Automatic	
Transmission/	<u>Fransaxle External Controls.</u>	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
R1: CHECK TE	ANSMISSION RANGE SENSOR CONTINUITY IN D.	
	1 Disconnect TR sensor electrical connector JB156.	
	2 Select D.	
	3 Check for continuity between JB156, pin 08 and pin 01 at the sensor.	
	Is the circuit continuous?	
	Yes	
	GO to R2.	
	No	
	Carry out the adjustment procedure for the transmission range sensor.	
	REFER to <u>Transmission Range (TR) Sensor Adjustment</u> in this section.	
	Recheck the circuit. If still open circuit, INSTALL a new transmission range sensor.	
	REFER to Transmission Range (TR) Sensor in this section.	
	CLEAR the DTC. TEST the system for normal operation.	
R2: CHECK TR	ANSMISSION RANGE SENSOR DRIVE SIGNAL WIRE FOR HIGH RESISTANCE.	
	1 Disconnect the TCM electrical connector, JB131.	
	2 Measure the resistance between JB131, pin 27 (Y) and JB156, pin 01 (Y).	

the DTC. TEST the system for normal operation. No GO to R3. R3: CHECK POWER SUPPLY TO THE J-GATE. 1 Disconnect the J-Gate electrical connector, IP14. 2 Turn the ignition switch to the ON position. 3 Measure the voltage between IP14, pin 01 (WR) and GROUND. Is the voltage less than 10 volts? Yes REPAIR the circuit between IP14, pin 01 (WR) and the ignition switch (this circuit includes the central junction fuse box, ignition relay, and inertia switch). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No GO to R4. R4: CHECK GROUND SUPPLY TO THE J-GATE. 1 Turn the ignition switch to the OFF position. 2 Measure the resistance between J-Gate electrical connector IP14, 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. CLEAF the DTC. TEST the system for normal operation. No GO to R5. R5: CHECK J-GATE SIGNAL INPUT WIRES FOR CONTINUITY (4 RANGE). 1 Disconnect the TCM electrical connector JB131. 2 Measure the resistance between IP14 pin 05 (BW) and JB131 pin 45 (BW). Is the resistance greater than 5 ohms? Yes REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAF the DTC. TEST the system for normal operation. No GO to R6. R6: CHECK THE J-GATE SIGNAL INPUT WIRES FOR CONTINUITY (3 RANGE). 1 Measure the resistance between IP14 pin 15 (O) and JB131 pin 07 (O). Is the resistance greater than 5 ohms? Yes REPAIR the high resistance between IP14 pin 15 (O) and JB131 pin 07 (O). Is the resistance between IP14 pin 14 (R) and JB131 pin 08 (R). Is the resistance less than 5 ohms? Yes R7: CHECK THE J-GATE SIGNAL INPUT WIRES FOR CONTINUITY (2 RANGE). 1 Measure the resistance between IP14 pin 14 (R) and JB131 pin 08 (R). Is the resistance less than 5 ohms?	PINPOINT TE	ST S : P0791. INTERMEDIATE SPEED SENSOR MALFUNCTION (FROM VIN C79329)
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Yes		REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR
Is the resistance greater than 5 ohms?		Yes
		Is the resistance greater than 5 ohms?

PINPOINT T	EST S : P0791. INTERMEDIATE SPEED SENSOR MALFUNCTION (FROM VIN C79329)
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
S1: CHECK TH	HE INTERMEDIATE SPEED SENSOR GROUND CIRCUIT.

	Disconnect the transmission electrical connector, JB155.	
	Measure the resistance between JB155, pin 03 (B) and GROUND (shielded cable).	
	•	$\overline{}$
	the resistance greater than 5 ohms?	
	REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Cl	FΔR
	the DTC. TEST the system for normal operation.	/ \\\
	0	
	<u>GO to S2</u> .	
S2: CHECK T	INTERMEDIATE SPEED SENSOR GROUND CIRCUIT FOR CONTINUITY.	
	Disconnect the TCM electrical connector, JB131.	
	Measure the resistance between JB155, pin 03 (B) and JB131, pin 46 (B).	
	the resistance greater than 5 ohms?	
	es	
	REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Cl	∟EAR
	the DTC. TEST the system for normal operation.	
	<u>GO to S3</u> .	
S3: CHECK T	INTERMEDIATE SPEED SENSOR SIGNAL WIRE FOR CONTINUITY.	
	Measure the resistance between JB155, pin 4 (N) and JB131, pin 21 (N).	
	the resistance greater than 5 ohms?	
	es BERNIE II. II. II. II. II. II. II. II. II. I	
	REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. Cl	_EAR
	the DTC. TEST the system for normal operation.	
	GO to G4.	
S4: CHECK T	RESISTANCE OF THE INTERMEDIATE SPEED SENSOR.	
54. GIILGIK I	Measure the resistance between JB155, pin 13 and pin 04 at the transmission.	
	the resistance 550 ohms?	
	ess	
	Contact dealer technical support for advice on possible module failure.	
	0	
	INSTALL a new transaxle.	ļ
	REFER to <u>Transaxle -</u> in this section.	
	CLEAR the DTC. TEST the system for normal operation.	

PINPOINT T	EST T : P0720. OUTPUT SPEED SENSOR MALFUNCTION (FROM VIN C79329)
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
T1: CHECK TH	IE OUTPUT SPEED SENSOR GROUND CIRCUIT.
	1 Disconnect the transmission electrical connector, JB155.
	2 Measure the resistance between JB155, pin 05 (B) and GROUND (shielded cable).
	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 <u>GO to T2</u> .
T2: CHECK TH	IE OUTPUT SPEED SENSOR GROUND CIRCUIT FOR CONTINUITY.
	1 Disconnect the TCM electrical connector, JB131.
	2 Measure the resistance between JB155, pin 05 (B) and JB131, pin 42 (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.
	GO to T3.
T3: CHECK TH	IE OUTPUT SPEED SENSOR SIGNAL WIRE FOR CONTINUITY.
	1 Measure the resistance between JB155, pin 06 (N) and JB131, pin 05 (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 T4.
T4: CHECK TH	IE RESISTANCE OF THE OUTPUT SPEED SENSOR.
	1 Measure the resistance between JB155, pin 05 and pin 06 at the transmission.

Is the resistance 550 ohms? Yes
Contact dealer technical support for advice on possible module failure.
No
INSTALL a new transaxle.
REFER to <u>Transaxle - in this section</u> .
CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST U: P0715. TURBINE SPEED SENSOR MALFUNCTION (FROM VIN C79329)				
TEST	DETAILS/RESULTS/ACTIONS			
CONDITIONS				
U1: CHECK THE TURBINE SPEED SENSOR GROUND CIRCUIT.				
	1 Disconnect the transmission electrical connector, JB155.			
	2 Measure the resistance between JB155, pin 01 (B) and GROUND (shielded cable).			
	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 contraction			
LIQ. OLIFOX T	GO to U2.			
U2: CHECK THE TURBINE SPEED SENSOR GROUND CIRCUIT FOR CONTINUITY.				
	1 Disconnect the TCM electrical connector, JB131.			
	Measure the resistance between JB155, pin 01 (B) and JB131, pin 44 (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 GO to U3.			
U3: CHECK T	HE TURBINE SPEED SENSOR SIGNAL WIRE FOR CONTINUITY.			
	1 Measure the resistance between JB155, pin 2 (N) and JB131, pin 24 (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			
	<u>GO to U4</u> .			
U4: CHECK T	HE RESISTANCE OF THE OUTPUT SPEED SENSOR.			
	1 Measure the resistance between JB155, pin 01 and pin 02 at the transmission.			
	Is the resistance 550 ohms?			
	Yes			
	Contact dealer technical support for advice on possible module failure.			
	No			
	INSTALL a new transaxle.			
	REFER to Transaxle - in this section.			
	CLEAR the DTC. TEST the system for normal operation.			

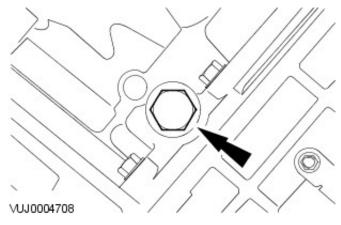
Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transmission Fluid Drain and Refill

General Procedures

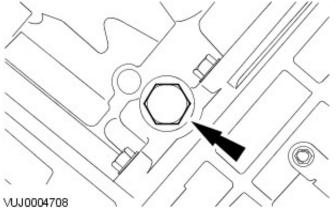
Drain

- Raise and support the vehicle. For additional information, refer to
 - For additional information, refer to: $\underline{\text{Lifting}}$ (100-02 Jacking and Lifting, Description and Operation).
- **2.** Place a suitable container under the transmission drain plug.
- 3. 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

Remove the transmission drain plug.

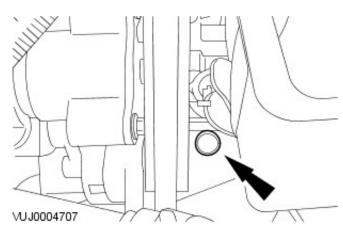


- 4. Install the transmission drain plug.
 - Tighten to 45 Nm.



Refill

- **5.** Lower the vehicle.
- **6.** Remove the automatic transmission fluid charging pipe cap.



7. NOTE: Use automatic transmission fluid WSS-M2C922-A1 or equivalent meeting Jaguar specification.

Fill the automatic transmission with 8 litres of automatic

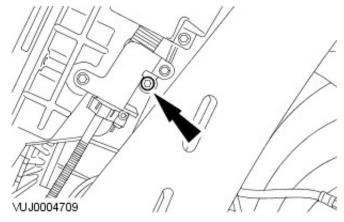
transmission fluid through the automatic transmission fluid charging pipe.

8. Carry out a fluid level check and adjustment. For additional information, refer to
For additional information, refer to: <u>Transmission Fluid Level Check</u> (307-01B Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21, General Procedures).

Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transmission Fluid Level Check

General Procedures

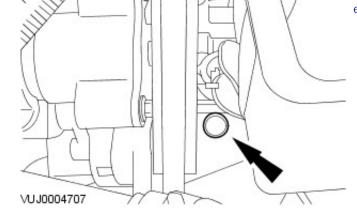
- 1. Raise and support the vehicle. For additional information, refer to Section 100-02 Jacking and Lifting.
- 2. Connect the Jaguar Approved Diagnostic System.
- 3. Make sure J-Gate shift selector is in the Park position (P).
- **4.** With the engine running and the foot brake applied, move the J-Gate shift selector through "P-R-N-D-4-3-2" and back to the "P" position to circulate the automatic transmission fluid until the temperature reaches 30 to 40°C (86 to 104°F) on the Jaguar Approved Diagnostic System.
- **5.** When the automatic transmission fluid temperature reaches 35°C (95°F) check that the selector lever is in the "P" position raise the vehicle.
- **6.** With the engine running, remove the automatic transmission fluid level tube plug.
 - Remove and discard the level plug and sealing washer.



7. NOTE: Use automatic transmission fluid WSS-M2C922-A1 or equivalent meeting Jaguar specification.

If the automatic transmission fluid does not come out of the transmission fluid level tube the automatic transmission fluid level is insufficient. If this is the case add the automatic transmission fluid in 0.5 litre units into the automatic transmission fluid charging pipe until the automatic transmission fluid comes out of the automatic transmission fluid level tube.

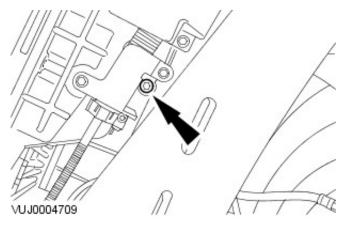
 Remove the automatic transmission fluid charging pipe cap.



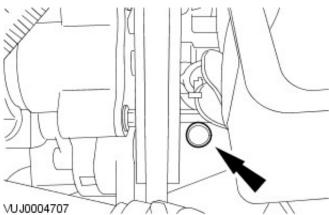
8. NOTE: Make sure the automatic transmission fluid temperature does not exceed 40°C (104°F). If the automatic transmission fluid temperature does exceed 40°C (104°F) stop the automatic transmission fluid level check and allow the automatic transmission fluid to cool until the temperature reaches 30 to 40°C (86 to 104°F).

Allow the automatic transmission fluid to come out of the automatic transmission fluid level tube until the overflow stops at a temperature of no more than 40°C (104°F).

- **9.** If when the automatic transmission fluid level plug is first removed and automatic transmission fluid comes out of the automatic transmission fluid level tube, allow the automatic transmission fluid to come out of the automatic transmission fluid level tube until the overflow stops at a temperature of no more than 40°C (104°F).
- 10. Install the transmission fluid level plug.



- Install a new level plug and sealing washer.
- Tighten to 15 Nm.

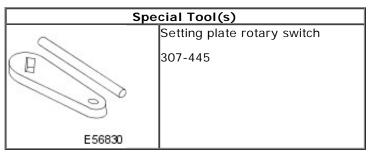


11. Install the automatic transmission fluid charging pipe cap.

- 12. Lower the vehicle.
- **13.** Disconnect the Jaguar Approved Diagnostic System.

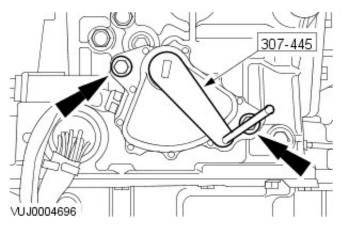
Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transmission Range (TR) Sensor Adjustment

General Procedures



- VJJ0004697
- 1. Remove the battery tray.

 For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- 2. Loosen the Transmission Range (TR) sensor.



- **3.** Make sure the J-Gate shift selector is in the "N" position.
- 4. Using the special tool adjust the TR sensor.
 - Tighten to 10 Nm.

- 5. Remove the special tool.
- **6.** Install the battery tray. For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- **7.** NOTE: If the J-Gate shift selector does not illuminate in all positions repeat the complete procedure.

Make sure the vehicle starts in the "P" and "N" positions and that it does not start in the R, D, 4, 3 and 2 positions, and that the J-Gate shift selector illuminates in all positions.

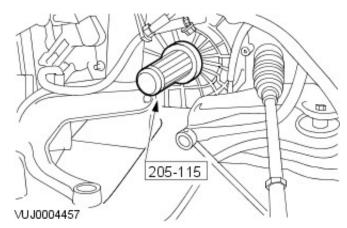
Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Halfshaft Seal LH

In-vehicle Repair

Special Tool(s)			
	Link shaft oil seal installer		
	205-115		
205-115			
624	Pinion oil seal remover		
	308-208		
400			
308-208			

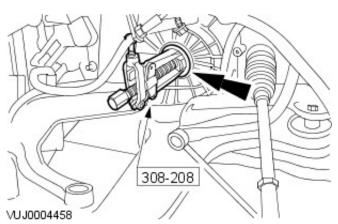
Removal

- 1. Drain the transmission. For additional information, refer to Transmission Fluid Drain and Refill.
- 2. Remove the left-hand drive halfshaft. For additional information, refer to Section 205-04 Front Drive Halfshafts.
- 3. Using the special tool, remove the drive halfshaft oil seal.



Installation

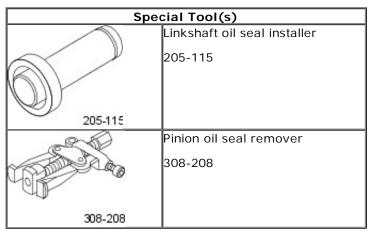
1. Using the special tool, install the drive halfshaft oil seal.



- 2. Install the left-hand drive halfshaft. For additional information, refer to Section 205-04 Front Drive Halfshafts.
- **3.** Fill the transmission. For additional information, refer to <u>Transmission Fluid Drain and Refill</u>

Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Halfshaft Seal RH

In-vehicle Repair

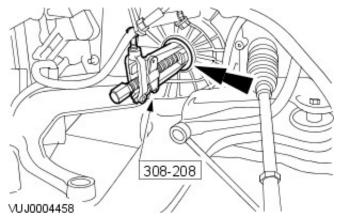


- Drain the transmission.
 For additional information, refer to <u>Transmission Fluid Drain and Refill</u> in this section.
- 2. Remove the intermediate shaft.
 For additional information, refer to Section 205-04 Front Drive Halfshafts.

Removal

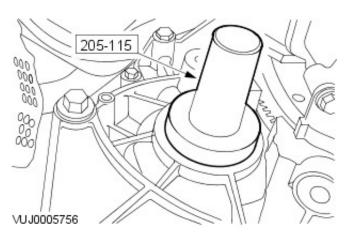
1. NOTE: Left-hand shown, right-hand similar.

Using the special tool, remove the halfshaft oil seal.



Installation

1. Using the special tool install, the halfshaft oil seal.



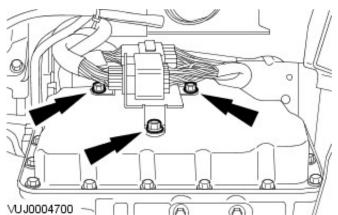
- Install the intermediate shaft.
 For additional information, refer to Section 205-04 Front Drive Halfshafts.
- **3.** Refill the transmission. For additional information, refer to <u>Transmission Fluid Drain</u>

and Refill in this section.

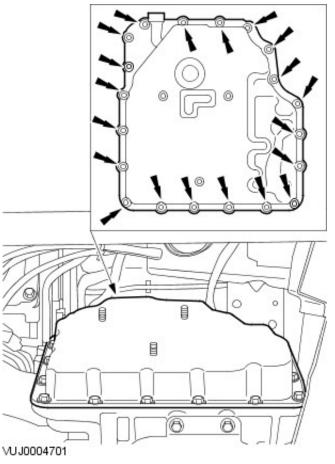
Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Main Control Valve Body

In-vehicle Repair

Removal

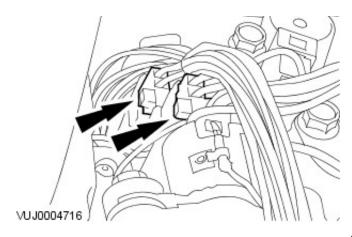


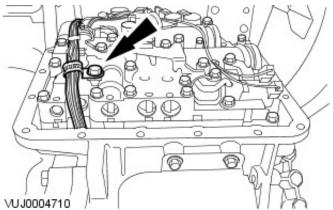
1. Detach the wiring harness.



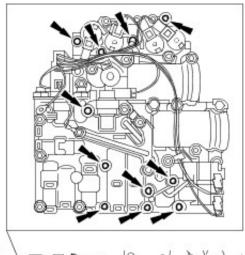
- 2. Remove the main valve body cover.
 - Drain the transmission fluid into a suitable container.
 - Clean and inspect the main valve body cover and transmission sealing surfaces using Metal surface cleaner WSE-M5B392-A or equivalent meeting Jaguar specification.

3. Disconnect the electrical connectors.

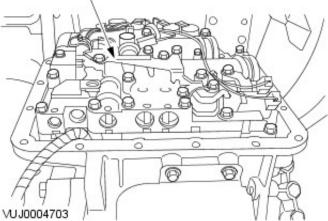




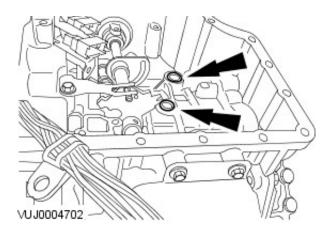
4. Detach the wiring harness.



5. Remove the main control valve body.



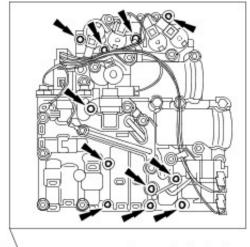
6. Remove and discard the O-ring seals.



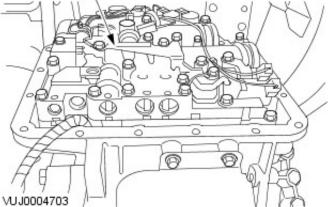
VUJ0004702

Installation

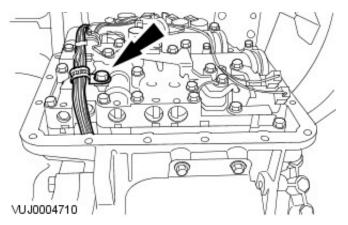
- **1.** To install, reverse the removal procedure.
 - Install the new O-ring seals.

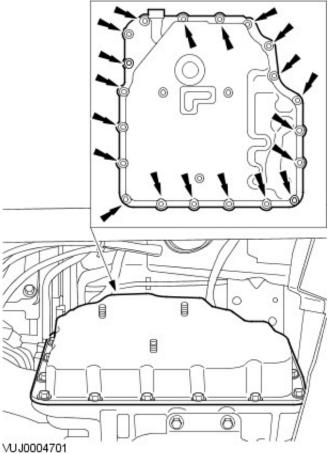


- 2. To install, reverse the removal procedure.
 - Tighten to 8 Nm.



3. Tighten to 8 Nm.





4. NOTE: Apply an even bead of silicone gasket sealant WSE-M4G323-A6 or equivalent meeting Jaguar specification to the main valve body cover sealing surface.

Tighten to 8 Nm.

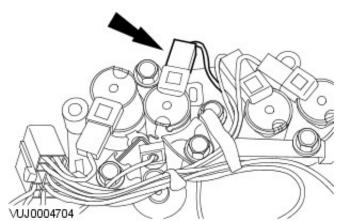
5. Check and adjust the transmission fluid level. For additional information, refer to Adjustment—Fluid Level Check.

Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Shift Solenoids (SS)

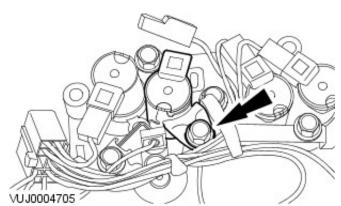
In-vehicle Repair

Removal

- **1.** Remove the main control valve body. For additional information, refer to Main Control Valve Body.
- 2. Disconnect the electrical connector.



3. Remove the shift solenoid.

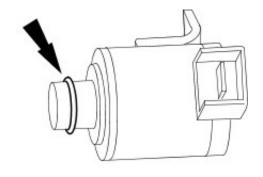


Installation

1. NOTE: Lubricate the shift solenoid O-ring seal with automatic transmission fluid WSS-M2C922-A1 or equivalent meeting Jaguar specification.

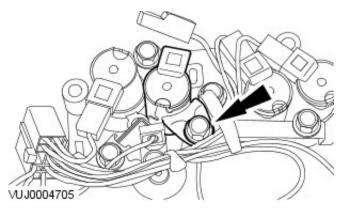
To install, reverse the removal procedure.

• Lubricate the shift solenoid O-ring seal.



VUJ0004706

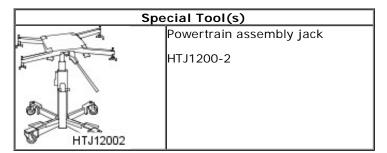
2. Tighten to 8 Nm.



3. Install the main control valve body. For additional information, refer to Main Control Valve Body.

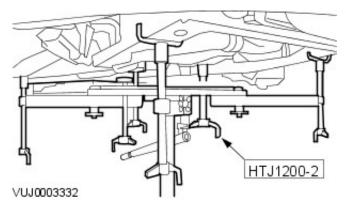
Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transaxle Support Insulator

In-vehicle Repair



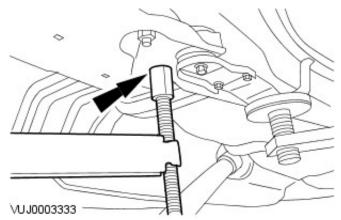
Removal

- **1.** Raise and support the vehicle. For additional information, refer to Section 100-02 Jacking and Lifting.
- 2. Install the special tool.



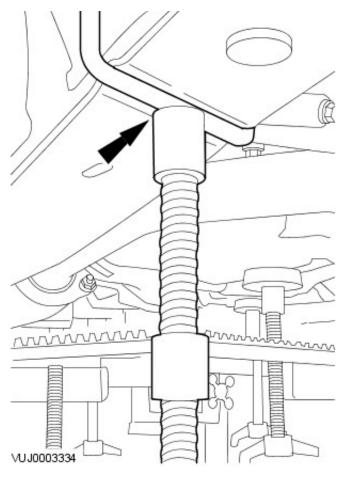
3. NOTE: Left-hand shown, right-hand similar.

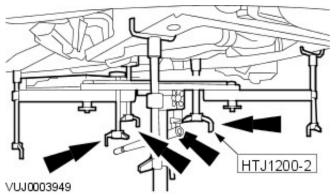
Position and adjust the special tool rear height adjuster.

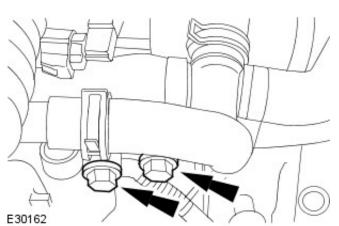


4. NOTE: Right-hand shown, left-hand similar.

Position and adjust the special tool front height adjuster.





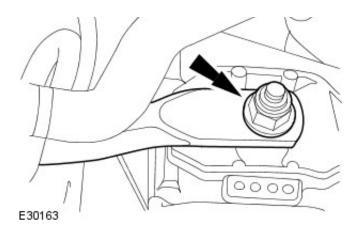


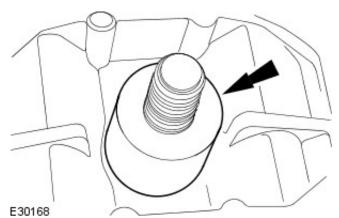
5. Position and adjust the special tool engine height adjusters.

6. Detach the support bar.

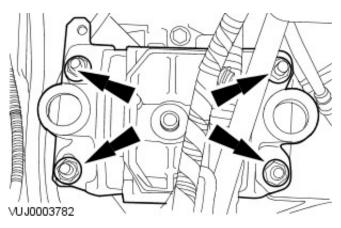
7. Remove the support bar.

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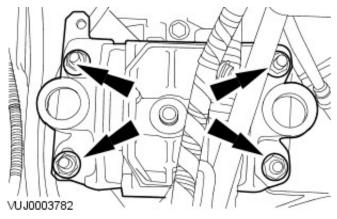
8. Remove the spacer.



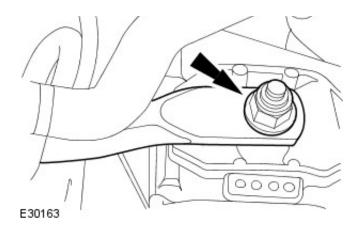
- **9.** Remove the transaxle support insulator.
 - Remove the transaxle support insulator retaining nuts.

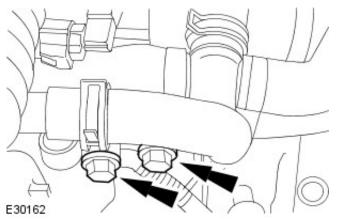
Installation

- **1.** To install, reverse the removal procedure.
 - Tighten to 47 Nm.



2. Tighten to 133 Nm.





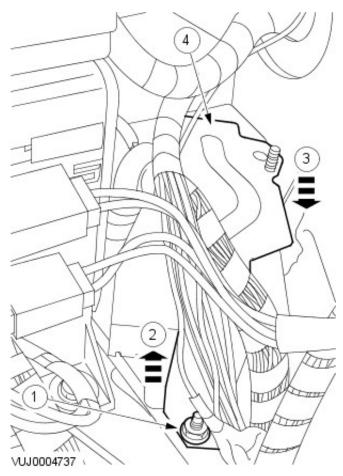
3. Tighten to 25 Nm.

Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transmission Control Module (TCM)

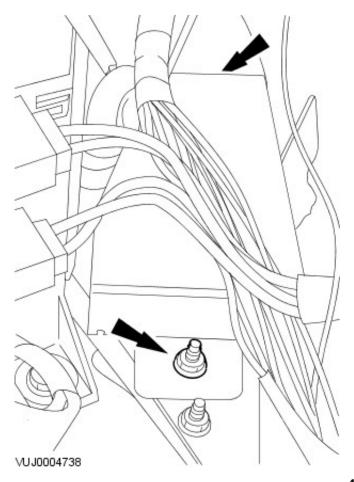
In-vehicle Repair

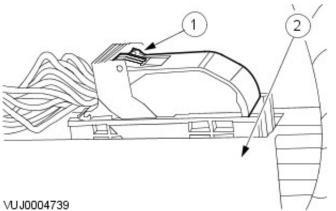
Removal

- **1.** Remove the rain sensor module. For additional information, refer to Section 501-16 Wipers and Washers.
- 2. Remove the mounting plate.
 - 1. Remove the retaining nut.
 - 2. Reposition the mounting plate.
 - 3. Detach the mounting plate.
 - 4. Remove the mounting plate.



3. Detach the Transmission Control Module (TCM).

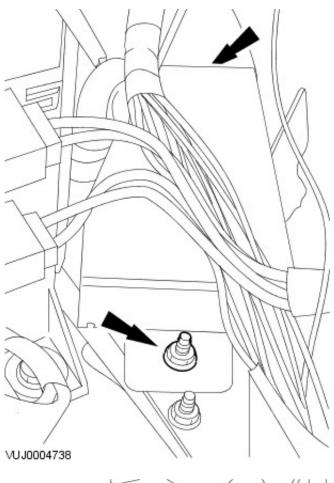


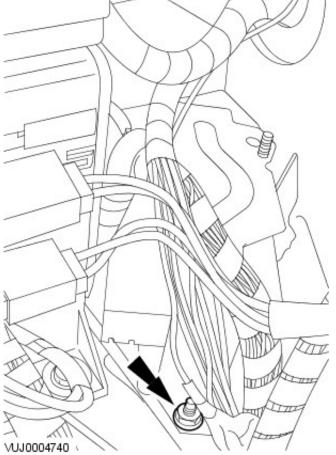


- 4. Remove the TCM.
 - 1. Disconnect the electrical connector.
 - 2. Remove the TCM.

Installation

- 1. To install, reverse the removal procedure.
 - Tighten to 10 Nm.





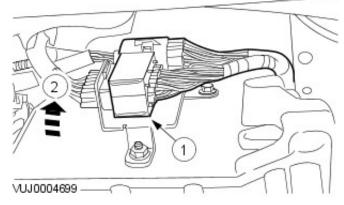
2. Tighten to 10 Nm.

Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transmission Range (TR) Sensor

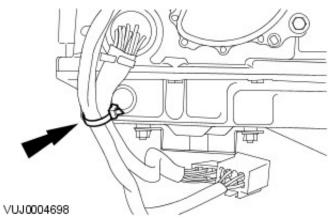
In-vehicle Repair

Removal

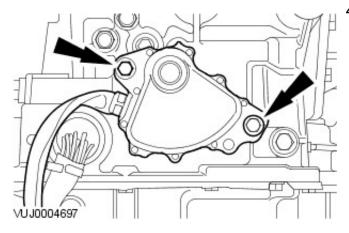
- **1.** Remove the battery tray. For additional information, refer to Section 414-01 Battery, Mounting and Cables.
- 2. Disconnect the electrical connector.
 - 1. Detach the electrical connector.
 - 2. Disconnect the electrical connector.



3. Remove the tie strap.

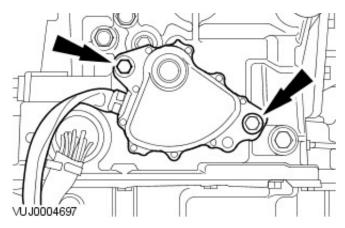


4. Remove the Transmission Range (TR) sensor.



Installation

1. Install the TR sensor.

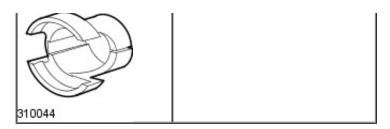


2. Adjust the TR sensor. For additional information, refer to Adjustment—Transmission Range (TR) Sensor.

Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transaxle

Removal

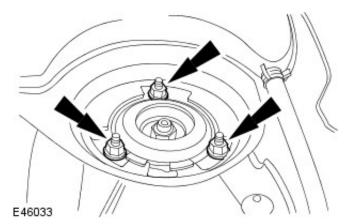
Special Tool(s)		
Зре	Slide hammer	
	100-012	
100012		
100012	100-012-02	
	Slide hammer shaft	
100-012-02		
	Halfshaft remover fork	
	204-226	
204-22€		
204-226	Powertrain assembly jack	
	HTJ1200-2	
HTJ12002		
	Pinion oil seal remover	
	308-208	
308-208	Control control by a both	
A STORY	Engine support bracket	
	303-021	
303-021	Engine support brackets	
	303-1068	
E46047		
2,2,2,2,00,00	Disconnect tool, fuel line	
	310-044	



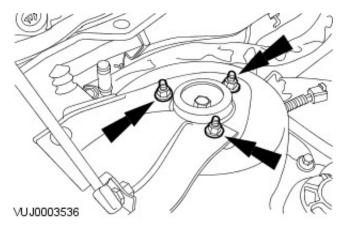
Removal

All vehicles

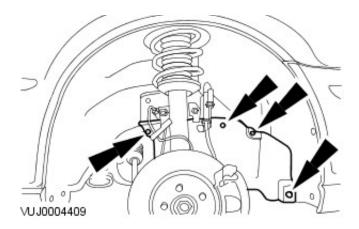
- Remove the battery tray.
 For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- Remove the air cleaner.
 For additional information, refer to: <u>Air Cleaner</u> (303-12A Intake Air Distribution and Filtering 2.5L NA V6 AJV6/2.0L NA V6 AJV6/3.0L NA V6 AJ27, Removal and Installation).
- **3.** Loosen the left-hand shock absorber and spring assembly securing nuts.



4. Loosen the right-hand shock absorber and spring assembly securing nuts.

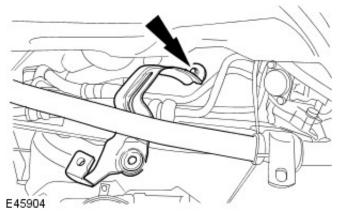


- **5.** Remove the front subframe. For additional information, refer to: Front Subframe 2.5L NA V6 AJV6/2.0L NA V6 AJV6/3.0L NA V6 AJ27 (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).
- **6.** Remove the fender splash shield access panel.

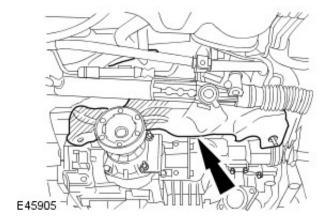


Vehicles with 2.5L or 3.0L engine

7. Remove the steering gear heat shield bracket.



8. Remove the steering gear heat shield.



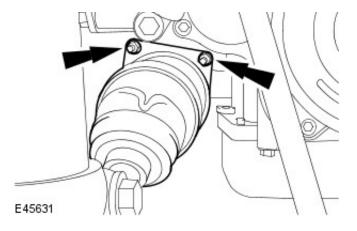
9. Remove the transfer case. For additional information, refer to: <u>Transfer Case</u> (308-07 Transfer Case, Removal).

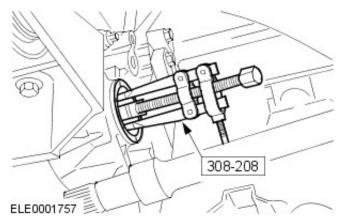
Vehicles with 2.0L engine

10. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Detach the right-hand halfshaft.

- Disengage the right-hand halfshaft from the transaxle.
- Secure the right-hand halfshaft to one side.



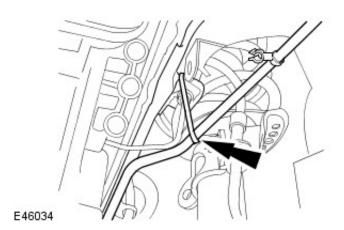


11. NOTE: Plug the transaxle to prevent fluid loss or dirt ingress.

Using the special tool, remove the right-hand halfshaft seal.

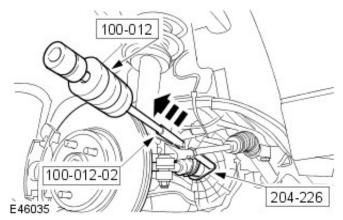
All vehicles

12. Support the power steering fluid pipe.



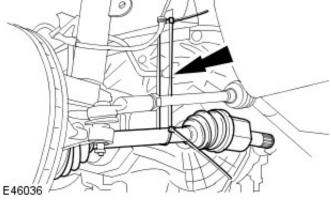
$\textbf{13.} \ \mathsf{NOTE:} \ \mathsf{Plug} \ \mathsf{the} \ \mathsf{transaxle} \ \mathsf{to} \ \mathsf{prevent} \ \mathsf{fluid} \ \mathsf{loss} \ \mathsf{or} \ \mathsf{dirt} \\ \mathsf{ingress.}$

Using the special tools, detach the left-hand halfshaft.

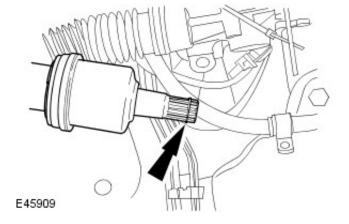




Support the left-hand halfshaft.

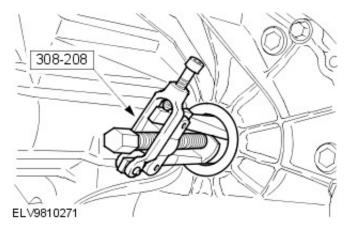


15. Remove and discard the halfshaft snap ring.

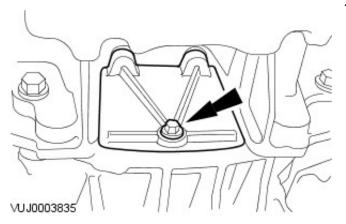


16. NOTE: Plug the transaxle to prevent fluid loss or dirt ingress.

Using the special tool, remove the halfshaft seal.



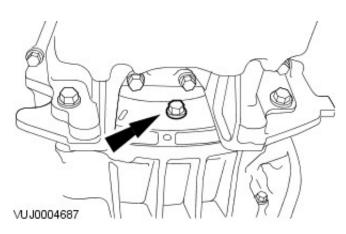
17. Remove the torque converter retaining bolts access cover.

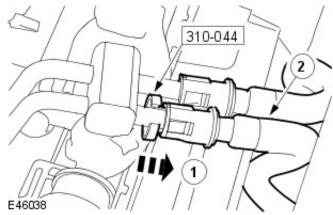


18. NOTE: Rotate the torque converter to gain access for the remaining retaining bolts.

Remove the torque converter retaining bolts.

TI

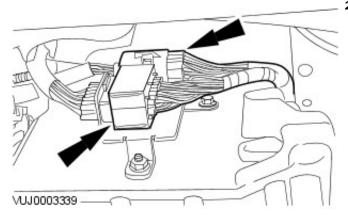




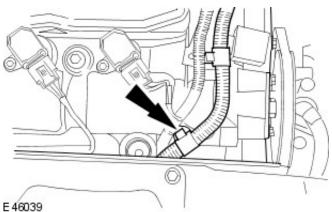
- **19.** NOTE: Lower transaxle fluid cooler tube shown, upper transaxle fluid cooler tube similar.
- NOTE: Plug the transaxle fluid cooler and transaxle fluid cooler tubes to prevent fluid loss or dirt ingress.

Using the special tool, detach the transaxle fluid cooler tubes.

- 1. Install the special tool to the transaxle fluid cooler tube.
- 2. Using the special tool, detach the transaxle fluid cooler tube.

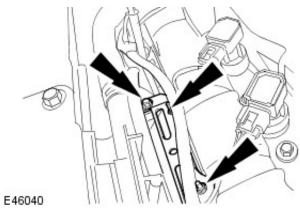


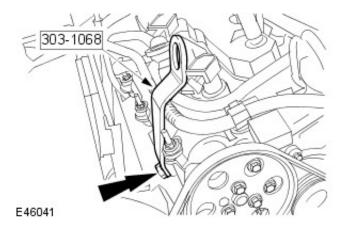
20. Disconnect the transaxle electrical connectors.



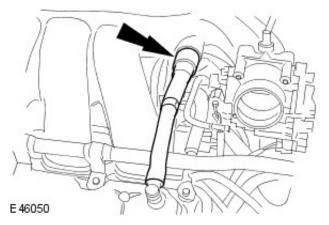
- 21. Lower the vehicle.
- **22.** Detach the generator wiring harness retaining clip from the camshaft cover retaining clip.

23. Remove the air cleaner mount bracket.

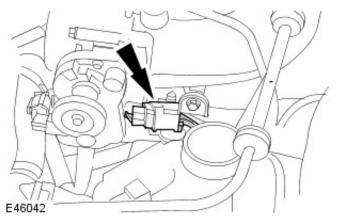




24. Install the engine support bracket.

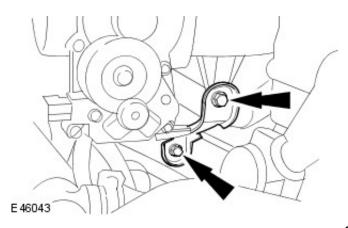


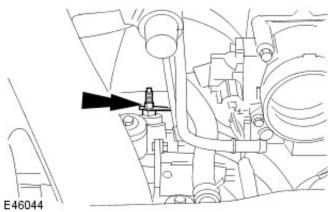
25. Detach the positive crankcase ventilation (PCV) hose from the intake manifold.



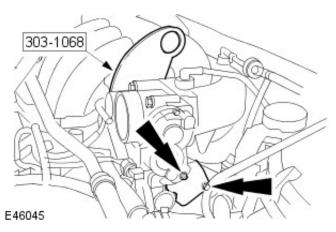
26. Detach the electrical connector from the intake manifold support bracket.

27. Remove the intake manifold support bracket.

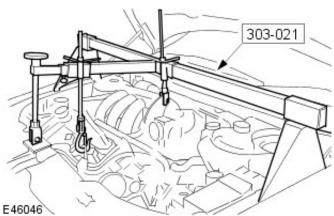




28. Detach the wiring harness from the camshaft cover retaining stud.

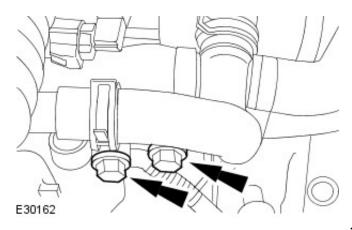


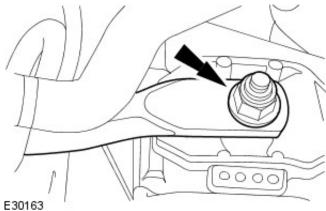
29. Install the engine support bracket.



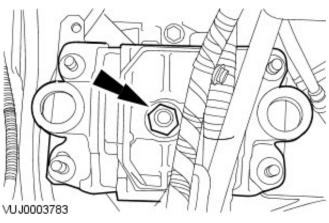
- **30.** Install the engine support bracket.
 - Adjust the engine support bracket to support the weight of the powertrain assembly.

31. Remove the support bar retaining bolts.

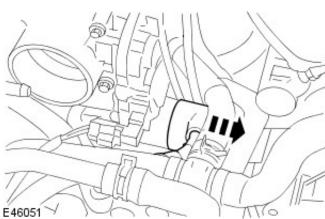




32. Remove the support insulator bar.

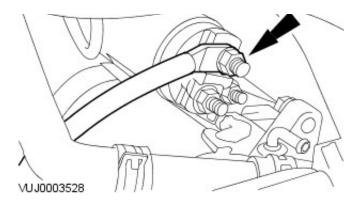


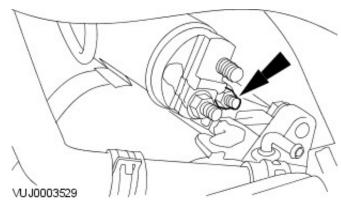
33. Install the support insulator retaining nut.



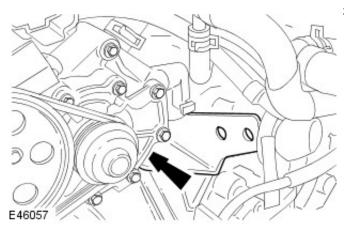
34. Detach the starter motor solenoid cover.

35. Detach the starter motor electrical connector.

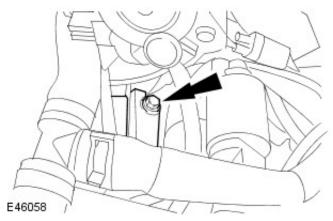




36. Detach the starter motor solenoid electrical connector.

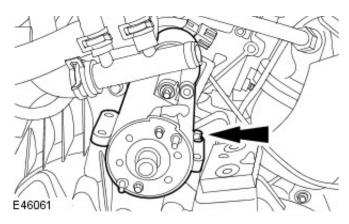


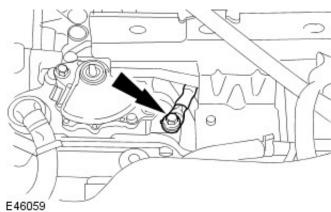
37. Remove the support bar mount bracket/transaxle upper retaining bolt.



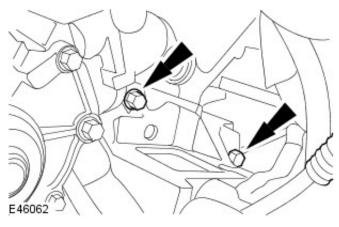
- **38.** Remove the support bar mount bracket.
 - Remove the stater motor front retaining bolt.

39. Remove the starter motor.

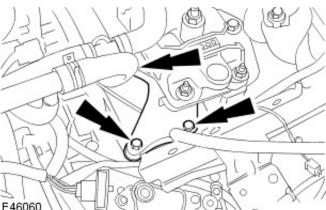




40. Detach the transaxle ground lead.



41. Remove the transaxle retaining bolts.

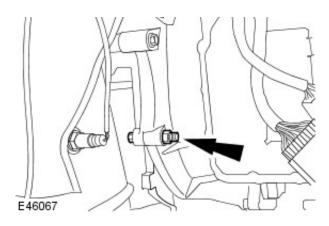


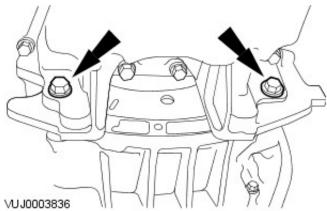
42. Remove the transaxle mount bracket securing bolts.

43. Raise the vehicle.

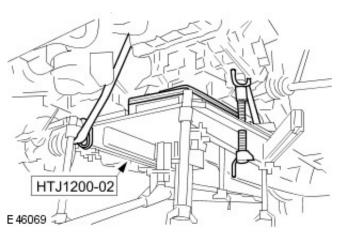
44. NOTE: The transaxle retaining bolt remains captive to the cylinder block flange.

Remove the transaxle retaining nut.



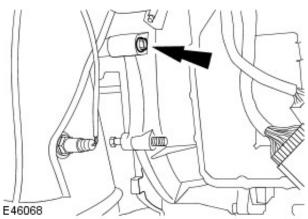


45. Remove the transaxle retaining bolts.



46. Align the powertrain assembly jack to the transaxle.

• Secure the transaxle to the powertrain assembly jack.

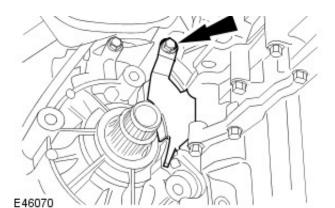


47. Remove the transaxle retaining bolt.

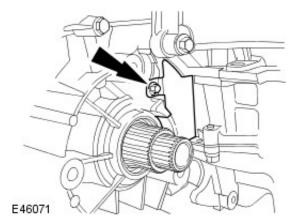
48. NOTE: Carry this step if an early condition transaxle is being removed.

 \bullet NOTE: Vehicles with 2.5L and 3.0L engines shown, vehicles with 2.0L engine similar.

Remove the transaxle retaining bolt



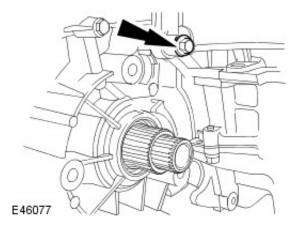
Remove the transaxle dust cover.



49. NOTE: Carry this step if a later condition transaxle is being removed.

• NOTE: Vehicles with 2.5L and 3.0L engines shown, vehicles with 2.0L engine similar.

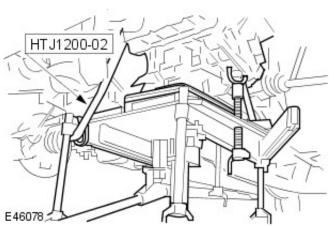
Remove the transaxle dust cover.



50. NOTE: Carry this step if a later condition transaxle is being removed.

 \bullet NOTE: Vehicles with 2.5L and 3.0L engines shown, vehicles with 2.0L engine similar.

Remove the transaxle retaining bolt.



51. WARNING: Do not let the torque converter drop out of the transaxle. Failure to follow this instruction may result in personal injury.

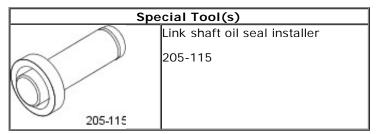
Remove the transaxle.

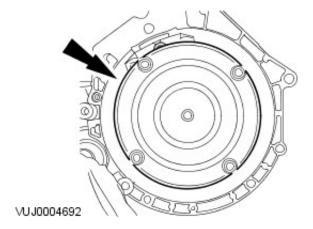
- Detach the transaxle from the drive plate.
- Lower the powertrain assembly jack and transaxle assembly.

J

Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Input Shaft Seal

Disassembly and Assembly of Subassemblies



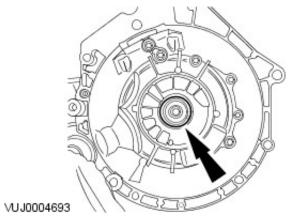






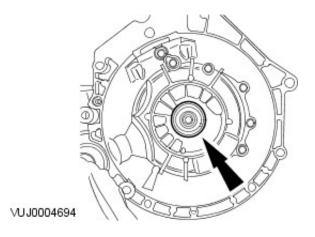
Remove the torque converter.

• Drain any remaining fluid into a suitable container.



3. NOTE: Make sure the transmission housing seal face is not damaged when removing the torque converter seal.

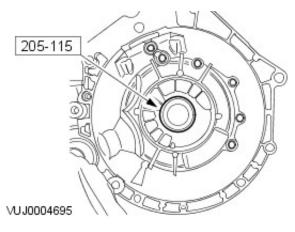
Using a suitable tool, remove the torque converter seal.

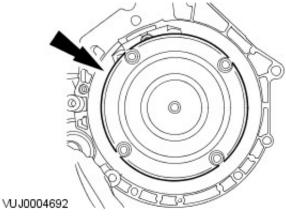


4. NOTE: Using a suitable Metal surface cleaner WSE-M5B392-A or equivalent meeting Jaguar specification. clean the seal face on the housing before fitting the new seal.

Clean and inspect the transmission housing seal face.

5. Using the special tool, install a new torque converter seal.





6. CAUTION: Do not let the torque converter drop out of the transmission. Failure to follow this instruction may result in personal injury.

 \bullet NOTE: The torque converter hub must engage fully in the oil pump drive gear.

Install the torque converter.

7. Install the transmission assembly. For additional information, refer to $\underline{\text{Transmission}}$.

Automatic Transmission/Transaxle - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transaxle

Installation

Sne	cial Tool(s)
Эрс	Halfshaft oil seal installer
	205-115
205-115	
205-115	
7	Powertrain assembly jack
OFFICE A	HTJ1200-2
I* H\	
₩ N	
- A	
HTJ12002	
. 28	Engine support bracket
	303-021
1	303 021
IRT 1	
303-021	
0	Engine support brackets
	303-1068
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Installation

All vehicles

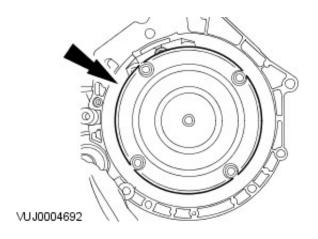
CAUTION: When replacing or installing a new automatic transaxle. The transaxle control module (TCM) adaptation procedure must be carried out using the Jaguar approved diagnostic system using software issue 19 or higher, where available. If the Jaguar approved diagnostic system is not available the TCM must be replaced. Failure to follow this instruction will result in damage to the automatic transaxle.

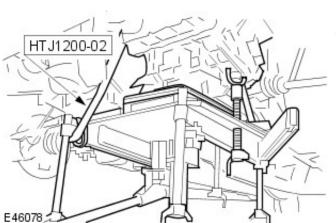
1. CAUTION: If the automatic transmission fluid is very dirty or it contains metallic particles, then along with a new transmission, install a new automatic transmission fluid cooler and lines.

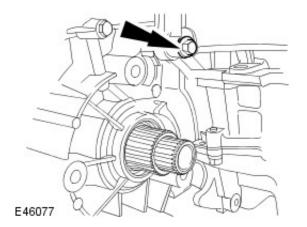
Flush the transaxle fluid cooler and fluid tubes.

2. NOTE: Use high-temperature grease ESD-M1C 220-A or equivalent meeting Jaguar specification.

Apply a thin layer of grease to the centering spigot bore on the torque converter.







- 3. CAUTION: The torque converter must remain at the correct installation depth throughout the whole installation procedure.
- NOTE: The torque converter hub must engage fully in the fluid pump drive gear.

Check the installation depth between the transaxle flange and the torque converter is at least 0.04 mm (0.015 in).

4. WARNING: Do not let the torque converter drop out of the transaxle. Failure to follow this instruction may result in personal injury.

Install the transaxle.

- **5.** NOTE: Carry out this step if a later condition transaxle is being installed.
- NOTE: Vehicles with 2.5L and 3.0L engines shown, vehicles with 2.0L engine similar.

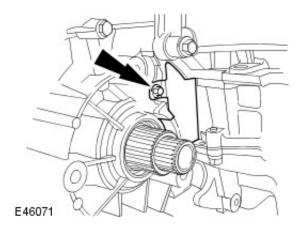
Install the transaxle retaining bolt.

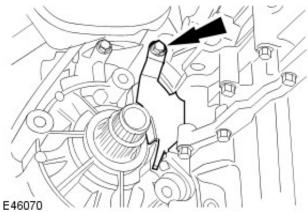
• Tighten to 48 Nm.

- **6.** NOTE: Carry out this step if a later condition transaxle is being installed.
- NOTE: Vehicles with 2.5L and 3.0L engines shown, vehicles with 2.0L engine similar.

Install the transaxle dust cover.

• Tighten to 10 Nm.





- E46068
- HTJ1200-02 E 46069

- **7.** NOTE: Carry out this step if an early condition transaxle is being installed.
- \bullet NOTE: Vehicles with 2.5L and 3.0L engines shown, vehicles with 2.0L engine similar.

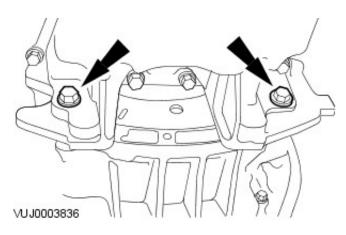
Install the transaxle retaining bolt

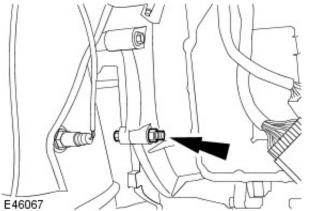
- Install the transaxle dust cover.
- Tighten to 48 Nm.
- 8. Install the transaxle retaining bolt.
 - Tighten to 48 Nm.

- 9. Remove the powertrain assembly jack.
 - Remove the transaxle to the powertrain assembly jack securing strap.

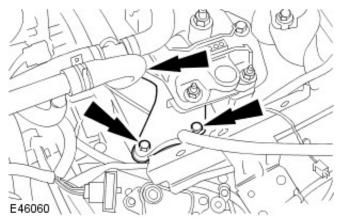
- 10. Install the transaxle retaining bolts.
 - Tighten to 48 Nm.

24 C F C

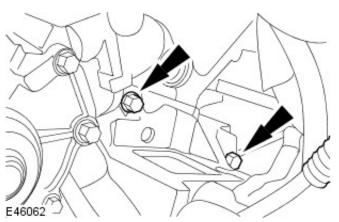




- 11. Install the transaxle retaining nut.
 - Tighten to 48 Nm.

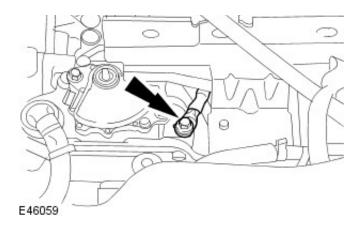


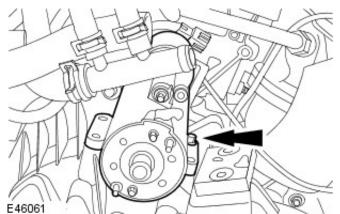
- **12.** Lower the vehicle.
- **13.** Install the transaxle mount bracket securing bolts.
 - Tighten to 48 Nm.



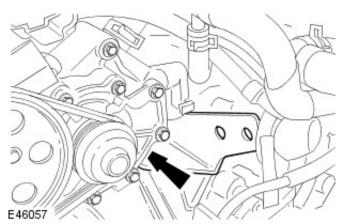
- **14.** Install the transaxle retaining bolts.
 - Tighten to 48 Nm.

- **15.** Attach the transaxle ground lead.
 - Tighten to 25 Nm.

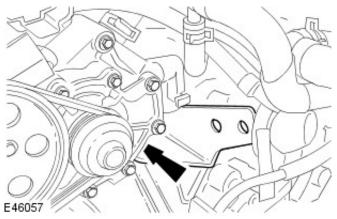




- **16.** Install the starter motor.
 - Tighten to 35 Nm.

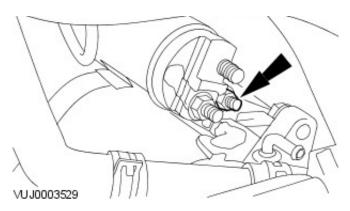


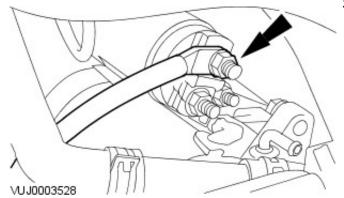
- 17. Install the support bar mount bracket.
 - Install the starter motor front retaining bolt.
 - Tighten to 35 Nm.



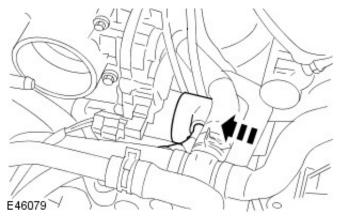
- **18.** Install support bar mount bracket/transaxle upper retaining bolt.
 - Tighten to 48 Nm.

- **19.** Attach the starter motor solenoid electrical connector.
 - Tighten to 6 Nm.

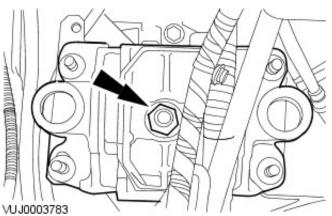




- **20.** Attach the starter motor electrical connector.
 - Tighten to 12 Nm.

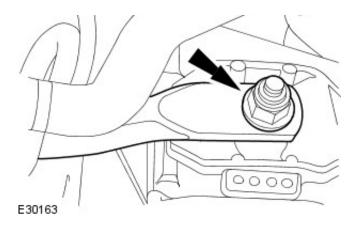


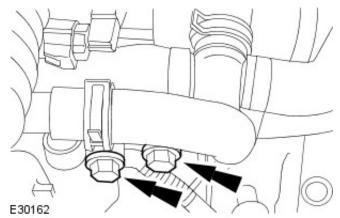
21. Attach the starter motor solenoid cover.



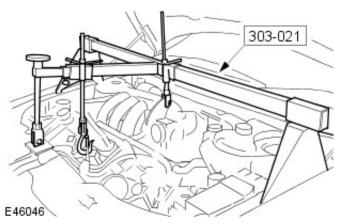
22. Remove the support insulator retaining nut.

- 23. Install the support insulator bar.
 - Tighten to 133 Nm.

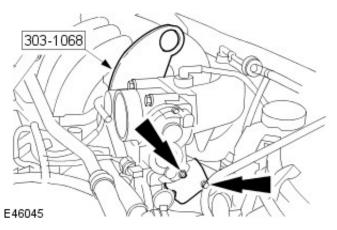




- **24.** Install the support bar retaining bolts.
 - Tighten to 25 Nm.

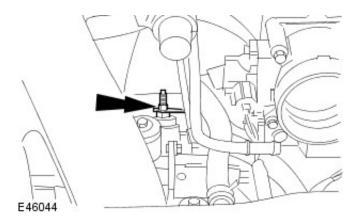


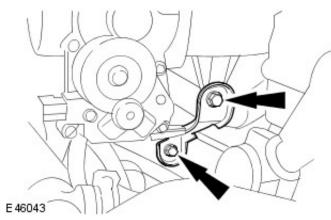
25. Remove the engine support bracket.



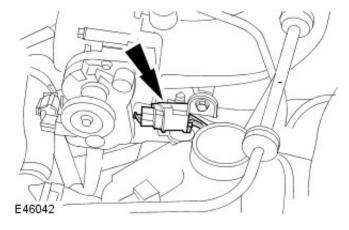
26. Remove the engine support bracket.

- **27.** Attach the wiring harness from the camshaft cover retaining stud.
 - Tighten to 6 Nm.

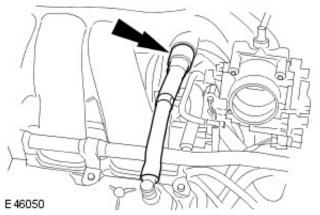




- 28. Install the intake manifold support bracket.
 - Tighten to 10 Nm.

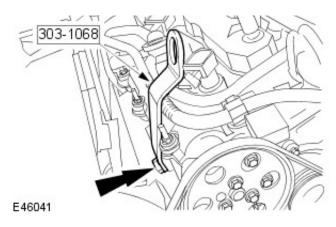


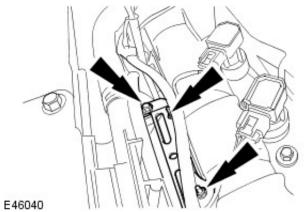
29. Attach the electrical connector to the intake manifold support bracket.



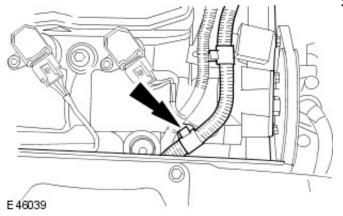
30. Attach the positive crankcase ventilation (PCV) hose to the intake manifold.

31. Remove the engine support bracket.



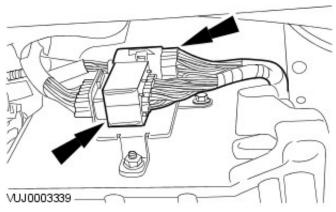


- **32.** Install the air cleaner mount bracket.
 - Tighten to 6 Nm.

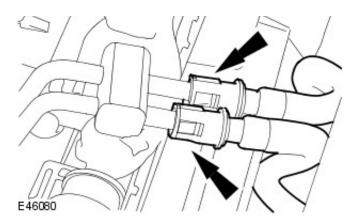


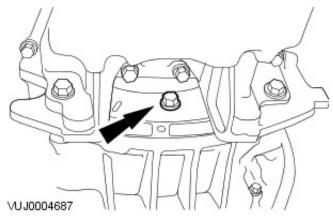
33. Attach the generator wiring harness retaining clip to the camshaft cover retaining clip.

- **34.** Raise the vehicle.
- **35.** Connect the transaxle electrical connectors.



36. Connect the transaxle fluid cooler tubes.

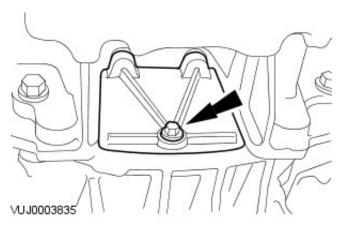




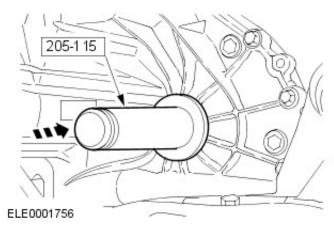
37. NOTE: Rotate the torque converter to gain access for the remaining retaining bolts.

Install the torque converter retaining bolts.

• Tighten to 55 Nm.



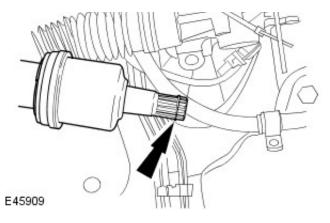
- **38.** Install the torque converter retaining bolts access cover.
 - Tighten to 10 Nm.

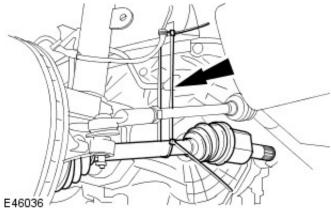


39. NOTE: Remove the transaxle plug.

Using the special tool, install a new halfshaft seal.

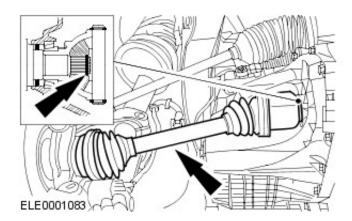
40. Install a new halfshaft snap ring.





41. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Detach the halfshaft.



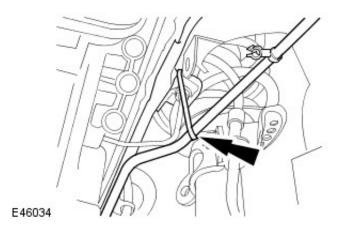
42. CAUTIONS:

Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Make sure the halfshaft seal is not damaged. Failure to follow this instruction may result in an transaxle fluid leak.

Attach the right-hand halfshaft to the transaxle.

• Make sure the halfshaft snap ring is correctly seated.

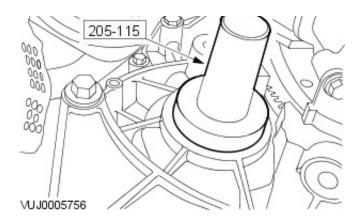


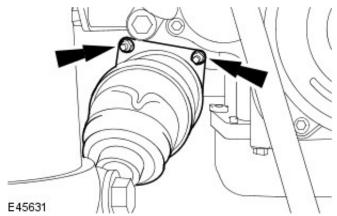
43. Detach the power steering fluid pipe.

Vehicles with 2.0L engine

44. NOTE: Remove the transaxle plug.

Using the special tool, install a new halfshaft seal.





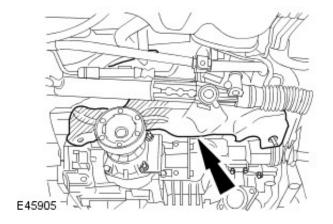
45. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Attach the right-hand halfshaft.

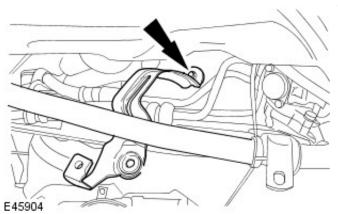
- Engage the right-hand halfshaft to the transaxle.
- Tighten to 25 Nm.

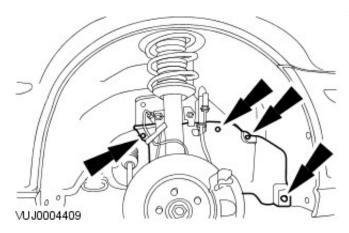


- **46.** Install the transfer case. For additional information, refer to: <u>Transfer Case</u> (308-07 Transfer Case, Installation).
- **47.** Install the steering gear heat shield.



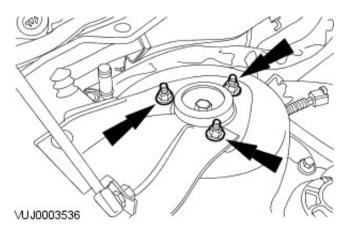
48. Install the steering gear heat shield bracket.





49. NOTE: Right-hand shown, left-hand similar.

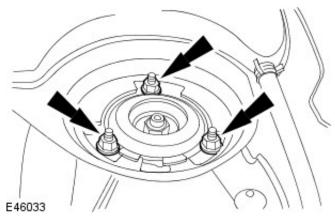
Install the fender splash shield access panel.



50. Install the front subframe.

For additional information, refer to: Front Subframe - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

- **51.** Tighten the right-hand shock absorber and spring assembly securing nuts.
 - Tighten to 25 Nm.



- **52.** Tighten the left-hand shock absorber and spring assembly securing nuts.
 - Tighten to 25 Nm.

53. Install the air cleaner.

For additional information, refer to: <u>Air Cleaner</u> (303-12A Intake Air Distribution and Filtering - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).

54. Install the battery tray.

For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).

55. Check the transaxle fluid level.

For additional information, refer to: <u>Transmission Fluid Level Check</u> (307-01B Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21, General Procedures).

56. 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 (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 -

Lubricant, Sealers, Solvents and Adhesives

Description	Specification
High-temperature grease	ESD-M1C220-A
Metal surface cleaner	WSW-M5B392-A
Sealant	WSK-M4G320-A
Adhesives	Loctite 243

Fluid Maint enance

CAUTION: Use only C2S-51628 automatic transmission fluid. Use of any other fluids may result in a transmission malfunction or failure.

Intervals		
Normal Maintenance	Not necessary. Filled for life.	

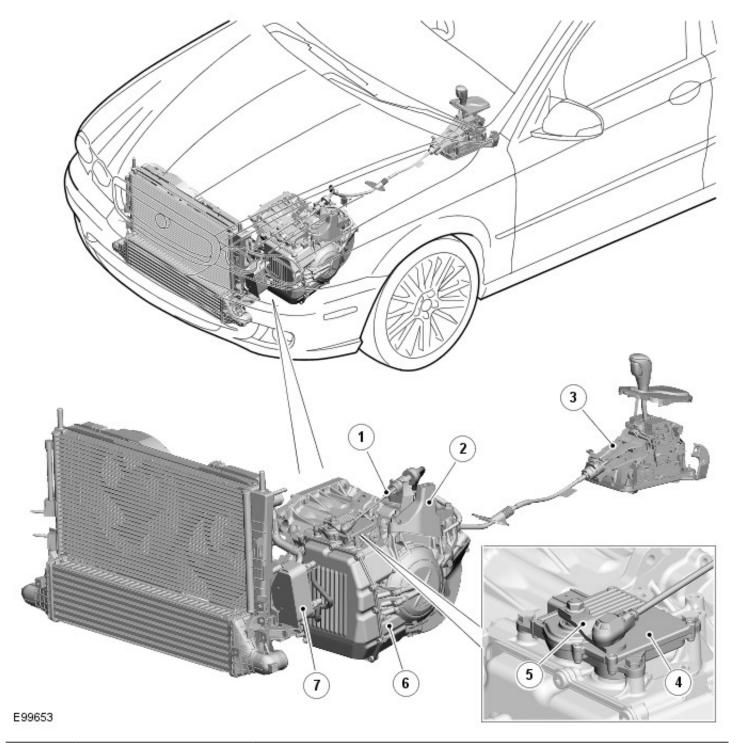
General Specifications

Gerierai Speci	General Specifications				
Engine	Dry Fill - Approximate Liters	Refil - Approximate Liters		Туре	
2.2L	6.6 C 2S-51628		528		
Description			Nm	lb-ft	
Main contro	l valve body screws		10	7	
Torque con	verter retaining bolts		60	44	
Transaxle r	etaining bolts		48	35	
Emission co	Emission control valve retaining bolts			22	
Transaxle support insulator retaining nut			130	96	
Transmission control module retaining nuts			24	18	
Transmission fluid drain plug			47	35	
Transmission fluid filler plug			40	30	
Transmission fluid level plug			7	5	
Transmission turbine shaft speed (TSS) sensor			6	4	
Transmission fluid pan retaining bolts			13	10	
Starter motor retaining bolts			35	26	
Starter motor solenoid electrical connector retaining nut			6	4	
Starter motor electrical connector retaining nut			12	9	
Wiring harness to camshaft cover retaining stud, retaining nut			6	4	
Intake manifold support bracket retaining bolts			10	7	
Air cleaner mount bracket retaining nuts and bolt			6	4	
Left-hand driveshaft retaining nuts			25	18	
Shock absorber and spring assembly securing nuts			25	18	
Transaxle ground lead			25	18	
Support bar retaining bolts			25	18	

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission DescriptionVehicles With: 6-Speed Automatic Transaxle - AWF21

Description and Operation

COMPONENT LOCATION - AW F21 6 SPEED AUTOMATIC TRANSMISSION 2009MY



Item	Part Number	Description
1	-	Selector cable
2	-	Cable bracket
3	-	Transmission selector lever assembly
4	-	Transmission Control Module (TCM)
5	-	Lever arm
6	-	Automatic transmission
7	-	Transmission fluid cooler

OVERVIEW

The AW F21 automatic transmission is a 6 speed, electronically controlled unit manufactured by Aisin AW in Japan. The transmission represents the latest in automatic transmission technology for a transverse unit. The transmission features lock-up slip control, 'Jaguar Sequential Shift' functions and automatic and driver selectable modes to give the optimum performance.

The transmission is controlled by a TCM (transmission control module) which contains software to provide operation as a semi-automatic 'Jaguar Sequential Shift' transmission. The TCM allows the transmission to be operated as a conventional automatic unit by selecting P, R, N, D on the selector lever. Movement of the selector lever across the gate to the 'M/S' position puts the transmission into electronic 'Sport' mode. Further movement of the lever in a longitudinal direction to the + or – position puts the transmission into electronic manual 'Jaguar Sequential Shift' mode.

For additional information, refer to: External Controls - Vehicles With: 6-Speed Automatic Transaxle - AWF21 (307-05B Automatic Transmission/Transaxle External Controls - Vehicles With: 6-Speed Automatic Transaxle - AWF21, Description and Operation).

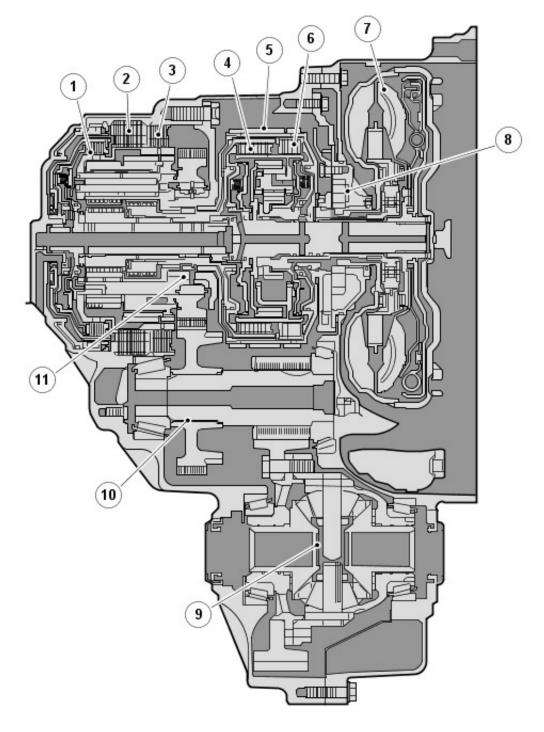
The AW F21 transmission has the following features:

- Designed to be maintenance free
- Torque capacity of 450 Nm
- Transmission fluid is fill for life
- The torque converter features a controlled slip feature with electronically regulated lock-up control on gears 2 to 6
- Shift programs controlled by the TCM
- TCM has an adaptive capability to ensure efficient gear shift quality throughout the service life of the transmission
- Diagnostics available from the TCM via the high speed CAN (controller area network) bus.

TRANSMISSION

The transmission comprises the main casing which houses all of the transmission components. The torque converter is located in a separate converter housing.

AW F21 Automatic Transmission - Sectional View



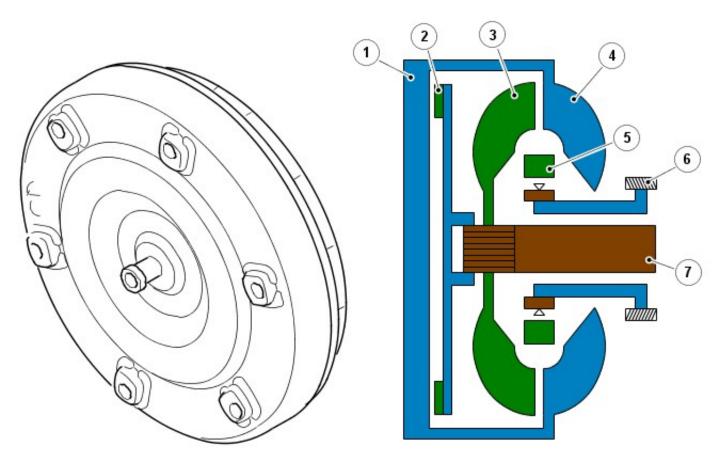
E83814

Item	Part Number	Description				
1	-	Clutch - C2				
2	-	Brake - B2				
3	-	One-way clutch - F1				
4	-	Clutch - C1				
5	-	Brake - B1				
6	-	Clutch - C3				
7	-	Torque converter				
8	-	Fluid pump				
9	-	Differential assembly				
10	-	Counter driven gear				
11	-	Counter drive gear				

The main casing retains the fluid at the bottom. A combined drain/filler plug is located in the bottom of the casing. The oil level is checked by removing the inner fill plug when the transmission fluid is at a temperature of between 50 to 60°C (122 to 140°F). When the oil flow becomes a drip from the plug hole, the level is correct.

The transmission has a fluid cooler which is located on the LH (left-hand) end of the engine cooling radiator. The cooler is connected to the transmission converter housing by 2 pipes. The fluid cooler is connected into the engine cooling system and cools the transmission fluid by heat transfer through the cooler to the engine coolant. For additional information, refer to: Transmission Cooling - Vehicles With: 6-Speed Automatic Transaxle - AWF21 (307-02B Transmission/Transaxle Cooling - Vehicles With: 6-Speed Automatic Transaxle - AWF21, Description and Operation).

TORQUE CONVERTER



E83815

Item	Part Number	Description				
1	-	Torque converter housing				
2	-	- Lock-up clutch				
3	-	Turbine				
4	-	Impeller				
5	-	Stator				
6	-	Fluid pump				
7	-	Input shaft				

The torque converter is the coupling element between the engine and the transmission and is located in the transmission housing, on the engine side of the transmission. The driven power from the engine crankshaft is transmitted hydraulically and mechanically through the torque converter to the transmission. The torque converter is connected to the engine by a drive plate.

The torque converter comprises an impeller, a stator and a turbine. The torque converter is a sealed unit with all components located between the converter housing cover and the impeller. The two components are welded together to form a sealed, fluid filled housing. With the impeller welded to the converter housing cover, the impeller is therefore driven at engine crankshaft speed.

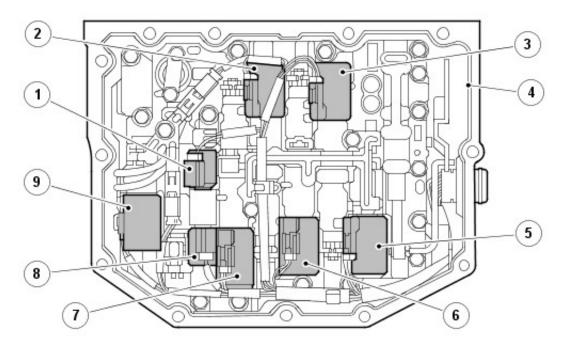
The torque converter contains a hydraulically operated lock-up clutch which is controlled by the TCM via a solenoid in the valve block which actuates spool valves to control the hydraulic pressure applied to the clutch. This allows the TCM to provide 3 modes of converter operation; unlocked, partially locked and fully locked.

VALVE BLOCK

The valve block is located in a vertical position at the front of the transmission main casing, behind a sealed cover.

The valve block contains a number of solenoids, dampers and spool valves to control the transmission operation. The solenoids are controlled by the TCM to provide gear changes and smooth transition between ratio changes.

Solenoids



E99654

Item	Part Number	Description	
1	-	3-Way solenoid - S2	
2	-	Shift control solenoid - SLC2	
3	-	Shift control solenoid - SLC1	
4	-	Valve block	
5	-	Lock-up control solenoid - SLU	
6	-	Shift control solenoid - SLC3	
7	-	Shift control solenoid - SLB1	
8	-	3-Way solenoid - S1	
9	-	Line pressure control solenoid - SLT	

Shift Control Solenoids - SLC1, SLC2, SLC3, SLB1

The shift control solenoids (SLC1, SLC2, SLC3 and SLB1) are installed on the front valve body. The solenoids respond to inputs from the TCM and control the hydraulic pressure applied to the clutches (C1, C2 and C3) and to the brake B1 to provide smooth shifting. The TCM uses a single or a combination of these solenoids to provide shifts from 1st to 6th gear.

If a solenoid fails, the TCM will remove the current to the shift control solenoids and the transmission will use limp home mode, to prevent damage to the transmission.

Line Pressure Control Solenoid - SLT

The line pressure control solenoid (SLT) is installed on the front valve body. The solenoid is controlled in a linear manner by the TCM which uses throttle opening degree signals and engine torque information from the ECM (engine control module) to determine the solenoid operation. The solenoid controls the line pressure applied to the clutches and brakes to provide smooth shifting.

If the solenoid fails, the TCM will remove the current supplied to the solenoid. Maximum line pressure will be applied to the clutches and brakes unless the failure is due to the solenoid valve sticking, which may result in low line pressure.

Lock-Up Control Solenoid - SLU

The lock-up control solenoid is installed on the front valve body. The solenoid is controlled in a linear manner by the TCM which uses engine speed, throttle opening degree signals and transmission speed sensor signals to determine the solenoid operation. The solenoid controls the amount of lock-up or slip required for the torque converter lock-up clutch.

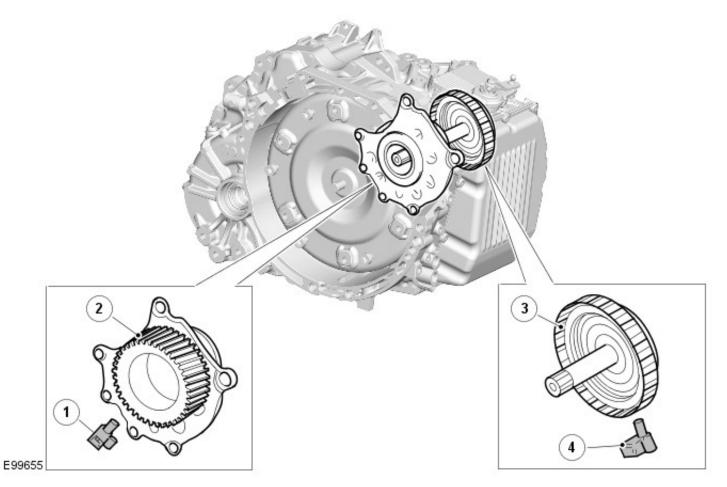
If the solenoid fails, the TCM removes the current supplied to the solenoid which results in no torque converter lockup being applied.

3-Way Solenoid - S1, S2

The 3-way solenoid (S1) is located on the center valve body and solenoid (S2) is located on the front valve body. The solenoids are on/off solenoids controlled by the TCM. A combination of the 2 solenoids is used to operate either the 1st gear engine braking or enable gear shifts.

If a solenoid fails, the TCM will remove the current supplied to both solenoids.

Speed Sensors



Item	Part Number	Description			
1	-	Speed Sensor (SP) - Output shaft speed			
2	-	ounter drive gear			
3	-	C2 clutch drum			
4	-	Speed sensor (NIN)			

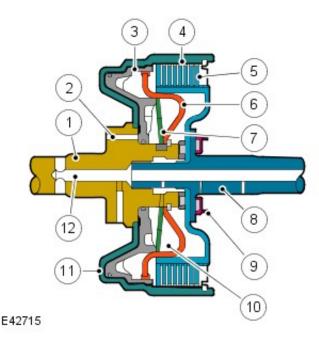
Two speed sensors (NIN and SP) are used in the transmission and are located within the transmission housing. Speed sensor (SP) is located adjacent to the counter drive gear and reads from the gear teeth to provide an output shaft speed signal. Speed sensor (NIN) is located adjacent to the clutch C" drum and reads off teeth on the outer circumference of the drum to provide an input shaft speed. Both speed signals are received by the TCM which uses the 2 signals to calculate engine torque output, shift timing and torque converter lock-up.

Fluid Temperature Sensor

The fluid temperature sensor is integrated into the internal wiring harness within the transmission. It detects the fluid temperature in the hydraulic pressure control circuit and transmits a signal corresponding to the temperature to the TCM. The TCM monitors the temperature and provides smooth gear shifts across a wide range of temperatures.

DRIVE CLUTCHES

Multiplate Drive or Brake Clutch - Typical



Item	Part Number	Description
1	-	Input shaft
2	-	Main pressure supply port
3	-	Piston
4	-	Cylinder – External plate carrier
5	-	Clutch plate assembly
6	-	Baffle plate
7	-	Diaphragm spring
8	-	Output shaft
9	-	Bearing
10	-	Dynamic pressure equalisation chamber
11	-	Piston chamber
12	-	Lubrication channel

There are three drive clutches and two brake clutches (B2 is a multiplate brake clutch & B1 is a double wrap brake band) used in the AW F21 transmission. Each clutch comprises one or more friction plates dependent on the output controlled. A typical clutch consists of a number of steel outer plates and inner plates with friction material bonded to each face.

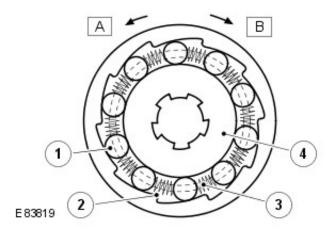
Clutch / Brake	Operation
C1 Clutch	Connects the front planetary carrier to the rear planetary rear sun gear
C2 Clutch	Connects the intermediate shaft to the rear planetary carrier
C3 Clutch	Connects the front planetary carrier to the rear planetary middle sun gear
B1 Brake	Locks the rear planetary middle sun gear
B2 Brake	Locks the rear planetary carrier

The clutch plates are held apart mechanically by a diaphragm spring and hydraulically by dynamic pressure. The pressure is derived from a lubrication channel which supplies fluid to the bearings etc. The fluid is passed via a drilling in the output shaft into the chamber between the baffle plate and the piston. To prevent inadvertent clutch application due to pressure build up produced by centrifugal force, the fluid in the dynamic pressure equalization chamber overcomes any pressure in the piston chamber and holds the piston off the clutch plate assembly.

When clutch application is required, main pressure from the fluid pump is applied to the piston chamber from the supply port. This main pressure overcomes the low pressure fluid present in the dynamic pressure equalization chamber. The piston moves, against the pressure applied by the diaphragm spring, and compresses the clutch plate assembly. When the main pressure falls, the diaphragm spring pushes the piston away from the clutch plate assembly, disengaging the clutch.

One-Way Clutch

One-Way clutch - Typical

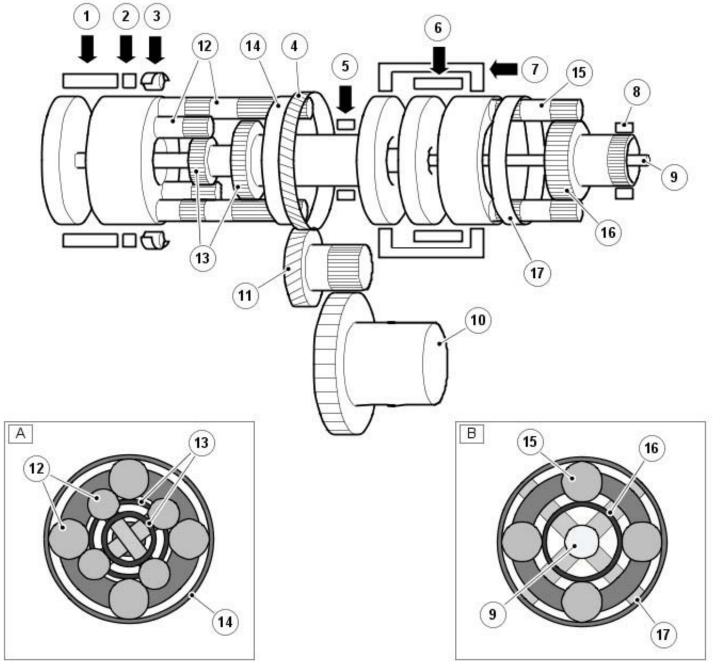


Item	Part Number	Description
1	-	Roller
2	-	Cage
3	-	Spring
4	-	Inner race

The roller clutch used on the one-way clutch uses parallel rollers, located between the smooth, cylindrical inner race and the inclined cam faces of the clutch body. Springs are used to hold the rollers in position between the two contact faces.

When the clutch is rotated in a clockwise direction, the rollers become trapped between the inner race and the inclined cam faces of the clutch body, providing positive (locked) rotation of the inner race, locking the counter-clockwise rotation of the rear planetary carrier. When the clutch is rotated in a clockwise direction, the rollers are moved away from the inclined cam faces and can rotate freely (unlocked) with the clutch body, providing no drive from the clutch to the rear planetary carrier. In this condition the clutch can rotate freely on the inner race.

PLANETARY GEAR TRAIN



E83818

Item	Part Number	Description			
1	-	Clutch C2			
2	-	Brake B2			
3	-	One way clutch F1			
4	-	Counter drive gear			
5	-	Brake B1			
6	-	Clutch C1			
7	-	Clutch C3			
8	-	Fluid pump			
9	-	Input shaft			
10	-	Differential gear assembly			
11	-	Counter gear assembly			
12	-	Pinion gears			
13	-	Sun gears			
14	-	Ring gear			

15	-	Pinion gear
16	-	Sun gears
17	-	Ring gear

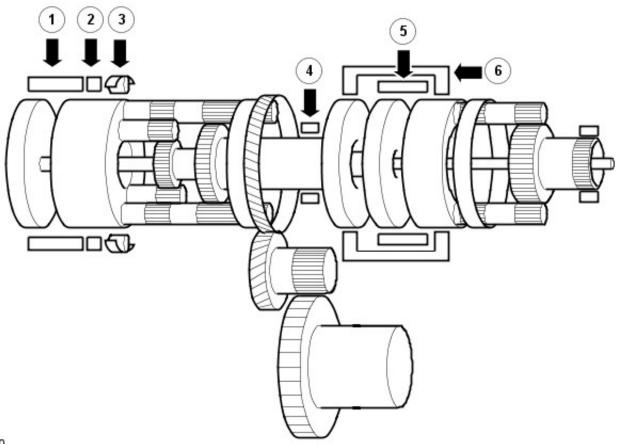
The planetary gear trains used on the AW F21 transmission comprise a single web planetary gear train and a double web planetary gear train. These gear trains are known as Ravignaux type gear trains and together produce the six forward gears and the one reverse gear.

Engine torque is transferred, via operation of single or combinations of clutches to the two planetary gear trains. Both gear trains are controlled by reactionary inputs from brake clutches to produce the six forward gears and one reverse gear. The ratios are as follows:

Gear	1st	2nd	3rd	4th	5th	6th	Reverse
Ratio	4.148	2.370	1.556	1.155	0.859	11 686	3.394

POWER FLOWS

Operation of the transmission is controlled by the TCM which electrically activates various solenoids to control the transmission gear selection. The sequence of solenoid activation is based on programmed information in the module memory and physical transmission operating conditions such as vehicle speed, throttle position, engine load and selector lever position.



E83820

Item	Part Number	Description
1	-	Clutch - C2
2	-	Brake - B2
3	-	One-way clutch - F1
4	-	Brake - B1
5	-	Clutch - C1
6	-	Clutch - C3

Power Flow - 1st Gear Engine Braking

Solenoid Operation

	Transmission Selector Lever Position	Solenoid					
		SLC 1	SLC 2	SLC 3	SLB 1	S1	S2
D	Engine Brake	-	Х	X	Х	X	X

X = Operating

Clutch and Brake Operation

	Transmission Selector Lever Position	С	lutc	h	Brake		One-Way clutch
		C1	C2	С3	B1	B2	F1
D	Engine Brake	X	-	-	-	X	X

X = Operating

When the engine brake is active, driving force is transmitted to the transmission from the road wheels, via the power transfer unit. The rear planetary carrier is locked from clockwise rotation by the one-way clutch (F1) and brake (B2). This results in torque from the wheels being transmitted directly to the engine, providing engine braking.

Power Flow - 1st Gear

Solenoid Operation

	Transmission Selector Lever Position			Solenoid			
		SLC 1	SLC 2	SLC 3	SLB 1	S1	S2
D	1st Gear	-	X	X	X	-	-

X = Operating

Clutch and Brake Operation

	Transmission Selector Lever Position		Clutc	h	Bra	ake	One-Way clutch
		C1	C2	СЗ	B1	B2	F1
D	1st Gear	X	1-	[-	[-	[-	X

X = Operating

The planetary gear trains are in the following conditions:

- Front planetary gear train
 - Input: Ring gearLocked: Sun gearOutput: Carrier
- Rear planetary gear train
 - Input: Rear sun gear
 - Locked: CarrierOutput: Ring gear

Front Planetary Gear Train

The input shaft rotates in a clockwise direction, driven by the torque converter. The planetary ring gear rotates in a clockwise direction along with the planetary pinion gear which also rotates clockwise on its axis and orbit. The planetary sun gear is locked by the fluid pump which causes it to press against the planetary ring gear and orbit the sun gear, rotating on its axis.

The front planetary carrier rotates clockwise in the same direction as the planetary pinion gear. The clutch (C1) is activated and locks the planetary carrier to the rear planetary sun gear.

Rear Planetary Gear Train

The planetary sun gear rotates in a clockwise direction. The planetary short pinion gear rotates in a counter-clockwise direction. The planetary carrier attempts to rotate in the same direction but is restrained by the one-way clutch (F1).

The long pinion gear rotates clockwise on its axis and the middle sun gear rotates counter-clockwise while idling. The ring gear is rotated by the long pinion gear and drives the counter drive gear in a clockwise direction.

The counter driven gear is driven in a counter-clockwise direction which in turn drives the differential ring gear in a clockwise direction.

Power Flow - 2nd Gear

Solenoid Operation

	Transmission Selector Lever Position	Solenoid									
		SLC 1	SLC 2	SLC 3	SLB 1	S1	S2				
D	2nd Gear	-	X	X	-	-	-				

X = Operating

Clutch and Brake Operation

	Transmission Selector Lever Position	Clutch		Brake		One-Way clutch	
		C1	C2	С3	B1	B2	F1
D	2nd Gear	X	-	-	Χ	[-	-

X = Operating

The planetary gear trains are in the following conditions:

Front planetary gear train

Input: Ring gearLocked: Sun gearOutput: Carrier

· Rear planetary gear train

Input: Rear sun gearLocked: Middle sun gearOutput: Ring gear

Front Planetary Gear Train

The input shaft rotates in a clockwise direction, driven by the torque converter. The planetary ring gear rotates in a clockwise direction along with the planetary pinion gear which also rotates clockwise on its axis and orbit. The planetary sun gear is locked by the fluid pump which causes it to press against the planetary ring gear and orbit the sun gear, rotating on its axis.

The front planetary carrier rotates clockwise in the same direction as the planetary pinion gear. The clutch (C1) is activated and locks the planetary carrier to the rear planetary sun gear.

Rear Planetary Gear Train

The planetary sun gear and the carrier rotate in a clockwise direction. The middle sun gear is locked by the brake (B1). The short pinion gears rotate counter-clockwise on its axis and orbits in a clockwise direction. The long pinion gears rotates clockwise on its axis and its orbit.

The ring gear is rotated in a clockwise direction by the long pinion gear. The ring gear and the counter drive gear both rotate in a clockwise direction.

The counter driven gear is driven in a counter-clockwise direction which in turn drives the differential ring gear in a clockwise direction.

• NOTE: Engine braking is available when this gear is selected.

Power Flow - 3rd Gear

Solenoid Operation

	Transmission Selector Lever Position			Solenoid									
		SLC 1	SLC 2	SLC 3	SLB 1	S1	S2						
D	3rd Gear	-	X	-	X	-	-						

X = Operating

Clutch and Brake Operation

	Transmission Selector Lever Position		Clutch		Brake		One-Way clutch
		C1	C2	СЗ	B1	B2	F1
D	3rd Gear	X	1-	-	X	[-	-

X = Operating

The planetary gear trains are in the following conditions:

• Front planetary gear train

Input: Ring gearLocked: Sun gearOutput: Carrier

• Rear planetary gear train

- Input: Middle sun gear

- Locked: -

- Output: Ring gear

Front Planetary Gear Train

The input shaft rotates in a clockwise direction, driven by the torque converter. The planetary ring gear rotates in a clockwise direction along with the planetary pinion gear which also rotates clockwise on its axis and orbit. The planetary sun gear is locked by the fluid pump which causes it to press against the planetary ring gear and orbit the sun gear, rotating on its axis.

The front planetary carrier rotates clockwise in the same direction as the planetary pinion gear. The clutch (C1) is activated and locks the planetary carrier to the rear planetary sun gear. Clutch (C3) is also activated and locks the carrier to the middle sun gear.

Rear Planetary Gear Train

The planetary short pinion gear and the long pinion gear are engaged which causes both pinion gears to lock due to the different rotational directions. Torque from the sun gear and middle sun gear is transmitted to the planetary ring gear which rotates clockwise in the same direction as the planetary carrier.

The counter drive gear rotates in a clockwise direction with the ring gear.

The counter driven gear is rotated in a counter-clockwise direction which in turn drives the differential ring gear in a clockwise direction.

• NOTE: Engine braking is available when this gear is selected.

Power Flow - 4th Gear

Solenoid Operation

	Transmission Selector Lever Position			Solenoid			
		SLC 1	SLC 2	SLC 3	SLB 1	S1	S2
D	4th Gear	-	-	Χ	Χ	-	-

X = Operating

Clutch and Brake Operation

	Transmission Selector Lever Position		Clutch		Clutch		Bra	ake	One-Way clutch
		C1	C2	СЗ	B1	B2	F1		
D	4th Gear	X	Χ]-	-	-	-		

X = Operating

The planetary gear trains are in the following conditions:

- Front planetary gear train
 - Input: Ring gearLocked: Sun gear
- Output: Carrier
- Rear planetary gear train
 - Input: Rear sun gear, Carrier
 - Locked: -
 - Output: Ring gear

Front Planetary Gear Train

The input shaft rotates in a clockwise direction, driven by the torque converter. The planetary ring gear rotates in a clockwise direction along with the planetary pinion gear which also rotates clockwise on its axis and orbit. The planetary sun gear is locked by the fluid pump which causes it to press against the planetary ring gear and orbit the sun gear, rotating on its axis.

The front planetary carrier rotates clockwise in the same direction as the planetary pinion gear. The clutch (C1) is activated and locks the planetary carrier to the rear planetary sun gear. The intermediate shaft rotates in the same direction as the input shaft. Clutch (C2) is also activated rotates in the same direction as the intermediate shaft.

Rear Planetary Gear Train

The planetary carrier rotates in a clockwise direction with the intermediate shaft. The short pinion gear rotates clockwise on its axis and orbits at a faster speed than the sun gear. The long pinion gear rotates counter-clockwise on its axis and orbit. The rotation of the ring gear is in a clockwise direction and is slower than the rotation of the carrier due to the long pinion gear's rotation is counteracted by the planetary carrier.

The counter drive gear rotates in a clockwise direction with the ring gear.

The counter driven gear is rotated in a counter-clockwise direction which in turn drives the differential ring gear in a clockwise direction.

• NOTE: Engine braking is available when this gear is selected.

Power Flow - 5th Gear

Solenoid Operation

	Transmission Selector Lever Position		Solenoid								
		SLC 1	SLC 2	SLC 3	SLB 1	S1	S2				
D	5th Gear	X	1-	[-	X	-	-				

X = Operating

Clutch and Brake Operation

1	Transmission Selector Lever Position		Clutch			Bra	ke	One-Way clutch
		Transmission delector Level 1 delition	C1	C2	C3	B1	B2	F1
)	5th Gear	-	X	X	-	-	-

X = Operating

The planetary gear trains are in the following conditions:

Front planetary gear train

 Input: Ring gear
 Locked: Sun gear
 Output: Carrier

• Rear planetary gear train

- Input: Middle sun gear

- Locked: -

- Output: Ring gear

Front Planetary Gear Train

The input shaft rotates in a clockwise direction, driven by the torque converter. The planetary ring gear rotates in a clockwise direction along with the planetary pinion gear which also rotates clockwise on its axis and orbit. The planetary sun gear is locked by the fluid pump which causes it to press against the planetary ring gear and orbit the sun gear, rotating on its axis.

The front planetary carrier rotates clockwise in the same direction as the planetary pinion gear. The clutch (C3) is activated and locks the planetary carrier to the rear planetary middle sun gear. The intermediate shaft rotates in the same direction as the input shaft. Clutch (C2) is also activated and rotates in the same direction as the intermediate shaft.

Rear Planetary Gear Train

The middle sun gear rotates clockwise in the same direction as clutch (C3). The deceleration of the front planetary gear slows the speed of the input shaft. The intermediate shaft rotates clockwise in the same direction as the input shaft. The planetary carrier also rotates clockwise in the same direction as the intermediate shaft.

The long pinion gear rotates clockwise on its axis and orbit. The carrier rotates faster than the middle sun gear which causes the middle pinion gear to be cancelled out by the speed difference. The middle pinion gear orbits and rotates on its axis in a clockwise direction.

The planetary ring gear rotates in a clockwise direction. The speed of the ring gear is faster than the planetary carrier because the long pinion gear's rotation is combined with the planetary carrier's speed. The counter drive gear rotates in a clockwise direction with the ring gear.

The counter driven gear is rotated in a counter-clockwise direction which in turn drives the differential ring gear in a clockwise direction.

• NOTE: Engine braking is available when this gear is selected.

Power Flow - 6th Gear

Solenoid Operation

	Transmission Selector Lever Position	Solenoid									
		SLC 1	SLC 2	SLC 3	SLB 1	S1	S2				
D	6th Gear	X	-	X	-	-	-				

X = Operating

Clutch and Brake Operation

	Transmission Selector Lever Position	С	lutc	h	Bra	ike	One-Way clutch
		C1	C2	C3	B1	B2	F1
D	6th Gear	-	X	-	X	-	-

X = Operating

The planetary gear trains are in the following conditions:

- Front planetary gear train
 - Input: -
 - Locked: -
 - Output: -
- Rear planetary gear train
 - Input: Carrier
 - Locked: Middle sun gear
 - Output: Ring gear

Front Planetary Gear Train

The input shaft rotates in a clockwise direction, driven by the torque converter. The intermediate shaft rotates clockwise in the same direction as the torque converter. Clutch (C2) locks the intermediate shaft to the rear planetary carrier.

Rear Planetary Gear Train

The planetary carrier rotates clockwise in the same direction as the intermediate shaft. The planetary long pinion gear rotates clockwise on its axis and orbit. The rotational speed of the middle sun gear increases with input shaft speed because it is locked.

The planetary ring gear rotates in a clockwise direction. The speed of the ring gear is faster than the planetary carrier because the long pinion gear's rotation is combined with the planetary carrier's speed. The counter drive gear rotates in a clockwise direction with the ring gear.

The counter driven gear is rotated in a counter-clockwise direction which in turn drives the differential ring gear in a clockwise direction.

• NOTE: Engine braking is available when this gear is selected.

Power Flow - Reverse Gear

Solenoid Operation

Г	Transmission Selector Lever Position	Solenoid							
		SLC 1	SLC 2	SLC 3	SLB 1	S1	S2		
R	Reverse Gear - Less than 11 volts	Χ	Χ	-	Χ	-	-		
R	Reverse Gear - More than 11 volts	Χ	Χ	Χ	Χ	X	X		

X = Operating

Clutch and Brake Operation

Г	Transmission Selector Lever Position	С	lutc	h	Bra	ıke	One-Way clutch
		C1	C2	СЗ	B1	B2	F1
R	Reverse Gear - Less than 11 volts	-	X	_	X	-	-
R	Reverse Gear - More than 11 volts	-	-	-	-	Χ	-

X = Operating

The planetary gear trains are in the following conditions:

- Front planetary gear train
 - Input: Ring gearLocked: Sun gearOutput: Carrier
- · Rear planetary gear train
 - Input: Middle sun gear
 - Locked: CarrierOutput: Ring gear

Front Planetary Gear Train

The input shaft rotates in a clockwise direction, driven by the torque converter. The planetary ring gear rotates clockwise with the input shaft.

The pinion gear rotates clockwise on its axis and orbit. The planetary sun gear is locked by the fluid pump which causes it to press against the planetary ring gear and orbit the sun gear, rotating on its axis. The planetary carrier rotates clockwise with the pinion gear orbit.

Clutch (C3) is activated and rotates clockwise and locks the planetary carrier to the rear planetary middle sun gear.

Rear Planetary Gear Train

The middle sun gear rotates clockwise with the clutch (C3), but at a lower speed than the input shaft. Brake (B2) is activated and locks the planetary carrier. The long pinion gear rotates counter-clockwise which in turn rotates the ring gear counter-clockwise.

The counter drive gear rotates in a counter-clockwise direction with the ring gear at the same speed.

The counter driven gear is rotated in a clockwise direction which in turn drives the differential ring gear in a counterclockwise direction.

NOTE: Engine braking is available when this gear is selected.

Power Flow Neutral

Solenoid Operation

	Transmission Selector Lever Position			Solenoid			
L		SLC 1	SLC 2	SLC 3	SLB 1	S1	S2
N	Neutral	Χ	Χ	X	X	-	-

X = Operating

Clutch and Brake Operation

I	7	ransmission Selector Lever Position	С	lutc	h	Bra	ike	One-Way clutch
			C1	C2	СЗ	B1	B2	F1
	N	Neutral	-	-	-	-	-	-

X = Operating

In neutral, all the solenoids, except the 3 way solenoids, are energised and the clutches and brakes are all disengaged. This allows rotation from the input shaft to rotate the front planetary gear train without transferring any drive to the differential ring gear.

TOWING FOR RECOVERY

WARNING: If the engine cannot be run whilst the vehicle is being towed, there will be no power assistance for the steering or brakes. This will result in greater effort being required to steer or slow the vehicle, and greatly increased stopping distances.

CAUTION: The vehicle should only be towed for a maximum of 80 km (50 miles), at a maximum speed of 80 km/h (50 mph). Towing for a greater distance, or at a higher speed may result in serious damage to the transmission.

NOTE: The recommended recovery method is by trailer or recovery vehicle.

Secure the towing attachment from the recovery vehicle to the front towing eye.

Switch on the ignition to ensure that the steering lock is dis-engaged.

• NOTE: Leaving the ignition switched on for extended periods will cause the battery to drain.

Apply the foot brake, and move the selector lever to the neutral 'N' position. With the footbrake still applied, release the park brake. If electrical power to the selector is not available, the emergency release lever on the selector lever can be used to release the interlock solenoid.

The vehicle can be towed a maximum of 80 km (50 miles) at a maximum speed of 80 km/h (50 mph).

Park the vehicle on firm, level ground. Apply the park brake and move the selector lever to the park 'P' position.

Switch off the ignition.

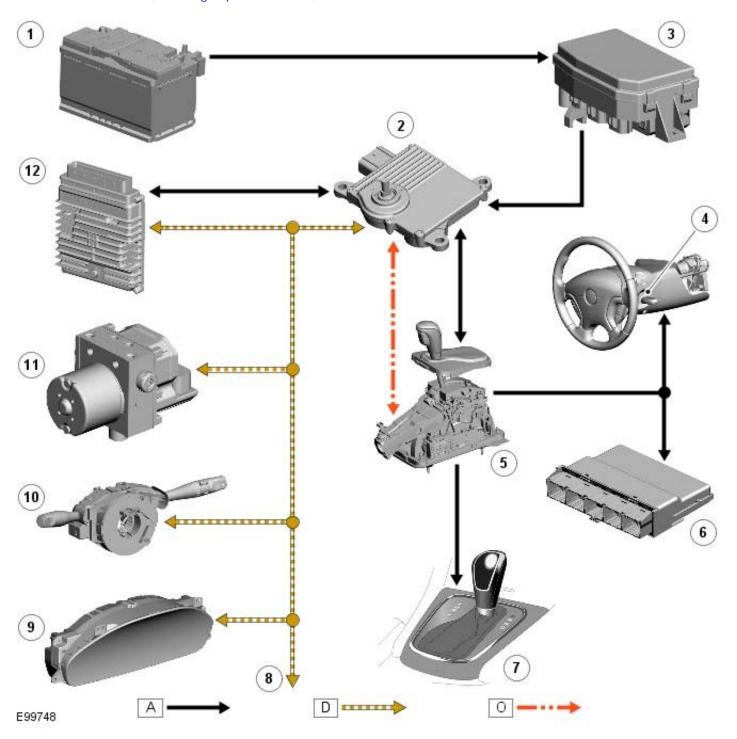
 Λ

CAUTION: The vehicle cannot be towed in a reverse direction.

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission Electronic Control SystemVehicles With: 6-**Speed Automatic Transaxle - AWF21**Description and Operation

CONTROL DIAGRAM - AW F21 6 SPEED AUTOMATIC TRANSMISSION 2009MY

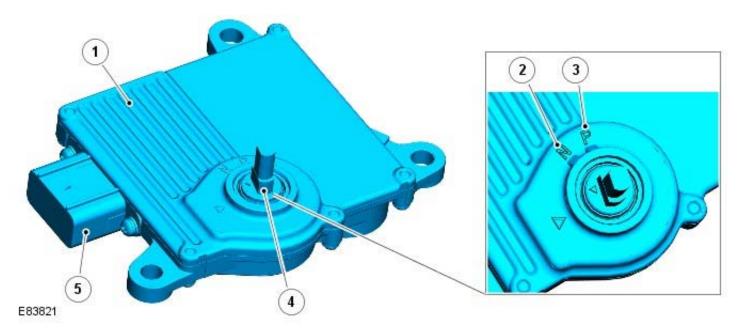
• NOTE: **A** = Hardwired; **D** = High speed CAN bus; **O** = LIN bus



Item	Part Number	Description
1	-	Battery
2	-	Battery Junction Box (BJB)
3	-	Central Junction Box (CJB)
4	-	Transmission Control Module (TCM)
5	-	Selector lever

6	-	Selector lever PRND and M/S Light Emitting Diode (LED) displays
7	-	High speed Controller Area Network (CAN) bus to other vehicle systems
8	-	Instrument cluster
9	-	Steering angle sensor
10	-	Anti-lock Brake System (ABS) module
11	-	Engine Control Module (ECM)

TRANSMISSION CONTROL MODULE (TCM)



Item	Part Number Description	
1	-	TCM
2	-	'Neutral 'N' position
3	-	Park 'P' position
4	-	Position sensor/manual shaft
5	-	Electrical connector

The TCM (transmission control module) is located on the top of the transmission casing and is connected on the high speed CAN (controller area network) bus to send and receive information to and from other system modules.

The TCM outputs signals to operate the transmission solenoid valves to control the hydraulic operation of the transmission.

The ECM (engine control module) supplies the engine management data on the high speed CAN bus system. The TCM requires engine data to efficiently control the transmission operation, using for example; crankshaft torque, engine speed, accelerator pedal angle, engine temperature etc.

The TCM processes signals from the transmission speed and temperature sensors, ECM and other vehicle systems. From the received signal inputs and pre-programmed data, the module calculates the correct gear, torque converter clutch setting and optimum pressure settings for gear shift and lock-up clutch control.

The steering angle sensor and the ABS (anti-lock brake system) module also supply data to the TCM on the high speed CAN bus system. The TCM uses data from these systems to suspend gear changes when the vehicle is cornering and/or the ABS module is controlling braking or traction control.

The TCM is positioned over the manual shaft which protrudes through an oil seal on the top face of the main casing. The shaft locates in a rotary position sensor and turns the sensor in the appropriate direction when a selection is made using the selector lever. The rotary position sensor is a Hall effect sensor which outputs a specified voltage relating to the selected selector lever position.

The selector lever is connected to the automatic transmission and the rotary position sensor in the transmission by a Bowden cable. Movement of the selector lever moves the position switch via the Bowden cable and the switch position informs the TCM of the selected position; P, R, N or D. The sport and manual +/- 'Jaguar Sequential Shift' switch passes sport or manual selections to the TCM on a LIN (local interconnect network) bus. The TCM outputs appropriate information on the high speed CAN bus which is received by the instrument cluster to display the gear selection information in the message center.

If the TCM or transmission requires replacement, a setting procedure must be performed using a Jaguar approved

diagnostic system to allow the TCM to learn the neutral position of the transmission. The TCM uses the neutral position as a reference point for each of the gear positions P, R, N and D.

INSTRUMENT CLUSTER

The instrument cluster is connected to the TCM via the CAN. For additional information, refer to: Instrument Cluster (413-01 Instrument Cluster, Description and Operation).

Message Center Display

The message center is located in the speedometer. The message center is a LCD (liquid crystal display) to relay vehicle status information to the driver. The message center will display 'SPORT' when sport mode is selected. For additional information, refer to: Information and Message Center (413-08 Information and Message Center, Description and Operation).

CONTROLLER AREA NETWORK (CAN)

The high speed CAN broadcast bus network is used to connect the powertrain modules. The CAN bus is connected between the following electronic units:

High Speed CAN Bus

- TCM
- · Instrument cluster
- Steering angle sensor
- Restraints control module
- ECM
- ABS module.
- Diagnostic socket.

The CAN bus allows a fast exchange of data between modules. The CAN bus comprises two wires which are identified as CAN high (H) and CAN low (L). The two wires are colored green and yellow and are twisted together to minimise electromagnetic interference (noise) produced by the CAN bus messages.

For additional information, refer to: <u>Communications Network</u> (418-00 Module Communications Network, Description and Operation).

In the event of CAN bus failure, the following symptoms may be observed:

- Transmission operates in default mode
- Torque converter lock-up clutch control is disabled.

DRIVING MODES

A number of different driving modes are available. Some can be selected by the driver and some are automatically initiated by the TCM to adapt to different driving conditions.

- Normal
- Sports
- Manual 'Jaguar Sequential Shift'
- Cooling
- Cruise
- Limp home
- Coast
- Fast off recognition
- Uphill and Trailer
- Downhill
- Wide Throttle
- Reverse lock-out

Normal

Normal mode is automatically selected by the TCM when the ignition is switched on. In this mode all automatic and adaptive modes are active. Normal mode uses gear shift and lock-up maps which provides the optimum of fuel consumption, emissions and driveability, depending on the driving style.

If the transmission is operated in sport mode or 'Jaguar Sequential Shift' mode and the selector lever is moved back to the drive 'D' position, then normal mode operation is resumed.

Sports

Sports mode provides enhanced acceleration and responsiveness by the use of sports shift maps. This mode allows the transmission to down shift more readily and hold gears for longer at higher engine speeds.

Manual 'Jaguar Sequential Shift'

Manual 'Jaguar Sequential Shift' mode allows the transmission to operate as a semi-automatic transmission. The driver can change up and down the six forward gears with the freedom of a manual transmission.

Shift maps are provided to protect the engine at high speeds. The TCM will automatically change up to a higher gear ratio to prevent engine overspeed and change down to a lower gear ratio to avoid engine laboring and stalling.

When kick-down is requested the TCM shifts down to the lowest available gear. When the vehicle is stationary, the driver can select 1st, 2nd or 3rd to start off.

When moving from a standstill, upshifts can be pre-selected by making '+' selections with the selector lever for the number of upshifts required. The TCM then performs the requested number of upshifts when appropriate shift points are reached. For example; when moving off in 1st gear, if 3 '+' selections are made in quick succession, the TCM will automatically upshift through the gears to 4th gear as the vehicle accelerates, without any further selections being made.

Cooling

Cooling mode is activated when the TCM detects excessively high transmission fluid or engine coolant temperatures. When this mode is active torque converter lock-up is activated earlier to minimize a further rise in fluid and/or engine coolant temperature and assist fluid cooling.

Cruise

When speed control is activated, the TCM receives a speed control active message on the high speed CAN bus. The TCM activates a speed control map which minimizes up and down shifts.

Cruise mode is active when speed control is selected on and the transmission is in drive 'D' or sport 'S'. Unique cruise maps override the current mode to provide a smooth driving feel and mode reselection.

Limp home

If a transmission fault is detected by the TCM, the TCM adopts a limp home strategy and a message 'TRANSMISSION FAULT LIMITED GEARS AVAILABLE' is displayed in the message center. If the fault has an effect on engine emissions, the MIL (malfunction indicator lamp) in the instrument cluster will also be illuminated.

In limp home mode, P, R and N functions operate normally (if the fault allows these selections) and the TCM locks the transmission in 3rd gear to allow the driver to take the vehicle to a Jaguar dealer or approved repairer. Torque converter lock-up is disabled and reverse-lock-out will not function.

If the vehicle is stopped and subsequently restarted in the limp home mode condition, the TCM operates normally until the fault which caused the condition is detected again.

Coast

Coast mode provides earlier downshifts during coasting dependant on output shaft deceleration rate to improve driveability and refinement by avoiding negative to positive driveline torque reversals transmission during the downshifts.

Fast Off Recognition

Fast off recognition is activated when the TCM detects that the driver has released the accelerator pedal quickly. This is detected by the TCM monitoring for a high level of negative pedal angle from ECM signals on the high speed CAN bus. If this condition is detected, the TCM holds the current gear ratio to allow the driver to complete the manoeuvre without the need for a downshift. The mode can remain active for a predetermined length of time or if the driving style remains passive.

Fast off recognition mode assists vehicle stability and is used in conjunction with a lateral acceleration input during cornering to maintain the current gear until the corner is negotiated.

Uphill and Trailer

Uphill and trailer mode can be active when the transmission is operating in normal or sport `modes. When the vehicle is pulling a trailer or driving up an incline, the TCM detects the increased resistance by monitoring engine torque and speed signals received from the ECM on the high speed CAN bus and also transmission output shaft speed sensor signals. Uphill and trailer mode will provide downshifts to prevent a drop in transmission torque output and maintain driving force.

Downhill

Downhill mode can be active when the transmission is operating in normal or sport modes. When the vehicle is descending an incline the TCM detects a reduction in resistance by monitoring engine torque and speed signals

received from the ECM on the high speed CAN bus and also transmission output shaft speed sensor signals. Downhill mode assists engine braking by selecting an appropriate gear reducing the load required on the brakes.

Wide Throttle

Wide open throttle mode operates for part throttle upshifts and kick-down upshifts. It provides consistent wide open throttle upshift performance under all driving conditions. The full engine speed range is used in all driving modes; normal, sport, hill modes and Jaguar Sequential Shift. Compensation is used for delays (hydraulic and electronic) in gear change request to gear change start to provide smooth changes and correct shift point correction.

Reverse Lock-Out

If the selector lever is moved from N to R and the vehicle is travelling forwards, reverse selection is prevented if the vehicle speed is 11 km/h (6.8 mph) or more. When reverse lock-out is activated, the clutch (C3) is released without energizing solenoid (SLC3), preventing the transmission from selecting reverse gear.

TRANSMISSION FAULT STATUS

If the TCM detects a fault with the transmission system, it will enter a default (limp home) mode to prevent further damage to the transmission and allow the vehicle to be driven. If possible reverse gear will be available and also 3rd gear only.

When a fault is detected a high speed CAN message is sent from the TCM and is received by the instrument cluster. The instrument cluster illuminates the MIL (if required) and displays an applicable message in the message center. For additional information, refer to: Information and Message Center (413-08 Information and Message Center, Description and Operation).

Some transmission faults may not illuminate the MIL or display a fault message, but the driver may notice a reduction in shift quality.

ENGINE SPEED AND TORQUE MONITORING

The ECM constantly supplies the TCM with information on engine speed and torque through messages on the CAN bus. The TCM uses this information to calculate the correct and appropriate timing of shift changes.

If the messages are not received by the ECM, the TCM will implement a back-up strategy to protect the transmission from damage and allow the vehicle to be driven.

In the event of an engine speed or torque signal failure, the transmission will adopt the electrical limp home mode with the transmission operating in a fixed gear.

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Diagnostic StrategyVehicles With: 6-Speed Automatic Transaxle - AWF21

Diagnosis and Testing

Principles of Operation

For a detailed description of the automatic transmission/transaxle, refer to the relevant Description and Operation sections in the workshop manual.REFER to: Transmission Description (307-01, Description and Operation).

Inspection and Verification

- 1. 1. Verify the customer concern.
- 2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical	Hydraulic
 Damaged/stuck shift mechanism Damaged automatic transmission casing 	 Blown fuse(s) Damaged, loose or corroded connectors Wiring harness Transmission Control Module (TCM) Gear Selection Module (GSM) Engine Control Module (ECM) 	 Fluid level too high/low Poor condition of fluid Fluid leak

- 3. **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. 4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart.

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/transmission 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 programme is in operation, prior to the installation of a new module/transmission.
- NOTE: Generic scan tools may not read the codes listed, or may read only five digit codes. Match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give additional information read by the manufacturer approved diagnostic system).
- NOTE: When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to three 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: 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.

Service Routines

Carry out the service routines listed below when instructed to do so by the repair 'action' of the DTC Index

- 1. Vehicle Configuration Main Menu, Configure New Modules, Transmission Control Module: This
 routine is used to install software into a new TCM. The routine must be performed if a new TCM has been
 installed.
- 2. **2. Vehicle Configuration Main Menu, Configure New Modules, On Demand Self Test:** This routine is used to check that the TCM is installed without any electrical errors. When the routine is activated the TCM will test all outputs for electrical errors. The routine must be performed if the TCM has been separated from the transmission.
- 3. **3. Vehicle Configuration Main Menu, Configure Existing Modules, Transmission Control Module:** This routine is used to install software into an existing TCM. The routine must be performed if an existing TCM is having its software updated.

- 4. **Vehicle Configuration Main Menu, Special Applications, Transmission Control Module Neutral Learn::** This routine is used to re-calibrate the neutral position. The routine must be performed if the TCM has been separated from the transmission, TCM software is updated or TCM hardware is updated.
- 5. **5. Vehicle Configuration Main Menu, Special Applications, Clear Self Learning Data:** This routine is used to clear the solenoid adaptation in the TCM. The routine must be performed if the transmission is replaced and TCM is reused.
- 6. **6. Vehicle Configuration Main Menu, Special Applications, Set Adaption Mode:** This routine is used when the transmission is replaced. When this is done the transmission must be pre adapted before the customer drives the car, otherwise bad shifts might occur.
- 7. **7. Vehicle Configuration Main Menu, Special Applications, Oil Change Reset:** This routine is used to clear the counter that counts the oil degradation. The data needs to be erased if the oil is exchanged or if the transmission is replaced and the TCM is reused.
- 8. **8. Vehicle Configuration Main Menu, Special Applications, TCM Adaption Clear:** This routine is used to rest the self learning data in the TCM. The routine must be performed after a software update, if the TCM has been installed to another vehicle or if any mechanical components have been replaced in the transmission.

DTC	Description	Possible Cause	Action
P021868	Transmission Fluid Over temperature Condition	 Event information. System event not caused by the TCM, but requiring the TCM to record this DTC Transmission fluid level low Transmission fluid cooler/hoses are obstructed, damaged, blocked Mechanical fault in the transmission Engine cooling system failure 	Check the transmission fluid level and condition. Check the transmission fluid cooler/hoses for signs of obstruction, damage, blockage. Replace as required. Check the engine cooling system and engine cooling fans operation. Suspect the TCM/transmission, check and install a new TCM/transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
	Vehicle Speed Sensor A	SP+ or SP- open circuit • Vehicle speed sensor failure	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P056100	System Voltage Unstable	oxidation in the connector on	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check BAT+ circuit for correct battery voltage, open circuit, oxidation in connector terminals. Check the vehicle charging system. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P056200	System Voltage Low	the TCM or the transmission Battery charger with incorrect voltage has been used Charging system failure Internal failure in TCM	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check BAT+ circuit for correct battery voltage, open circuit, oxidation in connector terminals. Check the vehicle charging system. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
	Internal Control Module Memory Check Sum Error	◆ Internal failure in TCM	Using the manufacturer approved diagnostic system select the vehicle configuration main menu, select configure existing modules menu and programme the transmission control module.

		Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Internal Control Module Keep Alive Memory (KAM) Error	◆ Internal failure in TCM	Using the manufacturer approved diagnostic system select the vehicle configuration main menu, select configure existing modules menu and programme the transmission control module. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Internal Control Module Random Access Memory (RAM) Error	◆ Internal failure in TCM	Using the manufacturer approved diagnostic system select the vehicle configuration main menu, select configure existing modules menu and programme the transmission control module. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Internal Control Module Read Only Memory (ROM) Error	◆ Internal failure in TCM	Using the manufacturer approved diagnostic system select the vehicle configuration main menu, select configure existing modules menu and programme the transmission control module. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Internal Control Module EEPROM Error	 Internal failure in TCM 	Using the manufacturer approved diagnostic system select the vehicle configuration main menu, select configure existing modules menu and programme the transmission control module. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Transmission Range Sensor A Circuit (PRNDL Input)	selector lever cable	Check the adjustment of the gear selector lever cable. Carry out neutral learn service routine. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Transmission Range Sensor A Circuit Intermittent	selector lever cable	Check the adjustment of the gear selector lever cable. Carry out neutral learn service routine. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Transmission Fluid Temperature Sensor A Circuit Range/Performance	 High contact resistance in the connector terminals Failure of oil temperature sensor Internal failure in TCM 	Check for high contact resistance in the connector terminals between the TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new

Transmission Fluid Temperature Sensor A Circuit Low	 Short to ground on the OT circuit of the oil temperature sensor Failure of oil temperature sensor Internal failure in TCM 	module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as
Transmission Fluid Temperature Sensor A Circuit High	 High contact resistance in the connector terminals Short to power on the OT circuit of the oil temperature sensor Open circuit on the OT circuit of the oil temperature sensor Failure of oil temperature 	of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system Check for high contact resistance in the connector terminals between the TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index.
Turbine/Input Shaft Speed Sensor A Circuit	 Internal failure in TCM Short to power on the NIN+ circuit of the input speed sensor Failure of input speed sensor Internal failure in TCM 	the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved
Turbine/Input Shaft Speed Sensor A Circuit Range/Performance	 High contact resistance in the connector terminals Input speed sensor not correctly installed Failure of input speed sensor Internal failure in TCM 	diagnostic system Check for high contact resistance in the connector terminals between the TCM and transmission. Check input speed sensor installed correctly. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved
Turbine/Input Shaft Speed Sensor A Circuit Intermittent	 High contact resistance in the connector terminals Input speed sensor not correctly installed Failure of input speed sensor Internal failure in TCM 	diagnostic system Check for high contact resistance in the connector terminals between the TCM and transmission. Check input speed sensor installed correctly. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Output Shaft Speed Sensor Circuit	 Short to power SP+ circuit of vehicle speed sensor Failure of vehicle speed sensor Internal failure in TCM 	Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top

			of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P072100	Output Shaft Speed Sensor Circuit Range/Performance	 High contact resistance in the connector terminals Vehicle speed sensor not correctly installed Failure of vehicle speed sensor The wheel radius does not agree with the wheel radius programmed in the vehicle's configuration file Internal failure in TCM 	Check the correct wheels and tires are installed. Using the manufacturer approved diagnostic system go to vehicle setup and configuration tab, add/remove accessories and carry out, tire size rolling circumference test. Check for high contact resistance in the connector terminals between the TCM and transmission. Check vehicle speed sensor installed correctly. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P072200	Output Shaft Speed Sensor Circuit No Signal	 High contact resistance in the connector terminals Failure of vehicle speed sensor Internal failure in TCM 	Check for high contact resistance in the connector terminals between the TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P072300	Output Shaft Speed Sensor Circuit Intermittent	 High contact resistance in the connector terminals Vehicle speed sensor not correctly installed Failure of vehicle speed sensor Internal failure in TCM 	Check for high contact resistance in the connector terminals between the TCM and transmission. Check vehicle speed sensor installed correctly. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P072500	Engine Speed Input Circuit	 Open circuit on CAN circuit between ECM and TCM Engine speed signal has not been updated Engine speed signal quality factor has a failure value Short to ground on CAN circuit between ECM and TCM 	Refer to the electrical guides and check CAN circuit for open circuit, short to ground between ECM and TCM. Check ECM for DTCs and refer to relevant DTC Index
P072900	Gear 6 Incorrect Ratio	 Incorrectly regulating solenoid Mechanical failure in transmission Transmission components worn causing low system fluid pressure and slip 	Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P073000	Incorrect Gear Ratio	 Internal malfunction in the transmission 	Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system

	Incorrect Gear Ratio	 Incorrect final drive installed Incorrect assembly. The TCM has detected that the transmission has the incorrect gear ratio 	Suspect the final drive unit, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P073100	Gear 1 Incorrect Ratio	 Incorrectly regulating solenoid Mechanical failure in transmission Transmission components worn causing low system fluid pressure and slip 	Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P073200	Gear 2 Incorrect Ratio	 Incorrectly regulating solenoid Mechanical failure in transmission Transmission components worn causing low system fluid pressure and slip 	Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P073300	Gear 3 Incorrect Ratio	 Incorrectly regulating solenoid Mechanical failure in transmission Transmission components worn causing low system fluid pressure and slip 	Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
1	Gear 4 Incorrect Ratio	 Incorrectly regulating solenoid Mechanical failure in transmission Transmission components worn causing low system fluid pressure and slip 	Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
1	Gear 5 Incorrect Ratio	 Incorrectly regulating solenoid Mechanical failure in transmission Transmission components worn causing low system fluid pressure and slip 	Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P073600	Reverse Incorrect Ratio	 Mechanical failure in transmission Transmission components worn causing low system fluid pressure and slip Internal failure in TCM 	Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
	Unable to Engage Reverse Unable to Engage	 Signal plausibility failure. The TCM has detected a plausibility failure High contact resistance in the connector terminals C3 pressure control SLC3 not operating when reverse gear is selected Mechanical failure in transmission High contact resistance in 	Check for high contact resistance in the connector terminals between the TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system Check for high contact resistance in the connector

Gear 1	 solenoid has stuck in off or on position C2 pressure control SLC2 solenoid has stuck in off or on position C3 pressure control SLC3 	terminals between the TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Torque Converter Clutch Solenoid Circuit Performance/Stuck Off	lock up control solenoidFailure of SLU lock up solenoid	Check for high contact resistance in the connector terminals between the TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Torque Converter Clutch Solenoid Circuit Stuck On	 High contact resistance in the connector terminals Open circuit of SLU circuit of lock up control solenoid Failure of SLU lock up solenoid Internal failure in TCM 	Check for high contact resistance in the connector terminals between the TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Torque Converter Clutch Solenoid Circuit Intermittent	 Event information. System event not caused by the TCM, but requiring the TCM to record this DTC Engine stall condition detected Mechanical fault in engine 	Check for engine related DTCs. Rectify as required
Unable to Engage Gear 2	 C1 pressure control SLC1 	Check for high contact resistance in the connector terminals between the TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Unable to Engage Gear 3	 High contact resistance in the connector terminals C1 pressure control SLC1 solenoid has stuck in off position 	Check for high contact resistance in the connector terminals between the TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index.

	 C3 pressure contro solenoid has stuck i position C2 pressure contro solenoid has stuck i position Mechanical failure in transmission 	transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the of the DTC Index and carry out service routines required using the manufacturer approved
P074C00 Unable to Gear 4	 High contact resistathe connector termions of the connector terminal of the control of the control	terminals between the TCM and transmission. SLC1 Suspect the TCM, check and install a new TCM required, refer to the new module/component installation note at the top of the DTC Index. SLC2 Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the of the DTC Index and carry out service routines required using the manufacturer approved diagnostic system
P074D00 Unable to Gear 5	 High contact resistathe connector termine C2 pressure controsolenoid has stuck position C3 pressure controsolenoid has stuck position C1 pressure controsolenoid has stuck position B1 pressure controsolenoid has stuck position Mechanical failure in transmission 	terminals between the TCM and transmission. SLC2 Suspect the TCM, check and install a new TCM required, refer to the new module/component installation note at the top of the DTC Index. SLC3 Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the of the DTC Index and carry out service routines required using the manufacturer approved diagnostic system
P074E00 Unable to Gear 6	 High contact resistathe connector termions of the connector termination of the connector termination of the connector termination of the connector termination of the connector solenoid has stuck in position. C1 pressure controposition. C3 pressure controposition. C3 pressure controposition. Mechanical failure in transmission. 	terminals between the TCM and transmission. SLC2 Suspect the TCM, check and install a new TCM required, refer to the new module/component installation note at the top of the DTC Index. SLB1 Suspect the transmission, check and install a new TCM required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the of the DTC Index and carry out service routines required using the manufacturer approved diagnostic system
P077700 Pressure Solenoid I On		osition transmission as required, refer to the new
P081442 Transmiss Range Dis Circuit	play • Internal fault in GS	required, refer to the new module/component installation note at the top of the DTC Index
P081449 Transmiss	ion • Internal electronic f	ailure. Suspect the GSM, check and install a new GSM

	Range Display Circuit	The TCM has detected an internal circuit failure Internal fault in GSM	required, refer to the new module/component installation note at the top of the DTC Index
	Starter Disable Circuit / Open	 Circuit short to ground. The TCM has detected a ground measurement for a period longer than expected or has detected a ground measurement when another value was expected High contact resistance in the connector terminals Start lock STLK circuit short to ground Internal failure in TCM Internal failure in ECM 	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check Start lock STLK circuit for high resistance in connector terminals, short to ground Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refe to service routines at the top of the DTC Index ar carry out service routines as required using the manufacturer approved diagnostic system
	Starter Disable Circuit / Open	 Circuit short to power. The TCM has detected a vehicle power measurement for a period longer than expected or has detected a vehicle power measurement when another value was expected Start lock STLK circuit short to power Internal failure in TCM Internal failure in ECM 	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check Start lock STLK circuit for short to power. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the tof the DTC Index and carry out service routines a required using the manufacturer approved diagnostic system
P081C49	Park Input Circuit	 Internal electronic failure. The GSM has detected an internal circuit failure Internal fault in GSM 	Suspect the GSM, check and install a new GSM as required, refer to the new module/component installation note at the top of the DTC Index
	Up and Down Switch Circuit	 General electrical failure GSM not working (tiptronic mode) 	Suspect the GSM, check and install a new GSM as required, refer to the new module/component installation note at the top of the DTC Index
	Gear Shift Module B Communication Circuit	LIN communication line failureInternal fault in GSM	Refer to the electrical guides and check LIN circui for open circuit, short to ground, short to power. Suspect the GSM, check and install a new GSM as required, refer to the new module/component installation note at the top of the DTC Index
	Gear Shift Module A Communication Circuit	 Circuit short to ground. The TCM has detected a ground measurement for a period longer than expected or has detected a ground measurement when another value was expected Short to ground on the LIN communication circuit between the TCM and GSM Internal failure in GSM Internal failure in TCM 	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides
	Gear Shift Module A Communication Circuit	 Circuit short to power. The TCM has detected a vehicle power measurement for a period longer than expected or has detected a vehicle power measurement when another value was expected Short to power on the LIN communication circuit between the TCM and GSM Internal failure in GSM 	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check LIN circuit between TCM and GSM for short to power. Suspect the GSM, check and insta a new GSM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the TCM, check and insta a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top

	Internal failure in TCM	of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system Carry out any diagnostic pinpoint tests associated
Gear Shift Module A Communication Circuit	 Circuit open. The TCM has determined an open circuit via lack of bias voltage, low current flow, no change in the state of an input in response to an output High contact resistance in the connector terminals Oxidation in the connector terminals Open circuit on the power supply to the GSM Open circuit on the ground supply to the GSM Open circuit on the LIN communication circuit between the TCM and GSM Internal failure in GSM Internal failure in TCM 	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check LIN circuit between TCM and GSM for open circuit. Check for high contact resistance in the connector terminals. Check for oxidation in the connector terminals. Check for open circuit on the power supply to the GSM. Check for open circuit on the ground supply to the GSM. Suspect the GSM, check and install a new GSM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Gear Shift Module A Communication Circuit	 Missing message. The TCM has not received one or more expected messages from the GSM. Internal failure in GSM Internal failure in TCM 	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check LIN circuit between TCM and GSM for open circuit. Suspect the GSM, check and install a new GSM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
TCM Power Relay Control Circuit /Open	current flow, no change in the state of an input in	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check VSUP power circuit between TCM and GSM for open circuit. Suspect the GSM, check and install a new GSM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
TCM Power Relay Control Circuit Low	measurement for a period longer than expected or has detected a ground measurement when another value was expected High contact resistance in the connector terminals	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check VSUP power circuit between TCM and GSM for high resistance in connector terminals, short to ground. Suspect the GSM, check and install a new GSM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
Shift Time Too Short	Mechanical fault in transmissionHydraulic fault in	Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index.

		transmission ◆ Internal failure in TCM	Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the tof the DTC Index and carry out service routines a required using the manufacturer approved
P089600	Shift Time Too Long	 Mechanical fault in transmission Hydraulic fault in transmission Internal failure in TCM 	Siaspeatine year, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the tof the DTC Index and carry out service routines a required using the manufacturer approved diagnostic system
	Transmission Fluid Deteriorated	 Transmission fluid is degraded, exerted to very hard strain and high ambient temperatures and is no longer serviceable 	Replace the transmission fluid. Refer to service routines at the top of the DTC Index and carry or service routines as required using the manufacturer approved diagnostic system
P092813	Gear Shift Lock Solenoid/Actuator Circuit A / Open	 Circuit open. The TCM has determined an open circuit via lack of bias voltage, low current flow, no change in the state of an input in response to an output High contact resistance in the connector terminals Open circuit on the SFL shiftlock circuit between the TCM and GSM Open circuit on the ground circuit between the GSM and ground stud Internal failure in GSM 	Refer to the electrical guides and check the SFL shiftlock circuit for open circuit, high resistance, corrosion, oxidation of connector terminals. Refer to the electrical guides and check the ground circ between the GSM and ground stud. Suspect the GSM, check and install a new GSM as required, refer to the new module/component installation note at the top of the DTC Index
P093011	Gear Shift Lock Solenoid/Actuator Circuit A Low	 Circuit short to ground. The TCM has detected a ground measurement for a period longer than expected or has detected a ground measurement when another value was expected Short to ground on the SFL shiftlock circuit between the TCM and GSM Failure of the shiftlock solenoid Internal failure in GSM 	Refer to the electrical guides and check the SFL shiftlock circuit for short to ground. Suspect the GSM, check and install a new GSM as required, refer to the new module/component installation note at the top of the DTC Index
	Gear Shift Lock Solenoid/Actuator Circuit A High	 Circuit short to power. The TCM has detected a vehicle power measurement for a period longer than expected or has detected a vehicle power measurement when another value was expected Short to power on the SFL shiftlock circuit between the TCM and GSM Internal failure in GSM 	Refer to the electrical guides and check the SFL shiftlock circuit for short to power. Suspect the GSM, check and install a new GSM as required, refer to the new module/component installation note at the top of the DTC Index
P096000	Pressure Control Solenoid A Control Circuit / Open		Check the terminals for corrosion, oxidation between TCM and transmission. Suspect the TCM check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required,

	Pressure Control Solenoid A Control Circuit Range/Performance	 SLT ground signal circuit SLT line pressure control solenoid no operation High contact resistance in the connector terminals between TCM and transmission open circuit of internal wiring for SLT control signal circuit open circuit of internal wiring for SLT ground signal circuit SLT line pressure control solenoid no operation SLT line pressure control solenoid stuck note at the top of the DTC Index. Refer to serv routines as the top of the DTC Index. Suspect the To check and install a new transmission. Suspect the To check and install a new transmission as required refer to the new module/component installation note at the top of the DTC Index. Refer to serv routines at the top of the DTC Index and carry service routines as required using the manufacturer approved diagnostic system
	Pressure Control Solenoid A Control Circuit High	 Short to power of internal wiring for SLT line pressure solenoid control signal circuit SLT line pressure control solenoid no operation Internal failure in TCM Suspect the TCM, check and install a new TCM required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new TCM required, refer to the new module/component installation note at the top the DTC Index. Refer to service routines at the of the DTC Index and carry out service routine required using the manufacturer approved diagnostic system
P096400	Pressure Control Solenoid B Control Circuit / Open	 High contact resistance in the connector terminals between TCM and transmission. Suspect the TC check and install a new TCM as required, refer the new module/component installation note at the new module/component installation note at the new module/component installation note at the top of the DTC Index. Suspect the transmission check and install a new transmission as required refer to the new module/component installation note at the top of the DTC Index. Refer to serve routines at the top of the DTC Index and carry service routines as required using the manufacturer approved diagnostic system
	Pressure Control Solenoid B Control Circuit Range/Performance	 High contact resistance in the connector terminals between TCM and transmission. Suspect the TC check and install a new TCM as required, refer the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry service routines as required using the manufacturer approved diagnostic system
P096700	Pressure Control Solenoid B Control Circuit High	 Short to power of internal wiring for SLU lock up control solenoid signal circuit SLU lock up control solenoid no operation Internal failure in TCM Suspect the TCM, check and install a new TCM required, refer to the new module/component installation note at the top of the DTC Index. Refer to the new module/component installation note at the top the DTC Index. Refer to service routines at the of the DTC Index and carry out service routines required using the manufacturer approved diagnostic system
	Pressure Control Solenoid C Control Circuit Range/Performance	 High contact resistance in the connector terminals between TCM and transmission. Suspect the To check and install a new TCM as required, refer the new module/component installation note at top of the DTC Index. Suspect the transmission check and install a new transmission as required refer to the new module/component installation note at the top of the DTC Index. Refer to service the transmission as the top of the DTC Index. Refer to service the terminals for corrosion, oxidation between TCM and transmission. Suspect the To check and install a new TCM as required, refer to possible the terminals for corrosion, oxidation between TCM and transmission. Suspect the To check and install a new TCM as required, refer to possible the new module/component installation note at the top of the DTC Index. Refer to service the transmission.

	•	signal circuit SLC2 pressure control solenoid no operation SLC2 pressure control solenoid stuck Internal failure in TCM	service routines as required using the manufacturer approved diagnostic system
	enoid C Control uit Low	Short to ground of internal wiring for SLC2 control signal circuit Open circuit of internal wiring for SLC2 control signal circuit SLC2 pressure control solenoid no operation Internal failure in TCM	Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
	enoid C Control uit High	Short to power of internal wiring for SLC2 control signal circuit SLC2 pressure control solenoid no operation Internal failure in TCM	Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P097300 Shift Con	trol Circuit Low	Short to ground of internal wiring for S1 shift solenoid 1 S1 shift solenoid 1 not working Internal failure in TCM	Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P097400 Shift Con	trol Circuit High • •	Open circuit of internal wiring for S1 shift solenoid 1 S1 shift solenoid 1 not working Short to power of internal	Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P097600 Shift Con	trol Circuit Low	S2 shift solenoid 2 not working Internal failure in TCM	Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P097700 Shift Con	trol Circuit High •	wiring for S2 shift solenoid 2 S2 shift solenoid 2 not working Short to power of internal	Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system

	Engine Torque Signal	 CAN message, engine torqued signal has not been updated CAN message, engine torque signal quality factor equals zero 	Check for ECM DTCs. Rectify as required
	Ignition Key Lock Solenoid Circuit / Open	switch keylock solenoid and GSM	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check for open circuit between ignition switch keylock solenoid and GSM
	Ignition Key Lock Solenoid Circuit Low	ignition switch keylock solenoid and GSM	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check for short to ground between ignition switch keylock solenoid and GSM
	Ignition Key Lock Solenoid Circuit High	ignition switch keylock solenoid and GSM	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check for short to power between ignition switch keylock solenoid and GSM
	Transmission Overtemperature Condition	event not caused by the TCM, but requiring the TCM to record this DTC Transmission fluid level low Transmission fluid cooler/hoses are obstructed/damaged/blocked Mechanical failure of transmission Transmission has been	Check the transmission fluid level and condition, correct as required. Check the transmission fluid cooler hoses for signs of obstruction/damage/blockage, correct as required. Check the engine cooling system and engine cooling fans operation. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
	CAN TCM/ABS Circuit Malfunction	not been updated on CAN • ABS malfunction	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Check ABS for DTCs rectify as required
	Vehicle Speed Sensor B	wiring NIN+ input speed sensor circuit Short circuit to ground of internal wiring NIN+ input speed sensor circuit Input speed sensor failure Internal failure in TCM	Check the terminals for corrosion, oxidation between TCM and transmission. Check NIN+ circuit for open circuit, short to ground. Replace Input speed sensor. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
	Pressure Control Solenoid D Control Circuit Range/Performance	the connector terminals between TCM and transmission SLC3 pressure control solenoid stuck open circuit of internal wiring for SLC3 control signal circuit open circuit of internal wirings	Check the terminals for corrosion, oxidation between TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
277000	Pressure Control	High contact resistance in	Check the terminals for corrosion, oxidation

	Solenoid D Control Circuit Low	 the connector terminals between TCM and transmission Short to ground of internal wiring for SLC3 control signal circuit Open circuit of internal wiring for SLC3 control signal circuit SLC3 pressure control solenoid no operation Internal failure in TCM 	between TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
	Pressure Control Solenoid D Control Circuit High	 Short to power of internal wiring for SLC3 control signal circuit SLC3 pressure control solenoid no operation Internal failure in TCM 	Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
	Pressure Control Solenoid E Control Circuit Range/Performance	 High contact resistance in the connector terminals between TCM and transmission Open circuit of internal wiring for SLB1 control signa circuit Open circuit of internal wiring for SLB1 ground control signal circuit SLB1 pressure control solenoid no operation SLB1 pressure control solenoid stuck Internal failure in TCM 	Check the terminals for corrosion, oxidation between TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, Icheck and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
	Pressure Control Solenoid E Control Circuit Low	 High contact resistance in the connector terminals between TCM and transmission Open circuit of internal wiring for SLB1 control signa circuit Open circuit of internal wiring for SLB1 ground control signal circuit SLB1 pressure control solenoid no operation Internal failure in TCM 	Check the terminals for corrosion, oxidation between TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, Icheck and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
	Pressure Control Solenoid E Control Circuit High	 Short to power of internal wiring for SLB1 control signa circuit SLB1 pressure control solenoid no operation Internal failure in TCM 	Suspect the TCM, check and install a new TCM as Irequired, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
	Pressure Control Solenoid F Stuck On Pressure Control	 SLC1 pressure control not engaged in drive Mechanical fault in the transmission 	Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system Check the terminals for corrosion, oxidation

	Solenoid F Control Circuit Range/Performance	the connector terminals between TCM and transmission Open circuit of internal wiring for SLC1 control signal circuit Open circuit of internal wiring for SLC1 ground control signal circuit SLC1 pressure control solenoid no operation SLC1 pressure control solenoid stuck Internal failure in TCM	between TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P273800	Pressure Control Solenoid F Control Circuit Low	 High contact resistance in the connector terminals between TCM and transmission Open circuit of internal wiring for SLC1 control signal circuit Open circuit of internal wiring for SLC1 ground control signal circuit SLC1 pressure control solenoid no operation Internal failure in TCM 	Check the terminals for corrosion, oxidation between TCM and transmission. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P273900	Pressure Control Solenoid F Control Circuit High	 Short to power of internal wiring for SLC1 control signal circuit SLC1 pressure control solenoid no operation Internal failure in TCM 	Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
	Torque Converter Temperature Too High	 Event information. System event not caused by the TCM, but requiring the TCM to record this DTC Torque converter temperature greater than 170 degrees C (338 degrees F) 	Check the transmission fluid level and condition. Check the transmission fluid cooler/hoses for signs of obstruction, damage, blockage. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P278768	Clutch Temperature Too High	 Event information. System event not caused by the TCM, but requiring the TCM to record this DTC Torque converter stalled The transmission fluid temperature is the same, or greater than 120 degrees C (248 degrees F) for longer than 5 seconds The transmission fluid temperature is greater than 120 degrees C and lower than 150 degrees C (302 degrees F) for longer than 4 seconds The transmission fluid temperature is greater than 150 degrees (302 degrees F for longer than 3 seconds Internal failure in TCM 	Check the transmission fluid level and condition. Check the transmission fluid cooler/hoses for signs of obstruction, damage, blockage. Suspect the transmission, check and install a new transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system

P280000	Transmission Range Sensor B Circuit (PRNDL Input)	◆ Internal failure in TCM	Check the gear selector lever is adjusted correctly. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system. Check the gear selector lever is adjusted correctly. Suspect the TCM, GSM or transmission check and install a new TCM, GSM or transmission as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
P280100	Transmission Range Sensor B Circuit Range/Performance	selectedIncorrect adjustment of gear	
P280500	Transmission Range Sensor A / B Correlation	 Incorrect adjustment of gear position sensor Internal failure in TCM 	Check the gear selector lever is adjusted correctly. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
U000100	High Speed CAN Communication Bus	 CAN bus open circuit CAN bus short circuit to ground CAN bus short circuit to power Internal fault in another control module in the same part of the CAN network Internal failure in TCM 	Carry out any diagnostic pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical guides and check CAN circuit for open circuit, short to ground, short to power. Suspect the TCM, check and install a new TCM as required, refer to the new module/component installation note at the top of the DTC Index. Refer to service routines at the top of the DTC Index and carry out service routines as required using the manufacturer approved diagnostic system
U210511	Switch Pack Signal "A"	 Circuit short to ground. The TCM has detected a ground measurement for a period longer than expected or has detected a ground measurement when another value was expected Shiftlock solenoid circuit short to ground GSM internal failure 	Refer to the electrical guides and check shiftlock circuit for short to ground. Suspect the GSM, check and install a new GSM as required, refer to the new module/component installation note at the top of the DTC Index
U210512	Switch Pack Signal "A"	 Circuit short to power. The TCM has detected a vehicle power measurement for a period longer than expected or has detected a vehicle power measurement when another value was expected Shiftlock solenoid circuit short to power Open circuit shiftlock solenoid circuit GSM internal failure 	Refer to the electrical guides and check shiftlock circuit for short to power, open circuit. Suspect the GSM, check and install a new GSM as required, refer to the new module/component installation note at the top of the DTC Index

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission Fluid Drain and Refill

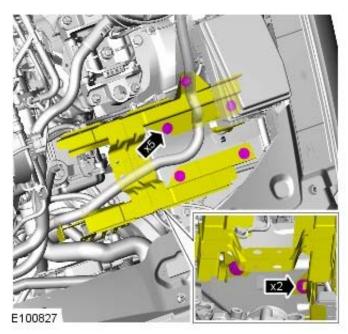
General Procedures

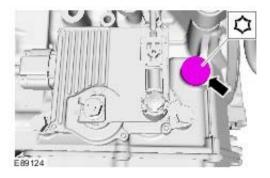


WARNING: Observe due care when draining, as the fluid can be very hot.

- **1.** Ensure that the automatic transmission is in 'P' and the handbrake is fully applied.
- 2. Remove the battery tray.

 For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
 - **3.** Release the battery carrier bracket and position aside.





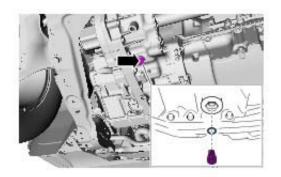
- 4. Clean the area around the transmission fluid filler plug.
- **5.** Remove the transmission fluid filler plug.

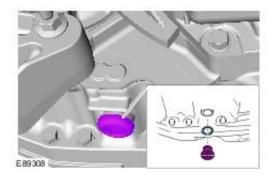
6. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

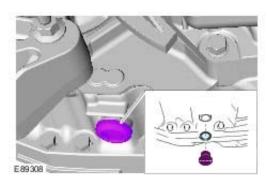
• NOTE: Make sure that the vehicle is standing on a level surface.

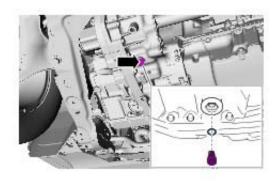
Raise and support the vehicle.

- 7. Remove the air deflector.
 For additional information, refer to: Air Deflector 2.2L
 Duratorq-TDCi (110kW/150PS) Puma/2.0L Duratorq-TDCi
 (501-02 Front End Body Panels, Removal and Installation).
- **8.** Clean the area around the transmission fluid level and drain plugs.
- 9. Place a container under the transmission.









10. CAUTION: The fluid level plug and drain plug both use the same point on the transmission. The inner plug is for level indication and the outer plug is to drain the fluid.

Remove the transmission fluid level plug.

- **11.** Remove the transmission fluid drain plug.
 - Allow the transmission fluid to drain.

12. NOTE: Install a new gasket.

Install the transmission fluid drain plug.

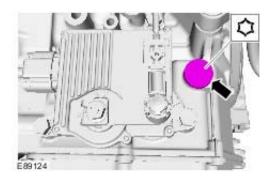
• Tighten to 47 Nm.

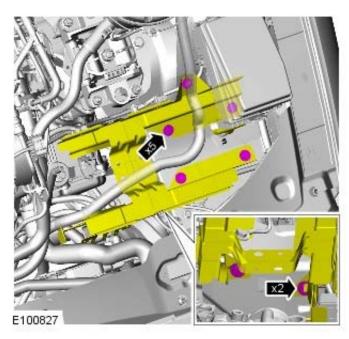
- 13. Lower the vehicle.
- **14.** Fill the transmission with the correct fluid until it runs from the level plug.
- 15. Install the transmission fluid level plug.
 - Tighten to 7 Nm.

- **16.** Add an additional 0.5 litres of transmission fluid.
- 17. A new O-ring seal is to be installed.

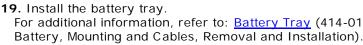
Install the transmission fluid filler plug.

• Tighten to 40 Nm.

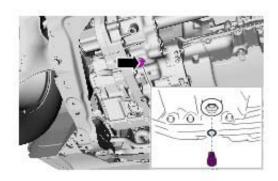




- **18.** Secure the battery carrier bracket.
 - Tighten to 25 Nm.

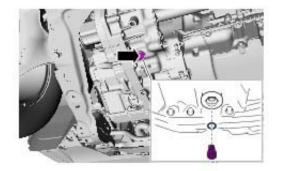


- **20.** Connect the Jaguar approved diagnostic equipment. Start and run the engine.
- **21.** Using the diagnostic equipment to monitor the transmission fluid temperature, allow the temperature to reach 60 degrees C.
- **22.** Move the selector lever from 'P' through all the gear positions, pausing in each gear position for 2-3 seconds and return to the 'P' position.
- 23. Raise the vehicle.
- 24. Remove the transmission fluid level plug.



25. With the engine running a small amount of fluid should drip out of the level plug.





Install the transmission fluid level plug.

• Tighten to 7 Nm.

27. Install the air deflector.

For additional information, refer to: <u>Air Deflector - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi (501-02 Front End Body Panels, Removal and Installation).</u>

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission Fluid Level Check

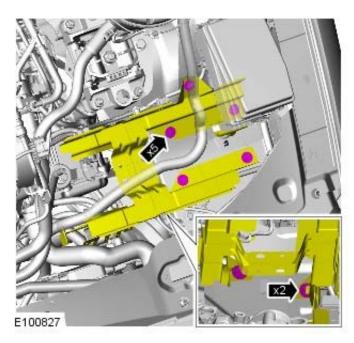
General Procedures

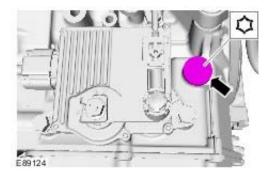


WARNING: Observe due care when draining, as the fluid can be very hot.

- **1.** Ensure that the automatic transmission is in 'P' and the handbrake is fully applied.
- 2. Remove the battery tray.

 For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
 - 3. Release the battery carrier bracket and position aside.





4. Clean the area around the transmission fluid filler plug.

5. CAUTION: The fluid level plug and drain plug both use the same point on the transmission. The inner plug is for level indication and the outer plug is to drain the fluid.

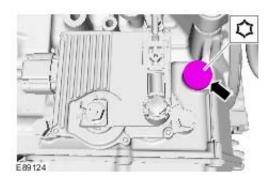
Remove the transmission fluid filler plug.

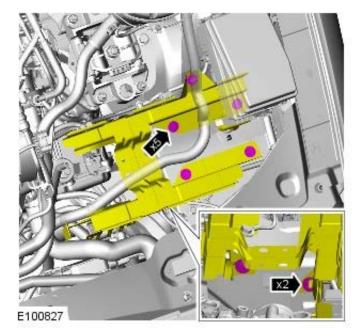
6. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

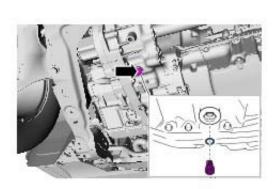
• NOTE: Make sure that the vehicle is standing on a level surface.

Raise and support the vehicle.

- 7. Remove the air deflector.
 For additional information, refer to: Air Deflector 2.2L
 Duratorq-TDCi (110kW/150PS) Puma/2.0L Duratorq-TDCi
 (501-02 Front End Body Panels, Removal and Installation).
- 8. Clean the area around the transmission fluid level plug.
- 9. Place a container under the transmission.
- 10. Lower the vehicle.







11. Add 0.5 litres of transmission fluid.



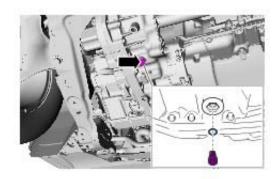
12. ACAUTION: A new O-ring seal is to be installed.

Install the transmission fluid filler plug.

• Tighten to 40 Nm.

- **13.** Secure the battery carrier bracket.
 - Tighten to 25 Nm.

- 14. Install the battery tray. For additional information, refer to: Battery Tray (414-01 Battery, Mounting and Cables, Removal and Installation).
- 15. Connect the Jaguar approved diagnostic equipment. Start and run the engine.
- 16. Using the diagnostic equipment to monitor the transmission fluid temperature, allow the temperature to reach 60 degrees C.
- 17. Move the selector lever from 'P' through all the gear positions, pausing in each gear position for 2-3 seconds and return to the 'P' position.
- 18. Raise the vehicle.
- 19. Remove the transmission fluid level plug.



drip out of the level plug.

21. CAUTION: A new O-ring seal is to be installed.

Install the transmission fluid level plug.

• Tighten to 7 Nm.

22. Install the air deflector.

For additional information, refer to: <u>Air Deflector - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi (501-02 Front End Body Panels, Removal and Installation).</u>

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Main Control Valve Body

In-vehicle Repair

Removal

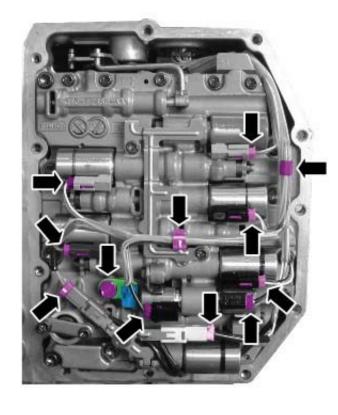
- 1. Raise and support the vehicle.
- 2. Remove the transmission fluid pan.
 For additional information, refer to: Transmission Fluid Pan
 (307-01B Automatic Transmission/Transaxle Vehicles
 With: 6-Speed Automatic Transaxle AWF21, In-vehicle
 Repair).
- **3.** Disconnect the electrical connector.





Release the transmission internal wiring harness.

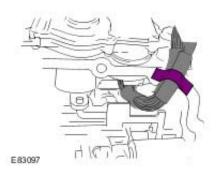
- Remove the bolt.
- Release from the clip.
- Disconnect the 9 electrical connectors.

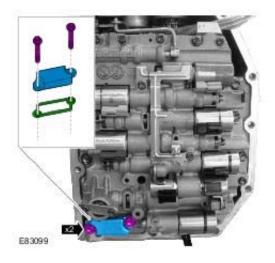


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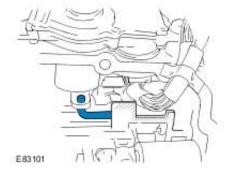
5. NOTE: Make sure that the tape has not detached from the edges of the component.

Position the wiring harness aside.











Remove the suction cover.

- Remove the 2 bolts.
- Remove and discard the gasket.

- 7. **CAUTION**: Discard the bolts.
- NOTE: With every pass, undo the bolts one turn at a time alternately.

Release the transmission main control valve body.

• Remove the 6 bolts.

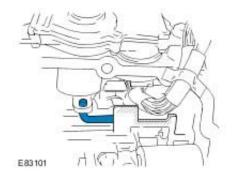
8. CAUTION: Make sure that no components fall off during removal.

Remove the transmission main control valve body.

• Release the selector selector rod.

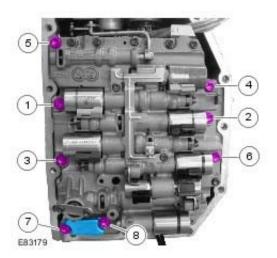
Installation

- 1. Install the transmission main control valve body.
 - Attach the selector rod.









2. CAUTIONS:



Make sure that new bolts are installed.



Only tighten the bolts finger-tight at this stage.

Secure the transmission main control valve body.

3. CAUTIONS:



Make sure that new bolts are installed.



Only tighten the bolts finger-tight at this stage.

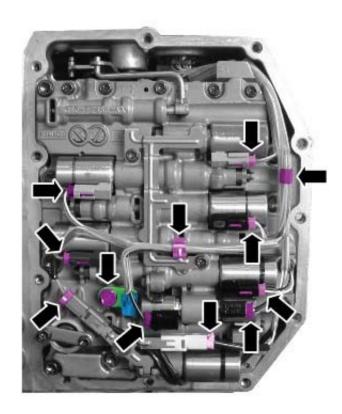
• NOTE: Install a new gasket.

Install the suction cover.

• Install the bolts.

4. NOTE: Install a new gasket.

Tighten the bolts to 10 Nm.

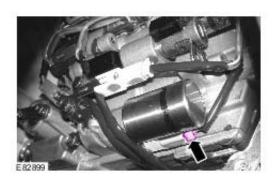


5. CAUTION: Make sure that these components are installed to the noted removal position.

Secure the transmission internal wiring harness.

- Secure in the clips.
- Connect the electrical connectors.
- Tighten the bolt to 10 Nm.

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6. Connect the electrical connector.

7. Install the transmission fluid pan.
For additional information, refer to: <u>Transmission Fluid Pan</u> (307-01B Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21, In-vehicle Repair).

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Selector Shaft Seal

In-vehicle Repair

Removal

• NOTE: Removal steps in this procedure may contain installation details.

- 1. Disconnect the battery ground cable.
 For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Remove the transmission control module (TCM). For additional information, refer to: Transmission Control Module (TCM) (307-01B Automatic Transmission/Transaxle Vehicles With: 6-Speed Automatic Transaxle AWF21, Invehicle Repair).

3. CAUTIONS:

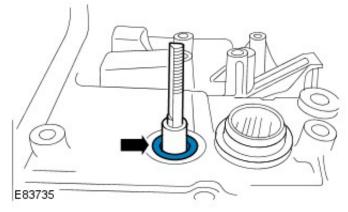


Take extra care not to damage the mating faces.



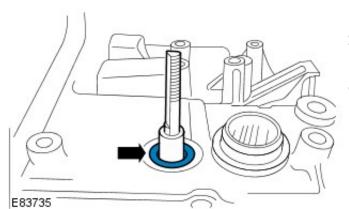
Make sure that a new component is installed.

Remove the transmission selector shaft seal.



Installation

1. CAUTIONS:



Make sure that the mating faces are clean and free of foreign material.



Install the seal, flush with the transmission case.

Install the transmission selector shaft seal.

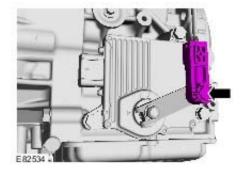
- 2. Install the transmission control module (TCM).
 For additional information, refer to: Iransmission Control Module (TCM) (307-01B Automatic Transmission/Transaxle Vehicles With: 6-Speed Automatic Transaxle AWF21, Invehicle Repair).
- 3. Connect the battery ground cable.
 For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission Control Module (TCM)

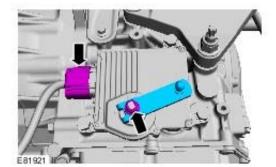
In-vehicle Repair

Removal

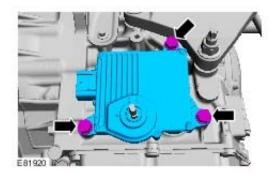
- Remove the cover and disconnect the battery ground cable.
 For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Remove the battery tray.
 For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- 3. Release and disconnect the selector lever cable.



- **4.** Remove the transmission selector lever and disconnect the electrical connector.
 - · Remove the nut.

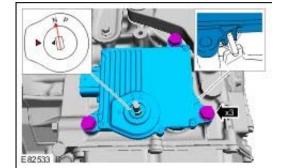


- **5.** Remove the transmission control module (TCM).
 - Remove the 3 bolts.



Installation

1. CAUTIONS:



Make sure that the terminals or pins/sockets of the transmission control module (TCM) and the TCM connector are not bent or damaged.

The component must be aligned with the installation markings.

• NOTE: The new transmission control module (TCM) is set in the N position at the factory.





Install the transmission control module (TCM).

- Tighten the bolts to 24 Nm.
- **2.** Install the transmission selector lever and connect the electrical connector.
 - Tighten the nut to 13 Nm.

3. Secure and connect the selector lever cable.

- **4.** Install the battery tray. For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- Connect the battery ground cable and install the cover.
 For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- **6.** If a new component has been installed, configure using Jaguar approved diagnostic equipment.

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission Internal Wiring Harness

In-vehicle Repair

Removal

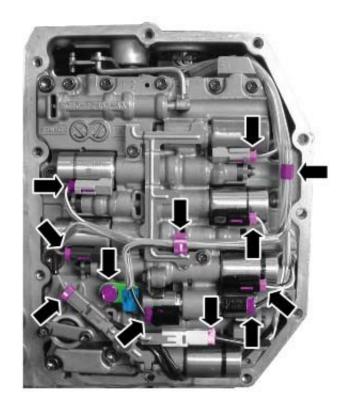
- 1. Raise and support the vehicle.
- 2. Remove the transmission control module (TCM). For additional information, refer to: Transmission Control Module (TCM) (307-01B Automatic Transmission/Transaxle Vehicles With: 6-Speed Automatic Transaxle AWF21, Invehicle Repair).
- 3. Remove the transmission fluid pan. For additional information, refer to: Transmission Fluid Pan (307-01B Automatic Transmission/Transaxle Vehicles With: 6-Speed Automatic Transaxle AWF21, In-vehicle Repair).
- **4.** Disconnect the electrical connector.

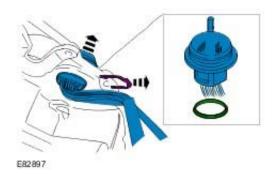


5. NOTE: Note the position of the electrical connectors.

Release the transmission internal wiring harness.

- Remove the bolt.
- Release from the clip.
- Disconnect the 9 electrical connectors.





Remove the transmission internal wiring harness.

• Remove the clip.

Installation

1. CAUTIONS:



Make sure that the wiring harness does not catch.



The component must be aligned with the installation markings.

Install the transmission internal wiring harness.

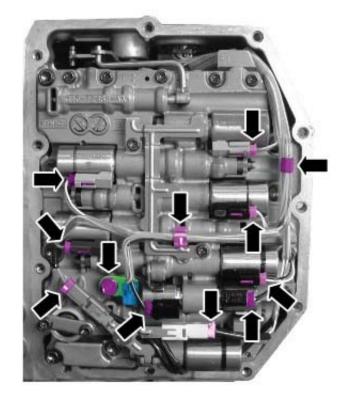
• Secure with the clip.



Secure the transmission internal wiring harness.

- Connect the electrical connectors.
- Tighten the bolt to 10 Nm.
- Secure in the clip.





E101212

3. Connect the electrical connector.



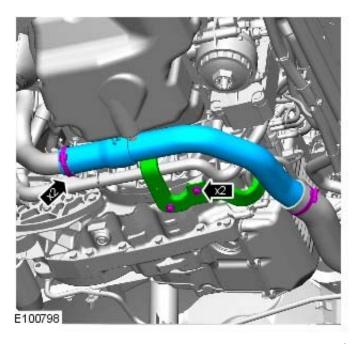
- **4.** Install the transmission fluid pan. For additional information, refer to: <u>Transmission Fluid Pan</u> (307-01B Automatic Transmission/Transaxle Vehicles With: 6-Speed Automatic Transaxle AWF21, In-vehicle Repair).
- **5.** Install the transmission control module (TCM). For additional information, refer to: <u>Transmission Control Module (TCM)</u> (307-01B Automatic Transmission/Transaxle Vehicles With: 6-Speed Automatic Transaxle AWF21, Invehicle Repair).

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission Fluid Pan

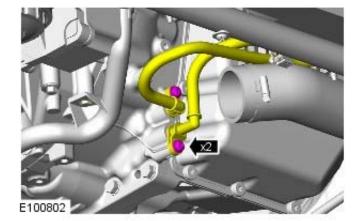
In-vehicle Repair

Removal

- NOTE: Removal steps in this procedure may contain installation details.
 - 1. Raise and support the vehicle.
 - 2. Drain the transmission fluid.
 For additional information, refer to: Transmission Fluid Drain and Refill (307-01B Automatic Transmission/Transaxle Vehicles With: 6-Speed Automatic Transaxle AWF21, General Procedures).
 - 3. Remove the charge air cooler intake pipe.
 - Release the 2 hose clips.
 - Remove the 2 bolts.



- **4.** Position the charge air cooler intake hose aside.
 - **5.** Disconnect the 2 transmission fluid cooler tubes.
 - Remove the 2 Torx bolts.
 - Position aside.



6. CAUTION: Take extra care not to damage the mating faces.

Remove the transmission fluid pan.

- Remove the 12 bolts.
- Slacken the transmission fluid pan with a plastic hammer, avoid distorting the pan.

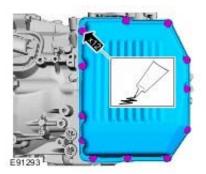




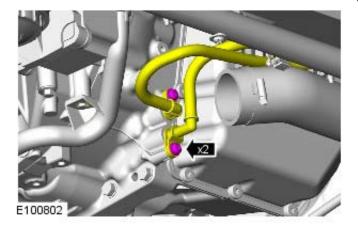
Installation

1. CAUTION: Make sure that the mating faces are clean and free of foreign material.

Apply silicone rubber sealant to the transmission fluid pan.

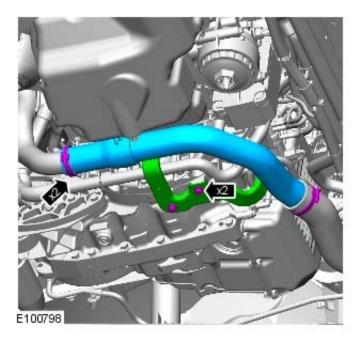


- 2. Install the transmission fluid pan.
 - Apply Loctite 243 to the transmission fluid pan bolt threads.
 - Tighten to 13 Nm.



- **3.** Connect the transmission fluid cooler tubes.
 - Tighten to 25 Nm.

- **4.** Install the charge air cooler intake pipe.
 - Tighten the hose clips.
 - Tighten the bolts to 35 Nm.



5. Refill the transmission with fluid.
For additional information, refer to: <u>Transmission Fluid Drain and Refill</u> (307-01B Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21, General Procedures).

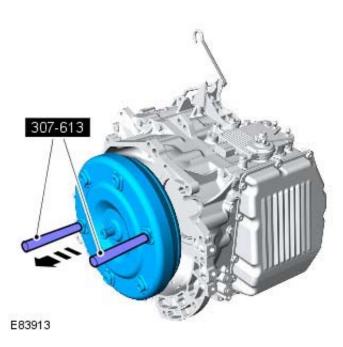
Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Torque Converter

Removal and Installation

Removal

- 1. Raise and support the vehicle.
- 2. Remove the transmission.
 For additional information, refer to: <u>Transmission</u> (307-01B Automatic Transmission/Transaxle Vehicles With: 6-Speed Automatic Transaxle AWF21, Removal).
 - **3.** NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

Using the special tools, remove the torque converter.



Installation

1. CAUTIONS:

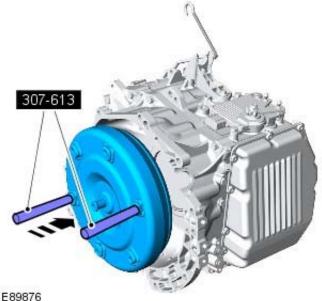
Align the torque converter and oil pump drive before installing the torque converter.

Make sure that the mating faces are clean and free of foreign material.



Take extra care when handling the component.

Install the torque converter.



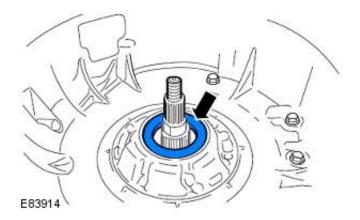
2. Install the transmission.
For additional information, refer to: <u>Transmission</u> (307-01B Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21, Removal).

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Torque Converter Seal

Removal and Installation

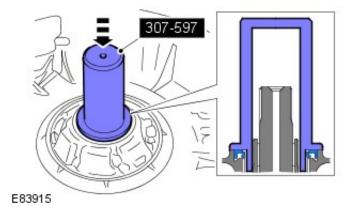
Removal

- 1. Raise and support the vehicle.
- Remove the torque converter.
 For additional information, refer to: Torque Converter (307-01, Removal and Installation).
 - 3. Carefully remove and discard the torque converter seal.



Installation

1. CAUTIONS:



Extreme cleanliness must be exercised when handling this component.

Make sure that the mating faces are clean and free of foreign material.

Using the special tool, install a new torque converter seal.

2. CAUTIONS:

Align the torque converter and oil pump drive before installing the torque converter.

Make sure that the mating faces are clean and free of foreign material.



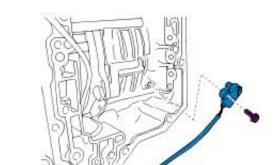
Take extra care when handling the component.

Install the torque converter.

For additional information, refer to: Torque Converter (307-01, Removal and Installation).

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Turbine Shaft Speed (TSS) Sensor

Removal and Installation



Removal

- Remove the main control valve body.
 For additional information, refer to: Main Control Valve Body (307-01B Automatic Transmission/Transaxle Vehicles With: 6-Speed Automatic Transaxle AWF21, In-vehicle Repair).
- 2. Remove the turbine shaft speed (TSS) sensor.
 - Remove the bolt.
 - Release the sensor from the transmission.



Installation

- 1. To install, reverse the removal procedure.
 - Tighten to 6 Nm.

Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission

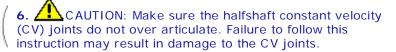
Removal

Special Tool(s)			
100-012	Impulse extractor 100-012(LRT-99-004)		
E54135			
*	Slide Hammer Shaft - 100-012-02		
100-012-02			
	Halfshaft Remover Fork - 204-226		
204-226	Power train assembly jack		
	HTJ1200-2		
HTJ12002			
303-021	Engine support bracket 303-021		

Removal

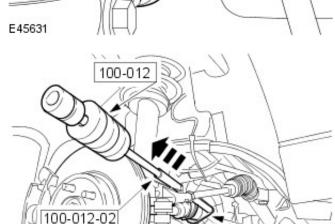
- Disconnect the battery ground cable.
 For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 2. Remove the battery tray.
 For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- 3. Raise the vehicle.
- 4. Remove the front subframe.
 For additional information, refer to: Front Subframe 2.2L
 Duratorq-TDCi (110kW/150PS) Puma/2.0L Duratorq-TDCi
 (502-00 Uni-Body, Subframe and Mounting System,
 Removal and Installation).
- **5.** Drain the transmission fluid. For additional information, refer to: <u>Transmission Fluid Drain and Refill</u> (307-01B Automatic Transmission/Transaxle -

Vehicles With: 6-Speed Automatic Transaxle - AWF21, General Procedures).

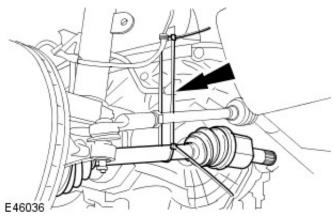


Release the RH halfshaft.

- Release the RH halfshaft from the transmission.
- Secure the RH halfshaft to one side.
- 7. Using the special tools, release the LH halfshaft.



204-226

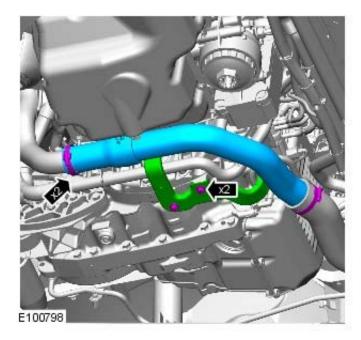


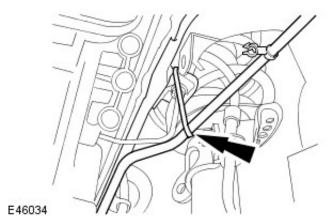
E46035

8. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

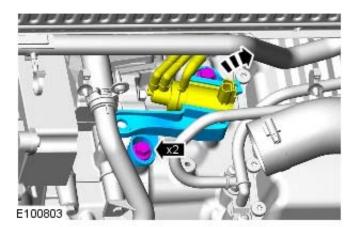
Using a suitable tie strap, support the LH halfshaft.

- 9. Remove the charge air cooler intake pipe.
 - Release the 2 hose clips.
 - Remove the 2 bolts.



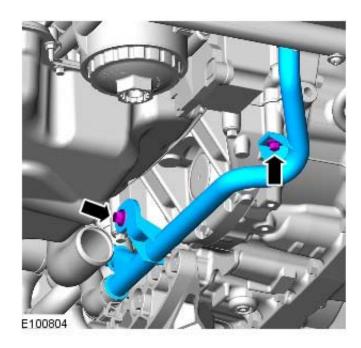


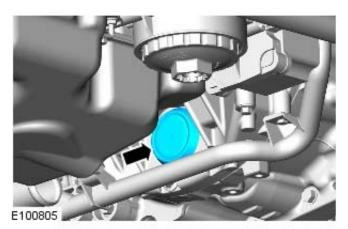
10. Support the power steering fluid pipe.



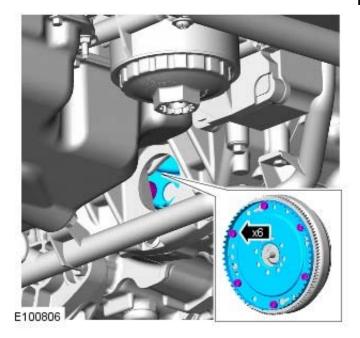
- **11.** Release the emission control valve.
 - Remove the 2 bolts.
 - Position aside.

- **12.** Release coolant pipe from the engine.
 - Remove the 2 bolts.





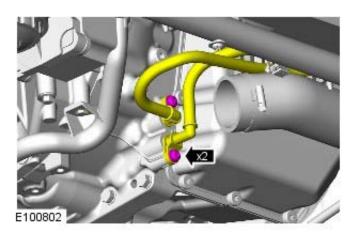
13. Remove the flexplate cover.

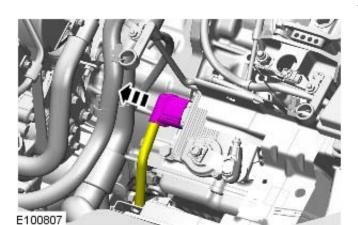


- **14.** Release the torque convertor from the flexplate.
 - Remove the 6 bolts.

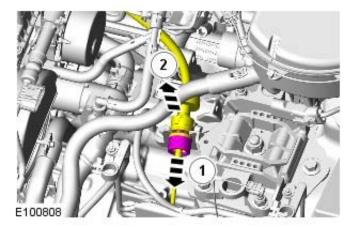
- **15.** Disconnect the 2 transmission fluid cooler tubes.
 - Remove the 2 Torx bolts.





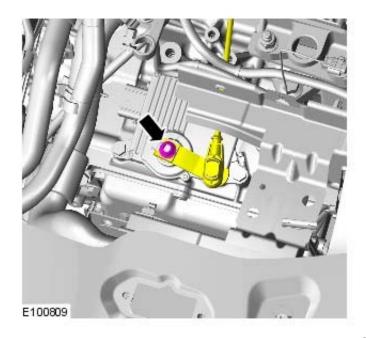


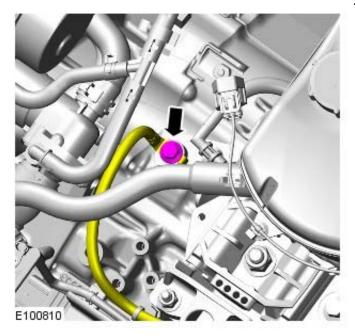
- **16.** Lower the vehicle.
 - **17.** Disconnect the transmission control module (TCM) electrical connector.



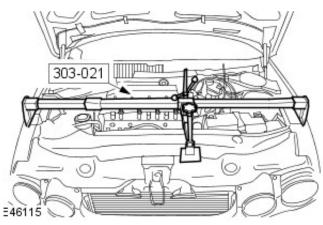
- **18.** Release the transmission selector cable from the bracket.
 - Release the locking sleeve and release from the bracket.

- **19.** Release the transmission selector lever cable from the $\mathsf{TCM}.$
 - Remove the nut.
 - Release the selector cable and lever.
 - Position aside.



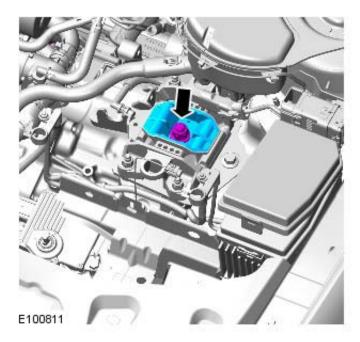


- 20. Disconnect the battery ground cable.
 - Remove the bolt.

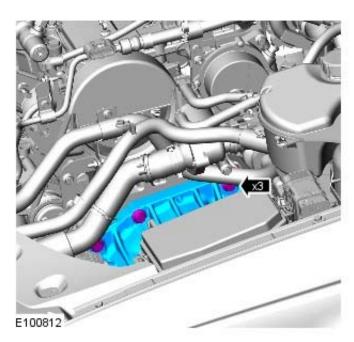


21. Using the special tool, support the engine and transmission assembly.

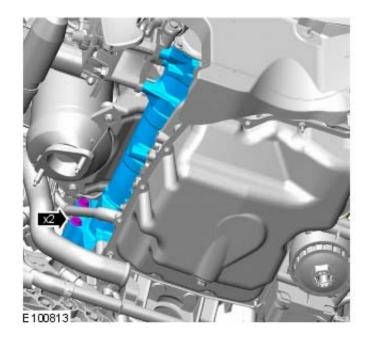
- 22. Release the transmission mounting.
 - Remove the nut.

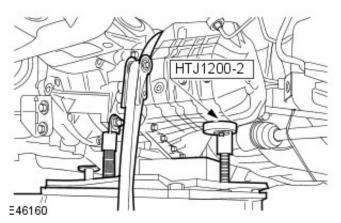


- **23.** Lower the engine sufficiently allowing the transmission assembly to clear the mounting.
 - **24.** Remove the 3 transmission assembly upper bolts.



- 25. Raise the vehicle.
 - **26.** Remove the 2 transmission assembly rear bolts.

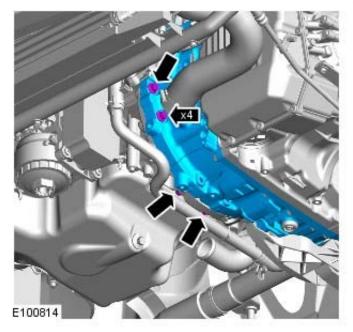




27. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

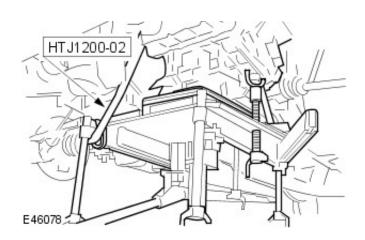
Align the powertrain assembly jack to the transmission.

 Secure the transmission to the powertrain assembly jack.



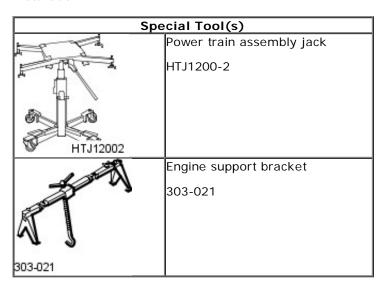
28. Remove the 4 transmission assembly lower bolts.

- 29. Remove the transmission.
 - Detach the transmission from the drive plate.
 - Lower the powertrain assembly jack and transmission assembly.

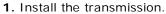


Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission

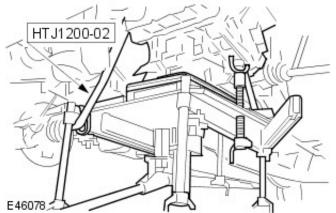
Installation



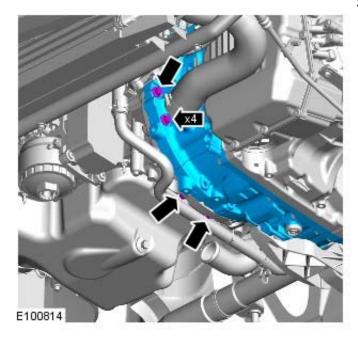
Installation



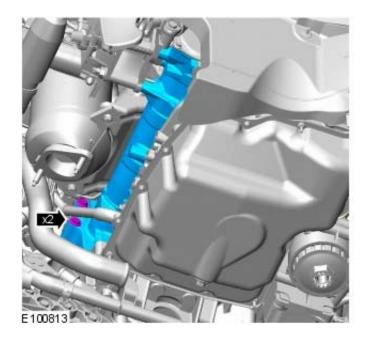
 Raise the powertrain assembly jack and transmission assembly.

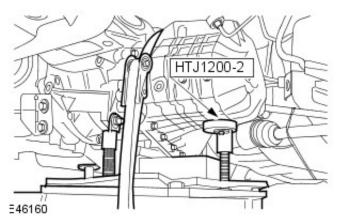


- 2. Install the transmission assembly lower bolts.
 - Tighten the bolts to 48 Nm.



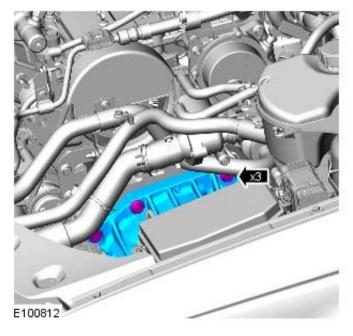
- **3.** Install the transmission assembly rear bolts.
 - Tighten the bolts to 48 Nm.





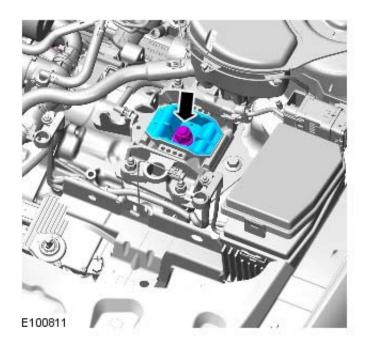
4. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

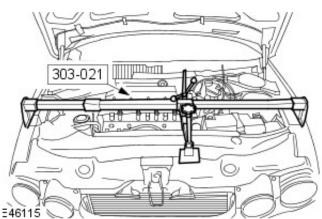
Remove the powertrain assembly jack.



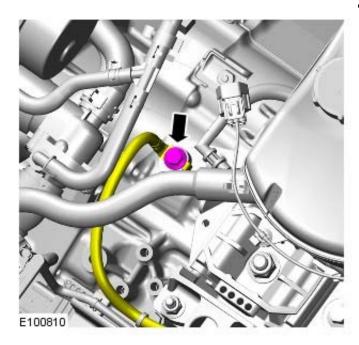
- **5.** Lower the vehicle.
 - **6.** Install the transmission assembly upper bolts.
 - Tighten the bolts to 48 Nm.

- **7.** Raise the engine and transmission assembly onto the mounting.
 - Tighten the nut to 130 Nm.



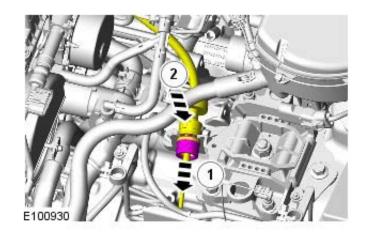


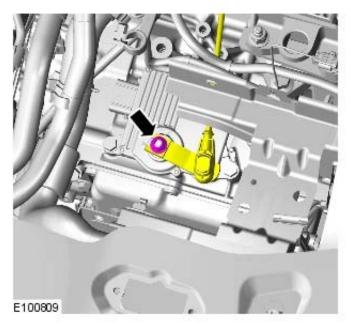
8. Remove the special tool.



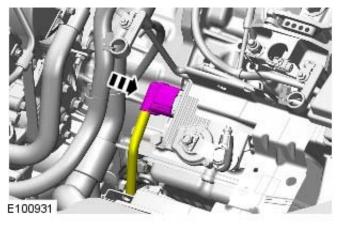
- 9. Attach the battery ground cable.
 - Tighten the bolt to 25 Nm.

- **10.** Attach the transmission selector cable to the bracket.
 - Release the locking sleeve and attach to the bracket.



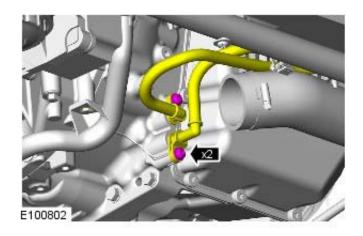


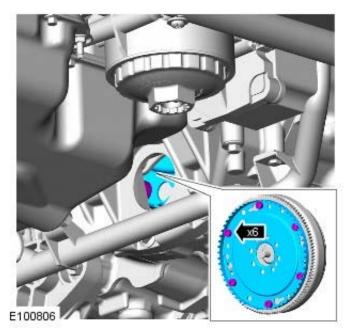
- **11.** Attach the transmission selector cable and lever to the transmission control module (TCM).
 - Tighten the nut to 13 Nm.



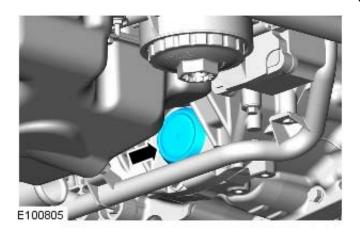
12. Connect the TCM electrical connector.

- **13.** Raise the vehicle.
 - **14.** Connect the transmission fluid cooler tubes.
 - Tighten the bolts to 10 Nm.



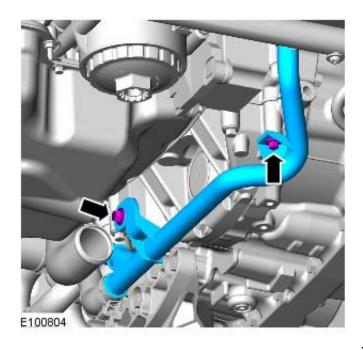


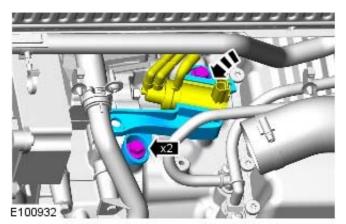
- **15.** Secure the torque convertor to the flexplate.
 - Tighten the bolts 60 Nm.



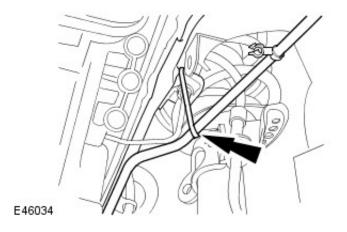
16. Install the flexplate cover.

- **17.** Secure the coolant pipe to the engine.
 - Tighten the bolts to 10 Nm.



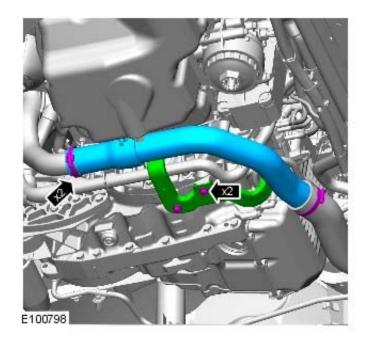


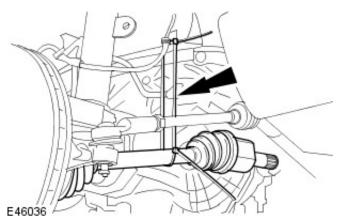
- **18.** Secure the emission control valve.
 - Tighten the bolts to 30 Nm.



19. Release the power steering fluid pipe.

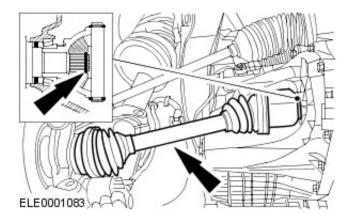
- **20.** Install the charge air cooler intake pipe.
 - Tighten the hose clips.
 - Tighten the bolts to 35 Nm.





21. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Release the LH halfshaft.

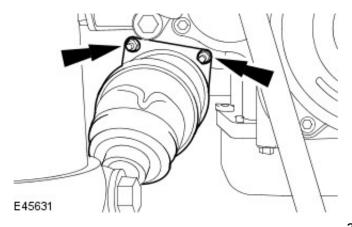


22. Attach the LH halfshaft to the transmission.

23. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Attach the RH halfshaft to the transmission.

- Engage the RH halfshaft to the transmission.
- Tighten the bolts to 25 Nm.



24. Install the front subframe.

For additional information, refer to: Front Subframe - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

- 25. Lower the vehicle.
- **26.** Install the battery tray. For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- 27. Refill the transmission with fluid.
 For additional information, refer to: <u>Transmission Fluid Drain and Refill</u> (307-01B Automatic Transmission/Transaxle Vehicles With: 6-Speed Automatic Transaxle AWF21, General Procedures).
- 28. Connect the battery ground cable.

 For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).
- 29. 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 (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).

Transmission/Transaxle Cooling - Vehicles With: 5-Speed Automatic Transaxle - JATCO -

General Specifications

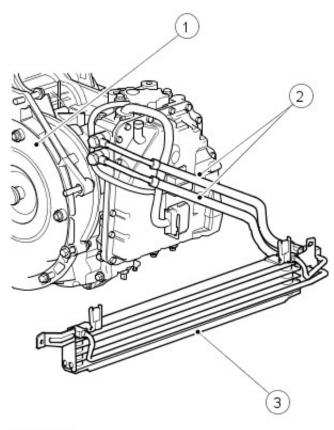
Item	Specification
Automatic transmission fluid	WSS-M2C922-A1

Torque Specifications

Description		lb-ft	lb-in
Automatic transmission fluid cooler tube union	35	26	-

Transmission/Transaxle Cooling - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transmission CoolingVehicles With: 5-Speed Automatic Transaxle - JATCO

Description and Operation



VUJ0004552

Item	Part Number	Number Description	
1	_	Automatic transmission	
2	_	Transmission fluid cooler tubes	
3	_	Transmission fluid cooler	

Transmission fluid cooler

The transmission 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 oil.

A thermostatic control valve is incorporated in the transmission fluid cooler, this maintains the transmission fluid at the optimum temperature for use in the transmission.

When carrying out automatic transmission procedures any drained fluid should be checked thoroughly for any metal filings or particles. If metal filings or particles are evident the automatic transmission fault should be located followed by a thorough flushing of the fluid cooler and fluid cooler lines.

Transmission/Transaxle Cooling - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transmission Cooling

Diagnosis and Testing

Inspection and Verification

- 1. **1.** Verify the customer concern by operating the system.
- 2. **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
- 3. **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. 4. If the concern is not visually evident, verify the symptom and refer to the Symptom chart.

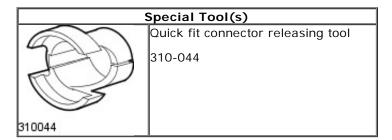
Symptom Chart

Symptom Chart

Symptom	Possible Sources	Action
Loss of automatic transmission fluid.	* Connections to the automatic transmission and the automatic transmission fluid cooler.	* Check the torque of the tubes, if correct, check the tubes and connections.
Loss of the automatic transmission fluid.	 Leak at transmission fluid cooler. 	* INSTALL new transmission fluid cooler.

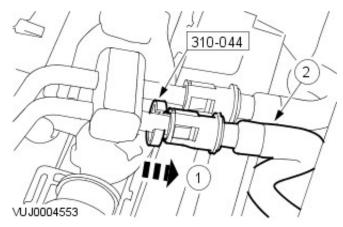
Transmission/Transaxle Cooling - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transmission Fluid Cooler

Removal and Installation



Removal

WARNING: Whenever releasing the transmission cooling system fluid, take care to prevent fluid scalding. Failure to follow these instructions may result in personal injury.



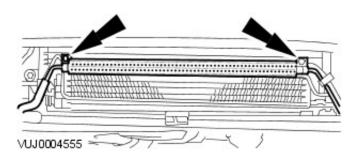
- **1.** Remove the front bumper. For additional information, refer to Section 501-19 Bumpers.
- 2. NOTE: Lower transmission fluid cooler tube shown, upper similar.
- NOTE: Allow the fluid to drain into a suitable container.

Detach the transmission cooler tube.

- 1. Install the special tool.
- 2. Detach the transmission cooler tube.

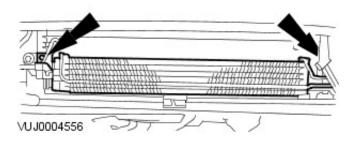


3. Detach the power assisted steering oil cooler.



4. Remove the transmission fluid cooler.

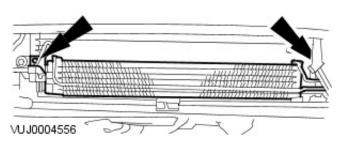




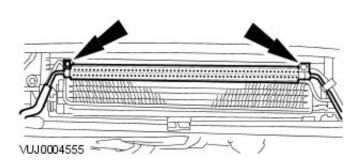
Installation



- **1.** To install reverse the removal procedure.
 - 1. Tighten to 7 Nm.



2. Tighten to 7 Nm.



3. CAUTION: Use of any transmission fluid other than the recommended fluid, will cause transmission damage.

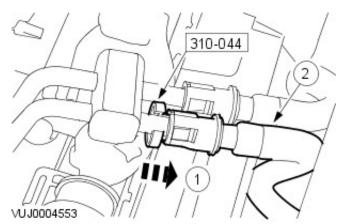
Carry out a transmission fluid level check. For additional information, refer to Section 307-01A Automatic Transmission/Transaxle Section 307-01B Automatic Transmission/Transaxle.

Transmission/Transaxle Cooling - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Transmission Fluid Cooler Tubes

Removal and Installation

Removal

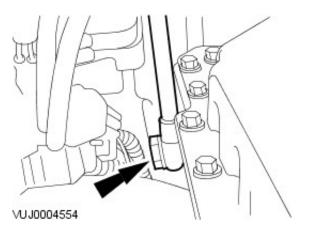
MARNING: Whenever releasing the transmission cooling system fluid, take care to prevent fluid scalding. Failure to follow these instructions may result in personal injury.



- 1. Remove the undertray. For additional information, refer to Section 501-02 Front End Body Panels.
- **2.** NOTE: Lower transmission fluid cooler tube shown, upper similar.
- NOTE: Allow the fluid to drain into a suitable container.

Detach the transmission cooler tube.

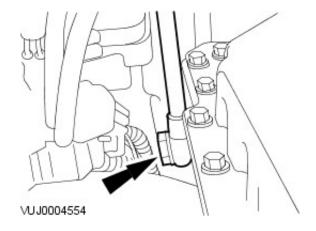
- 1. Install the special tool.
- 2. Detach the transmission cooler tube.



3. NOTE: Lower transmission fluid cooler tube shown, upper similar.

Remove the transmission fluid cooler tube.

• Remove and discard the sealing washers.



Installation

1. NOTE: Lower transmission fluid cooler tube shown, upper similar.

To install reverse the removal procedure.

- Install new sealing washers.
- Tighten to 35 Nm.

2. CAUTION: Use of any transmission fluid other than the recommended fluid, will cause transmission damage.

Carry out a transmission fluid level check. For additional information, refer to Section 307-01A Automatic Transmission/TransaxleSection 307-01B Automatic

<u>Transmission/Transaxle</u>.

Transmission/Transaxle Cooling - Vehicles With: 6-Speed Automatic Transaxle - AWF21 -

General Specifications

Item	Specification
Automatic transmission fluid	WSS-M2C922-A1

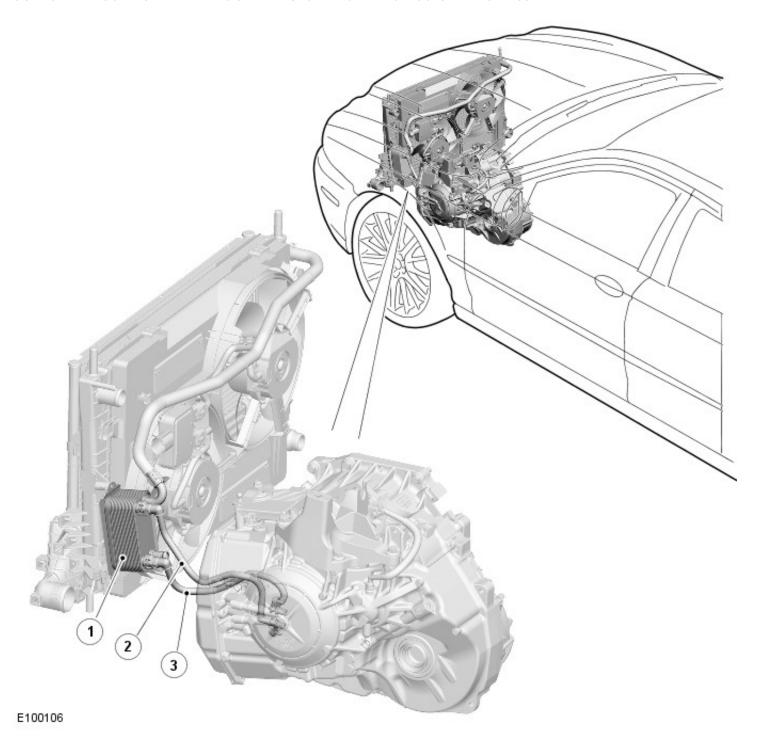
Torque Specifications

Description		lb-ft	lb-in
Automatic transmission fluid cooler tube union	35	26	-

Transmission/Transaxle Cooling - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission CoolingVehicles With: 6-Speed Automatic Transaxle - AWF21

Description and Operation

COMPONENT LOCATION - AW F21 6 SPEED AUTOMATIC TRANSMISSION - FROM 2009MY



Item	Part Number	Description	
1	-	Transmission fluid cooler	
2	-	Transmission fluid pipe - to transmission	
3	-	Transmission fluid pipe - from transmission	

OVERVIEW

The AW F21 transmission uses an external fluid cooler to reduce the temperature of the transmission fluid.

SYSTEM OPERATION

Fluid is supplied from the transmission fluid pump into the lower connection of the cooler. After passing through the cooler, the fluid passes out of the upper connection and is returned to the transmission fluid pan.

SYSTEM DESCRIPTION

The transmission fluid cooler is attached to the LH (left-hand) end of the radiator. The fluid cooler is an aluminum housing comprising louvred fins and plates. The plates allow a cross-flow of transmission fluid and engine coolant through the cooler. The plates are immersed in engine coolant from the 'cold' side of the radiator which provides cooling of the transmission fluid by the temperature differential between the transmission fluid and the engine coolant.

The radiator is divided so that any coolant passing through the top quarter of the radiator will also pass through the transmission oil cooler. There is a variable restrictor in the coolant bottom hose to allow the correct coolant flow through the transmission fluid cooler to optimise the transmission fluid cooling performance.

Transmission/Transaxle Cooling - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission Cooling

Diagnosis and Testing

Inspection and Verification

- 1. **1.** Verify the customer concern by operating the system.
- 2. **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
- 3. **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. 4. If the concern is not visually evident, verify the symptom and refer to the Symptom chart.

Symptom Chart

Symptom Chart

Symptom	Possible Sources	Action
Loss of automatic	* Connections to the automatic transmission and	* Check the torque of the tubes, if correct,
transmission fluid.	the automatic transmission fluid cooler.	check the tubes and connections.
Loss of the automatic	 Leak at transmission fluid cooler. 	* INSTALL new transmission fluid cooler.
transmission fluid.		

Transmission/Transaxle Cooling - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission Fluid Cooler

Removal and Installation

Removal

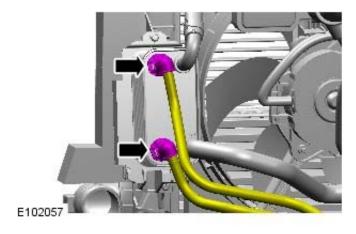
Drain the cooling system.
 For additional information, refer to: <u>Cooling System</u>
 <u>Draining, Filling and Bleeding</u> (303-03B Engine Cooling - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, General Procedures).



MARNING: Be prepared to catch escaping fluid.

• NOTE: Use suitable paper to absorb and escaping fluid.

Disconnect the 2 transmission fluid cooler tubes from the transmission fluid cooler.

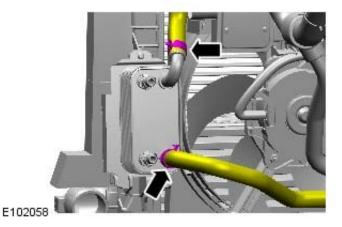


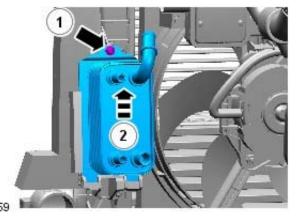


WARNING: Be prepared to catch escaping fluid.

Disconnect the 2 coolant hoses from the transmission fluid cooler.

• Release the 2 clips.





- **4.** Remove the Torx screw securing the transmission fluid cooler to the cooling pack.
 - Release the transmission fluid cooler from the cooling pack.

Installation

- 1. To install, reverse the removal procedure.
- 2. Check automatic transmission fluid level.
 For additional information, refer to: Transmission Fluid Level

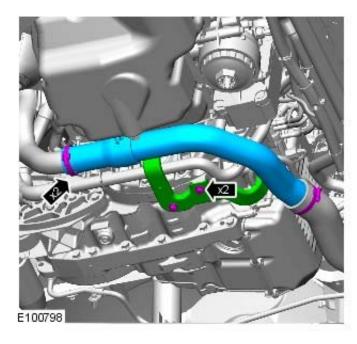
<u>Check</u> (307-01B Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21, General Procedures).

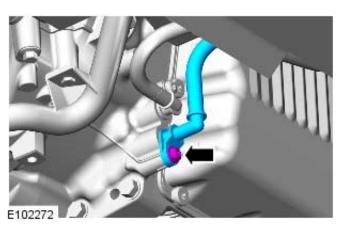
Transmission/Transaxle Cooling - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission Fluid Cooler Return Tube

Removal and Installation

Removal

- 1. Remove the radiator splash shield. For additional information, refer to: Radiator Splash Shield (501-02 Front End Body Panels, Removal and Installation).
 - 2. Remove the charge air cooler intake pipe.
 - Release the 2 hose clips.
 - Remove the 2 bolts.

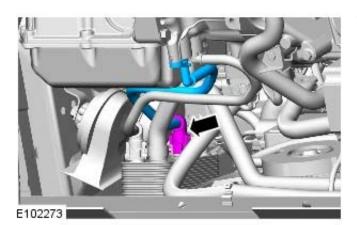




- 3. A WARNING: Be prepared to catch escaping fluid.
- NOTE: Use suitable paper to absorb and escaping fluid.

Disconnect the transmission fluid cooler return tube from the transmission.

• Remove the Torx bolt.

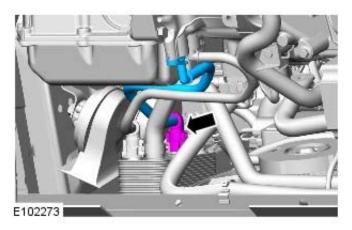


- 4. AWARNING: Be prepared to catch escaping fluid.
- NOTE: Use suitable paper to absorb and escaping fluid.

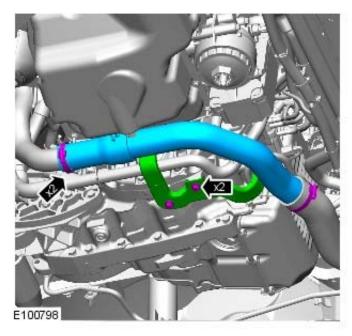
Disconnect the transmission fluid cooler return tube from the transmission fluid cooler.

Installation

- 1. Install the transmission fluid cooler supply tube.
 - 2. Connect the transmission fluid cooler return tube to the transmission fluid cooler.



- **3.** Connect the transmission fluid cooler return tube to the transmission.
 - Tighten to 10 Nm.



- 4. Install the charge air cooler intake pipe.
 - Tighten the hose clips.
 - Tighten the bolts to 35 Nm.

- Check and top-up the transmission fluid level.
 For additional information, refer to: <u>Transmission Fluid Level Check</u> (307-01B Automatic Transmission/Transaxle Vehicles With: 6-Speed Automatic Transaxle AWF21, General Procedures).
- **6.** Install the radiator splash shield. For additional information, refer to: Radiator Splash Shield

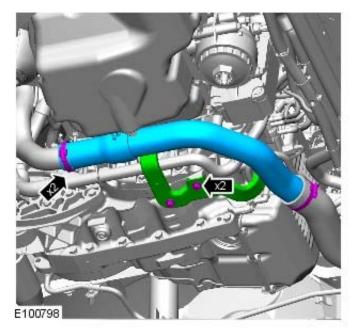
(501-02 Front End Body Panels, Removal and Installation).

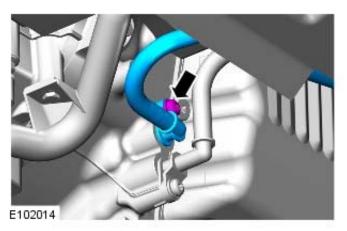
Transmission/Transaxle Cooling - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Transmission Fluid Cooler Supply Tube

Removal and Installation

Removal

- Remove the radiator splash shield.
 For additional information, refer to: <u>Radiator Splash Shield</u> (501-02 Front End Body Panels, Removal and Installation).
 - 2. Remove the charge air cooler intake pipe.
 - Release the 2 hose clips.
 - Remove the 2 bolts.

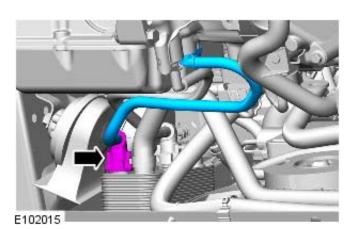




- 3. WARNING: Be prepared to catch escaping fluid.
- NOTE: Use suitable paper to absorb and escaping fluid.

Disconnect the transmission fluid cooler supply tube from the transmission.

• Remove the Torx bolt.

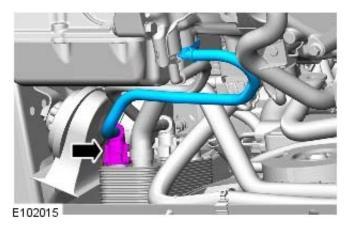


- 1. A WARNING: Be prepared to catch escaping fluid.
- NOTE: Use suitable paper to absorb and escaping fluid.

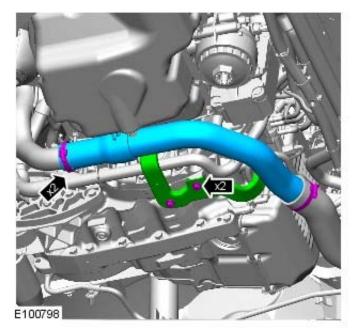
Disconnect the transmission fluid cooler supply tube from the transmission fluid cooler.

Installation

- 1. Install the transmission fluid cooler supply tube.
 - **2.** Connect the transmission fluid cooler supply tube to the transmission fluid cooler.



- E102014
- **3.** Connect the transmission fluid cooler supply tube to the transmission.
 - Tighten to 10 Nm.



- 4. Install the charge air cooler intake pipe.
 - Tighten the hose clips.
 - Tighten the bolts to 35 Nm.

- Check and top-up the transmission fluid level.
 For additional information, refer to: <u>Transmission Fluid Level Check</u> (307-01B Automatic Transmission/Transaxle Vehicles With: 6-Speed Automatic Transaxle AWF21, General Procedures).
- **6.** Install the radiator splash shield. For additional information, refer to: Radiator Splash Shield

(501-02 Front End Body Panels, Removal and Installation).

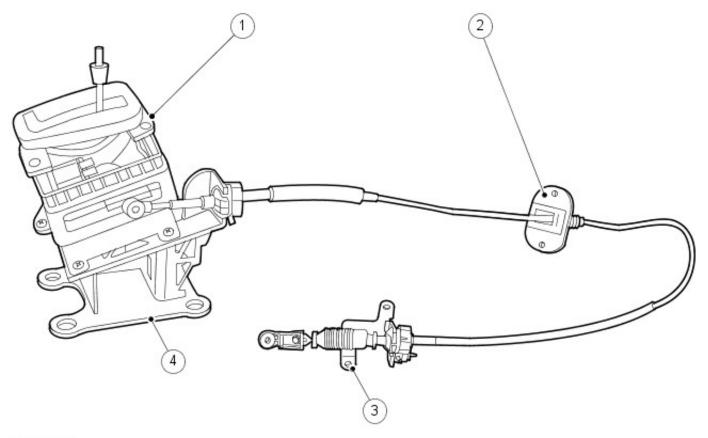
Automatic Transmission/Transaxle External Controls - Vehicles With: 5-Speed Automatic Transaxle - JATCO -

Torque Specifications

Description	Nm	lb-ft	lb-in
Selector cable shield	10	7	-
Selector cable retaining bracket	10	7	-

Automatic Transmission/Transaxle External Controls - Vehicles With: 5-Speed Automatic Transaxle - JATCO - External ControlsVehicles With: 5-Speed Automatic Transaxle - JATCO

Description and Operation



VUJ0003990

Item	Part Number	Description
1	_	Transmission selector lever.
2	_	Gear selector cable and bracket.
3	_	Gear selector cable retaining bracket.
4	_	Gear selector module bracket.

Transmission Selector Lever

The transmission selector lever:

- Has seven positions: PARK, REVERSE, NEUTRAL, DRIVE, FOURTH, THIRD and SECOND.
- Operates the transmission selector shaft in the PARK, REVERSE, NEUTRAL and DRIVE positions by means of a cable.
- Passes driver gearshift requests to the engine control module (ECM) via the rotary switch.
- 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 FOURTH, THIRD and SECOND gears.

The NEUTRAL position switch:

• Is incorporated within the transmission rotary switch.

The transmission selector illumination module:

- Provides a red transmission lever position illumination to indicate the selected gear.
- Provides a green background for the transmission selector lever.

The transmission selector interlock solenoid:

- Prevents the transmission selector lever from being moved from the PARK position, unless the ignition switch is
 in ON position, and the brake pedal is pressed.
- Is controlled by an input from the ECM via the CAN bus.

The seven transmission selector positions are:

- P: The transmission is mechanically locked (starting enabled).
- R: Reverse gear.
- N: No power to the road wheels (starting enabled).
- D: All 5 forward gears available.
- 4: Upshift to 4th gear only.
- 3: Upshift to 3rd gear only.
- 2: Upshift to 2nd gear only.

The performance mode push button:

- is mounted on the transmission selector surround.
- selects Normal or Sport mode when pressed by the driver.
- is illuminated when Sport mode is selected.
- is hard-wired to the ECM.

The transmission selector at the transmission unit:

- is connected to the driver's selector module by a cable.
- operates the manual selector valve, which is part of the electro-hydraulic control unit.
- operates the rotary switch, which is connected to the ECM.

The transmission selector cable provides the positive link between the selector lever and the transmission. The transmission selector cable does not require adjustment.

Automatic Transmission/Transaxle External Controls - Vehicles With: 5-Speed Automatic Transaxle - JATCO - External Controls

Diagnosis and Testing

Inspection and Verification

- 1. **1.** Verify the customer concern.
- 2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.

WARNING: Danger of accident. Apply the parking brake. Shift the gear selector to **P**. Failure to follow these instructions may result in personal injury.

Visual Inspection Chart

Mechanical	Electrical
 Visibly damaged or worn parts Gear selector interlock solenoid Brake pedal switch 	Fuse(s)Wiring harness for damage or corrosionElectrical connector(s)

- 3. **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. **4.** If the cause is not visually evident, verify the symptom and refer to the Jaguar approved diagnostic system.

Symptom Chart

CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

- NOTE: Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.
- 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.

Symptom (general)	Symptom (specific)	Possible source	Action
	Interlock function will not operate/release	 Brake shift interlock solenoid circuit failure Brake shift interlock solenoid failure 	GO to Pinpoint Test <u>A.</u>

Diagnostic Trouble Code (DTC) Index

Five Digit DTC	Component	Description	Condition	Action
P1780 (To VIN	D-4 switch	Switch or circuit	D-4 switch inoperative or out of	GO to Pinpoint
D15361)	malfunction	malfunction	range	Test <u>B.</u>
P0915 (From VIN	J-Gate input	J-Gate or circuit	Left-hand side of the J-Gate	GO to Pinpoint
D15362)		malfunction	inoperative	Test <u>C.</u>

PINPOINT TEST A : J-GATE SYSTEM CIRCUIT CHECKS		
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS	
A1: CHECK IGNITION SUPPLY TO THE J-GATE.		
	1 Disconnect the J-Gate electrical connector, IP14.	
	2 Turn the ignition switch to the ON position.	
	3 Measure the voltage between IP14, pin 01 (WR) and GROUND.	
	Is the voltage less than 10 Volts?	
	Yes REPAIR the circuit between IP14 pin 01 (WR) and the ignition switch. For additional information, refer to the wiring diagrams. TEST the system for normal operation. No GO to A2.	
A2: CHECK GROUND SUPPLY TO THE J-GATE.		
	1 Turn the ignition switch to the OFF position.	
	2 Measure the resistance between IP14, 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. TEST the system for normal operation.
No
CHECK for CAN DTCs.
REFER to Section 418-00 Module Communications Network.

	REFER to Section 418-00 Module Communications Network.
DINIDOINIT T	FOT D. DATOO D. A CHAITOU MAI FUNCTION (TO MAI DAFO(A)
	EST B : P1780. D-4 SWITCH MALFUNCTION (TO VIN D15361)
ı	rect adjustment of the selector cable could result in this DTC being set with no electrical fault being
present.	
	ctor Lever Cable Adjustment - in this section.
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	·
B1: CHECK IC	SNITION SUPPLY TO THE J-GATE.
	1 Disconnect the J-Gate electrical connector, IP14.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between IP14, pin 01 (WR) and GROUND.
	Is the voltage less than 10 volts?
	Yes
	REPAIR the circuit between IP14, pin 01 (WR) and the ignition switch (this circuit includes the
	Central Junction fuse box, Ignition relay, and inertia switch). For additional information, refer to
	the wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No
	GO to B2.
DS: CHECK CI	ROUND SUPPLY TO THE J-GATE.
DZ: CHECK GI	
	2 Measure the resistance between IP14, 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
	GO to B3.
B3: CHECK D	4 SWITCH SIGNAL WIRE FOR HIGH RESISTANCE.
	1 Disconnect the TCM electrical connector, JB131.
	2 Measure the resistance between IP14, pin 05 (BW) and JB131, pin 45 (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 J-Gate.
	REFER to <u>Transmission Selector Lever - in this section.</u>
	EST C : P0915 J-GATE SIGNAL INPUTS TO THE TCM (FROM VIN D15362)
ı	rect adjustment of the selector cable could result in this DTC being set with no electrical fault being
present.	
REFER to Sele	ctor Lever Cable Adjustment - in this section.

<u>PINPOINT T</u>	EST C : P0915 J-GATE SIGNAL INPUTS TO THE TCM (FROM VIN D15362)
NOTE: Incorr	rect adjustment of the selector cable could result in this DTC being set with no electrical fault being
oresent.	
REFER to Select	<u>ctor Lever Cable Adjustment - in this section.</u>
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
C1: CHECK TE	RANSMISSION RANGE SENSOR CONTINUITY IN D.
	1 Disconnect TR sensor electrical connector JB156.
	2 Select D .
	3 Check for continuity between JB156, pin 08 and pin 01 at the sensor.
	Is the circuit continuous?
	Yes
	GO to C2.
	No
	Carry out the adjustment procedure for the Transmission Range Sensor.
	REFER to <u>Transmission Range (TR) Sensor Adjustment</u> in this section.
	Recheck the circuit. If still open circuit, INSTALL a new Transmission Range Sensor.
	REFER to <u>Transmission Range (TR) Sensor</u> in this section.
	CLEAR the DTC. TEST the system for normal operation.
C2: CHECK TR	RANSMISSION RANGE SENSOR DRIVE SIGNAL WIRE FOR HIGH RESISTANCE.
	1 Disconnect the TCM electrical connector, JB131.

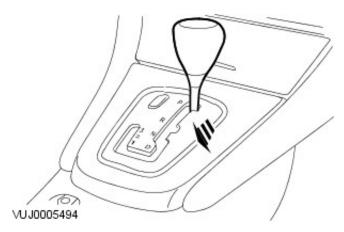
	2 Measure the resistance between JB131, pin 27 (Y) and JB156, pin 01 (Y).
	Is the resistance greater than 5 ohms?
	Yes REPAIR the high resistance circuit. For additional information, refer to wiring diagrams. CLEAR the
	DTC. TEST the system for normal operation. No
	GO to C3.
C3: CHECK IC	SNITION SUPPLY TO THE J-GATE.
	1 Disconnect the J-Gate electrical connector, IP14.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between IP14, pin 01 (WR) and ground.
	Is the voltage less than 10 volts?
	Pes REPAIR the circuit between IP14, pin 01 (WR) and the ignition switch (this circuit includes the Central Junction fuse box, Ignition relay, and inertia switch). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No
CA. CHECK CI	GO to C4. ROUND SUPPLY TO THE J-GATE.
C4. CHECK GI	1 Turn the ignition switch to the OFF position.
	2 Measure the resistance between J-Gate electrical connector IP14, 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
	GO to C5.
C5: CHECK J-	GATE SIGNAL INPUT WIRES FOR CONTINUITY (4 RANGE).
	Disconnect the TCM electrical connector JB131.
	Measure the resistance between IP14 pin 05 (BW) and JB131 pin 45 (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 OO LOOK
C4 - CLIECK TI	GO to C6.
C6: CHECK IF	HE J-GATE SIGNAL INPUT WIRES FOR CONTINUITY (3 RANGE).
	1 Measure the resistance between IP14 pin 15 (O) and JB131 pin 07 (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
-	<u>GO to C7</u> .
C7: CHECK TH	HE J-GATE SIGNAL INPUT WIRES FOR CONTINUITY (2 RANGE).
	1 Measure the resistance between IP14 pin 14 (R) and JB131 pin 08 (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 C8.
C8: J-GATE S	IGNALS FUNCTIONALITY
	1 If tests between C1 and C7 have been successfully completed and the fault is still present, INSTALL a new J-Gate.
	2 CLEAR the DTC.
	3 TEST the system for normal operation.
	Does the system function correctly?
	Yes No further action required.
	No Contact dealer technical support for advice on possible module.

Automatic Transmission/Transaxle External Controls - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Selector Lever Cable Adjustment

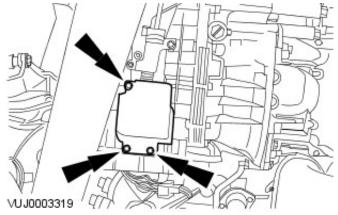
General Procedures

Setting Procedure-All Vehicles

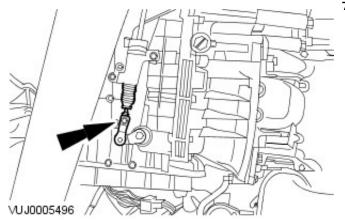
- 1. Apply the parking brake.
- 2. Apply the footbrake.
- **3.** Turn the ignition switch to position II.
- 4. Move the gear selector lever to 'N'.



- Raise and support the vehicle.
 For additional information, refer to Section 100-02 Jacking and Lifting.
- 6. Remove the gear selector cover plate.



7. Loosen the gear selector cable retaining bolt.

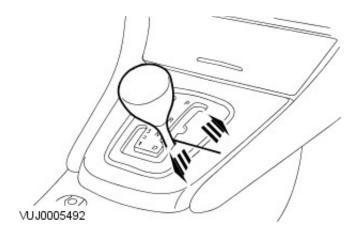


Vehicles Built up to VIN D15360

• NOTE: Before starting the 'J' gate setting procedure, make sure the vehicle is cold, or has been left to cool for at least two hours.

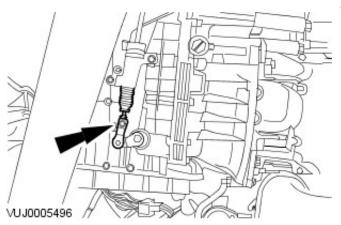
1. Using the corner of the grey feature line that follows the edge of the 'J' gate as a datum, use a rule and move the

gear selector forwards or back two millimeters.



All Vehicles

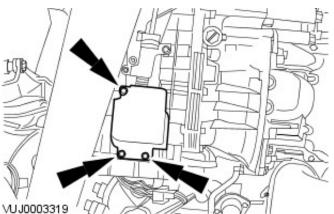
• NOTE: Before starting the 'J' gate setting procedure, make sure the vehicle is cold, or has been left to cool for at least two hours.



1. NOTE: Make sure the transmission is in neutral.

Fully tighten the cable retaining bolt

• Tighten to 5Nm.



- 2. Install the gear selector cover plate.
 - Tighten to 10Nm.

3. Check for correct operation. If setting is incorrect, repeat the above steps until correct operation is achieved.

Automatic Transmission/Transaxle External Controls - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Selector Lever Cable and Bracket

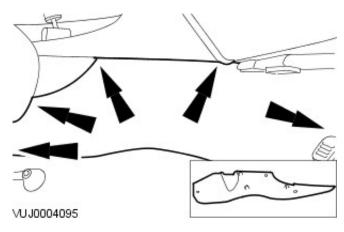
Removal and Installation

Removal

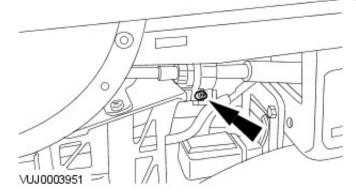
1. NOTE: To move the gear selector lever, the ignition must be in the RUN position, with the foot brake pressed.

Move the gear selector lever to "N" position.

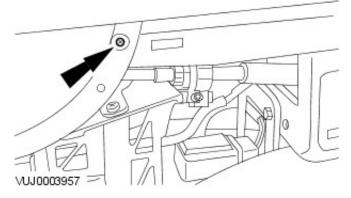
2. Remove the center console right-hand side trim panel.



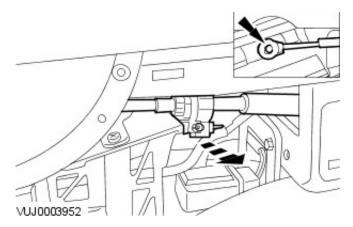
3. Release the gear selector cable locking pin.

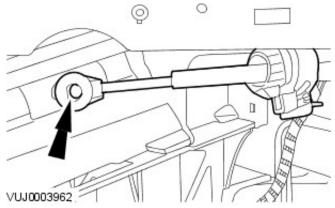


4. Remove the center console side retaining screw.

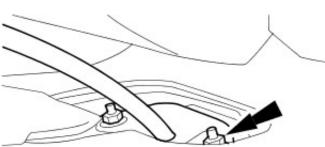


5. Detach the gear selector cable from the J-gate.





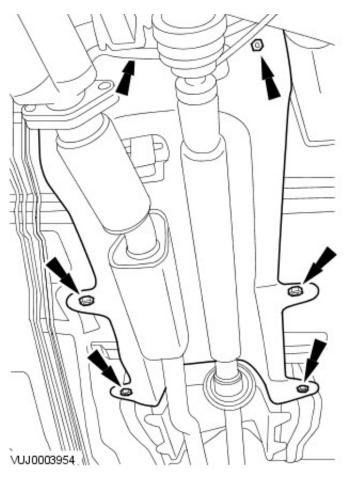
6. Disconnect the gear selector cable from the J-gate.

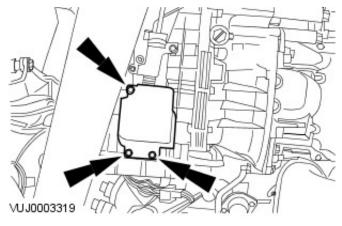


7. Detach the gear selector cable grommet.

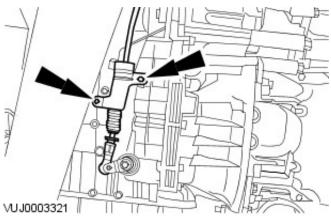
VUJ0003953

- **8.** Raise and support the vehicle. For additional information, refer to Section 100-02 Jacking and Lifting.
- 9. Detach the exhaust heat shield.



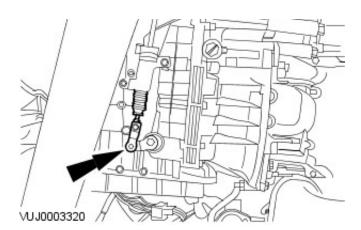


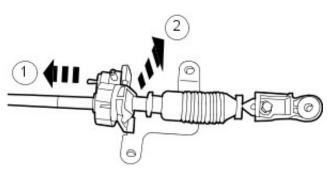
10. Remove the gear selector cable shield.



11. Detach the gear selector cable bracket.

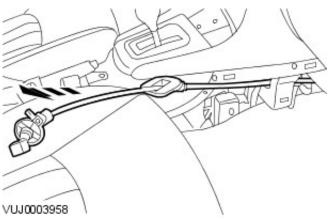
12. Disconnect the gear selector cable.





- **13.** Remove the gear selector cable from the gearbox mounting bracket.
 - 1. Pull out the locking pin.
 - 2. Remove the gear selector cable from the gearbox mounting bracket.

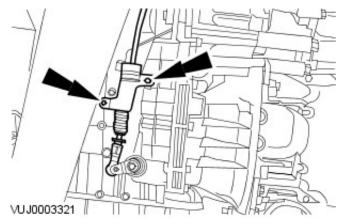




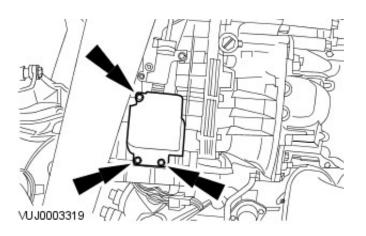
- 14. Lower the vehicle.
- 15. Remove the selector cable.

Installation

- **1.** To install, reverse the removal procedure.
 - Tighten to 10 Nm.



2. Tighten to 10 Nm.



Automatic Transmission/Transaxle External Controls - Vehicles With: 5-Speed Automatic Transaxle - JATCO - Selector Lever Assembly

Removal and Installation

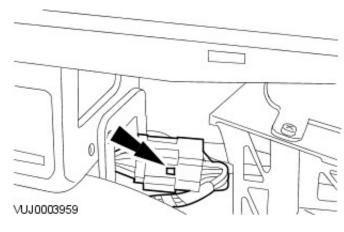
Removal

1. NOTE: To move the selector lever, the ignition must be in the RUN position, with the foot brake pressed.

Move the selector lever to the 'N' position.

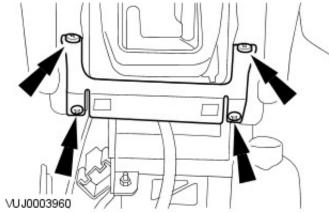
- 2. Remove the floor console.

 For additional information, refer to: Floor Console (501-12 Instrument Panel and Console, Removal and Installation).
- 3. Disconnect the electrical connector.

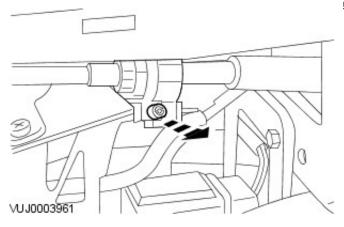


4. NOTE: The floor console bracket cannot be removed at this stage.

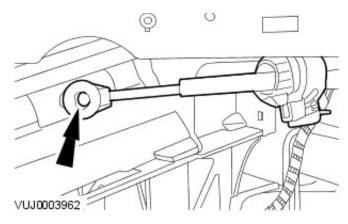
Remove the floor console bracket retaining screws.

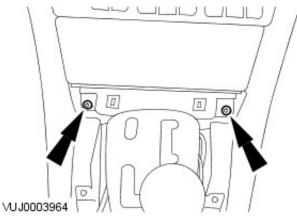


5. Release the selector lever cable locking pin.

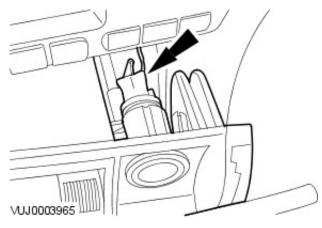


6. Disconnect the selector lever cable from the selector lever.

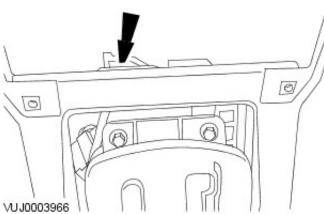




7. Remove the ashtray retaining screws.

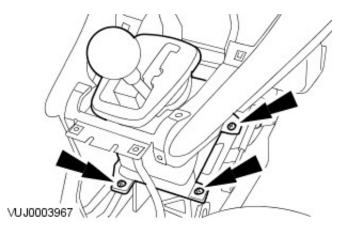


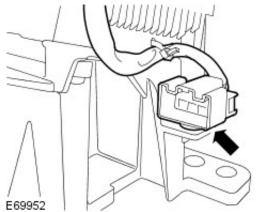
- 8. Remove the ashtray.
 - Disconnect the cigar lighter electrical connector.



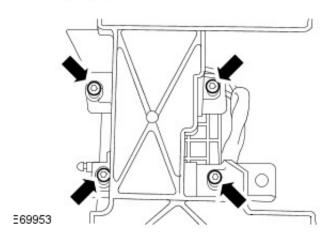
9. Remove the selector lever retaining screw.

10. Remove the selector lever.





11. Detach the electrical connector from the selector lever.

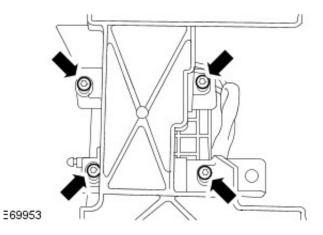


- **12.** Remove the selector lever from the selector lever bracket.
 - Remove the selector lever retaining screws.

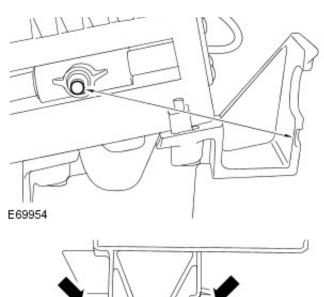


1. NOTE: Do not fully tighten the selector lever retaining screws at this stage.

Install the new selector lever to the selector lever bracket.



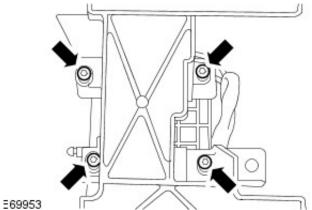
2. NOTE: The new selector lever is supplied with a setting tool installed, to hold the selector lever in the correct position for adjustment to be carried out.



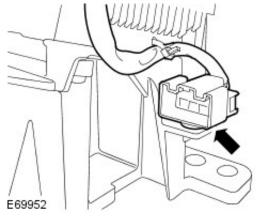
• NOTE: The setting tool must remain installed, until the selector lever cable adjustment has been carried out.

Set the distance between the selector lever pin and the selector lever bracket.

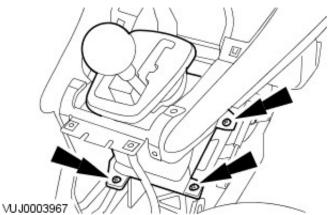
• Adjust the the distance to 97.5 mm (3.84 inches).



3. Tighten the selector retaining screws.

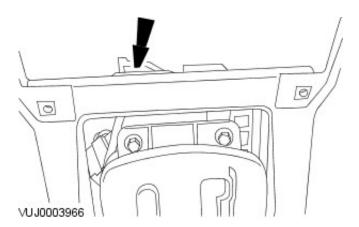


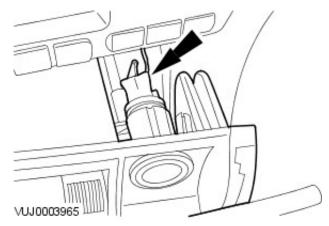
4. Attach the electrical connector to the selector lever.

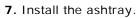


5. Install the selector lever.

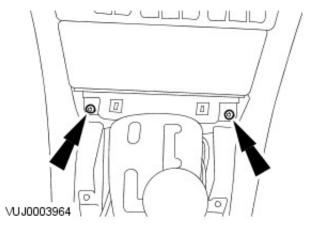
6. Install the selector lever retaining screw.



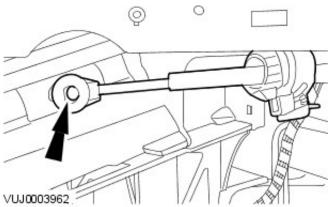




• Connect the cigar lighter electrical connector.

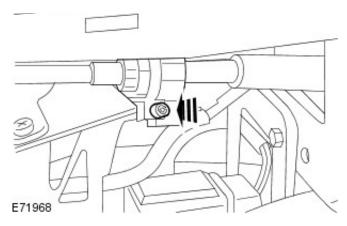


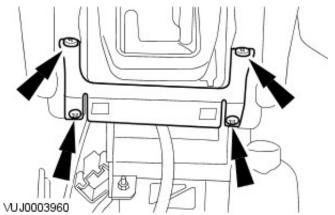
8. Install the ashtray retaining screws.



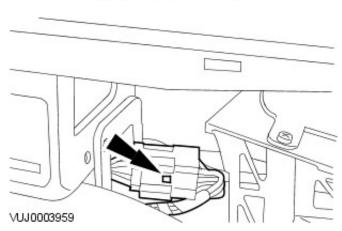
9. Connect the selector lever cable to the selector lever.

10. Install the selector lever cable locking pin.





11. Install the floor console bracket retaining screws.



12. Connect the selector lever electrical connector.

- 13. Set the selector lever cable adjustment.
 For additional information, refer to: Selector Lever Cable Adjustment (307-05B Automatic Transmission/Transaxle External Controls Vehicles With: 6-Speed Automatic Transaxle AWF21, General Procedures).
- **14.** Remove the selector lever setting tool.
- **15.** Install the floor console. For additional information, refer to: Floor Console (501-12 Instrument Panel and Console, Removal and Installation).
- **16.** Move the selector lever to the 'P' position.

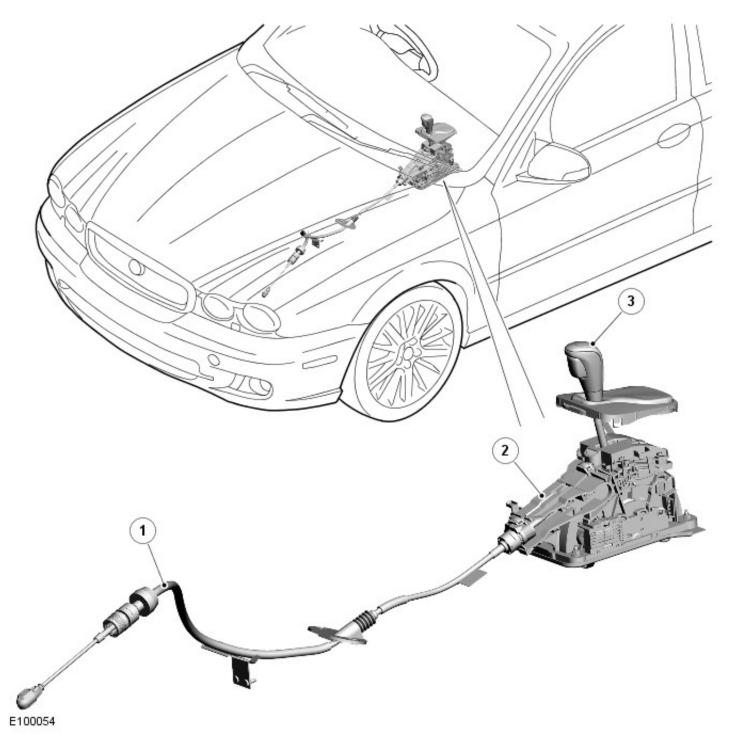
Automatic Transmission/Transaxle External Controls - Vehicles With: 6-Speed Automatic Transaxle - AWF21 -

Torque Specifications

Description	Nm	lb-ft	lb-in
Selector cable shield	10	7	-
Selector cable retaining bracket	10	7	-

Automatic Transmission/Transaxle External Controls - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - External ControlsVehicles With: 6-Speed Automatic Transaxle - AWF21 Description and Operation

COMPONENT LOCATION - AW F21 6 SPEED AUTOMATIC TRANSMISSION FROM 2009MY



Item	Part Number	Description
1	-	Selector cable
2	-	Selector lever assembly
3	-	Selector knob, gaiter and illumination module

OVERVIEW

The automatic transmission external controls comprise a selector lever assembly and a transmission cable. The selector lever allows the driver to select forward or reverse gears and also to engage sport or manual 'Jaguar

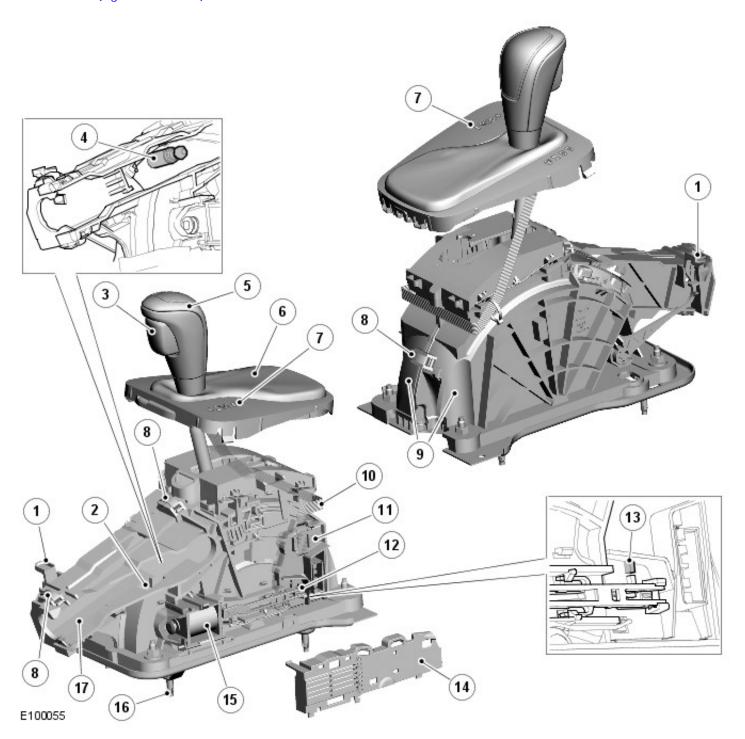
Sequential Shift' modes.

Movement of the selector lever is confirmed to the driver by illumination of the applicable position LED (light emitting diode) on the illumination module and by a message displayed in the instrument cluster message center.

• NOTE: PRND is not displayed in the message center. When in sport mode 'S' is displayed and when in Jaguar Sequential Shift mode the selected gear (1, 2, 3, 4, 5, or 6) is displayed.

SELECTOR LEVER

• NOTE: RHD (right-hand drive) version shown



Item	Part Number	Description
1	-	Interlock solenoid - Emergency release lever
2	-	Cable adjustment/setting aperture
3	-	Selector lever button
4	-	Cable attachment ball pin

5	-	Knob
6	-	Gaiter
7	-	Selector position LED's
8	-	Spring clip
9	-	Shift housing Left Hand (LH) and Right Hand (RH)
10	-	Printed Circuit Board (PCB) ribbon cable and connector
11	-	Gear shift module
12	-	Sensor arm
13	-	Optical sensor alignment mark
14	-	Cover
15	-	Shift interlock solenoid
16	-	Mounting bolt (4 off)
17	-	Cable abutment aperture

The selector lever assembly is located in a central position on the transmission tunnel, between the front driver and passenger seats and is secured to the transmission tunnel with 4 bolts. The selector lever assembly is an electromechanical assembly which is used by the driver to select the required transmission mode. Serviceable parts comprise the shifter mounting plate, the knob, the PRND LED display, gaiter and illumination module assembly and the base shifter. If other selector components require replacement then a complete shifter assembly will need to be fitted.

Selections made using the selector lever are passed to the transmission lever arm by a cable. A ball pin is attached to the lever mechanism and provides for the attachment of the cable.

There are 5 selector lever positions and 2 additional positions for manual 'Jaguar Sequential Shift' operation:

- P (Park) Prevents the vehicle from moving by locking the transmission
- R (Reverse) Select only when the vehicle is stationary and the engine is at idle
- N (Neutral) No torque transmitted to drive wheels
- D (Drive) Select only when the vehicle is stationary and the engine speed is at idle. Allows the transmission to automatically select the most appropriate of the 6 forward gears
- M/S (Manual/Sport Mode) Initial selection of this position activates the transmission 'Sport' mode. This position has the same function as 'D' but forces the transmission to upshift at higher engine speeds to improve acceleration
- + and (Manual 'Jaguar Sequential Shift' mode) Movement of the selector lever in the +/- positions, when the lever is in the M/S position, will operate the transmission in manual (Jaguar Sequential Shift) mode allowing the driver to manually select all 6 forward gears.
 - To change back to Sport mode once Manual 'Jaguar Sequential Shift' mode has been engaged, the selector lever must first be moved to the 'D' position and then returned to the M/S position.

The selector lever position is shown on the PRND LED display on the selector illumination module. The illumination of the LED's is controlled by CAN (controller area network) messages from the instrument cluster.

The selector lever position when in 'Sport' or 'Jaguar Sequential Shift' mode is displayed to the driver on the selector position LED and in the instrument cluster. PRND positions are not displayed. In 'Jaguar Sequential Shift' mode, if a gear is selected but the TCM (transmission control module) logic prevents selection of that gear, the requested gear will be initially displayed. The TCM will engage the next allowed gear and then display that gear. In 'Jaguar Sequential Shift' when a gear is selected it will only be displayed in the instrument cluster message center.

Gear Shift Module

A gear shift module is located on the LH (left-hand) side of the selector lever. The gear shift module is an intelligent unit and controls the selector position LED operation and also the shift interlock solenoid operation. The module comprises a Printed Circuit Board (PCB) and Hall sensors which detect the selected position of the selector lever, when in M/S and + and - positions, via a magnet located on the lever mechanism. The signals from the Hall sensors are passed from a connector on the gear shift module to the TCM on a LIN (local interconnect network).

The gear shift module main connector uses 4 pins for LIN bus, ground, power and neutral inputs and outputs. A second connector allows for the connection of a ribbon cable from the selector position LED for background illumination and position illumination. A third connector supplies power and ground connections to the shift interlock solenoid.

Shift Interlock

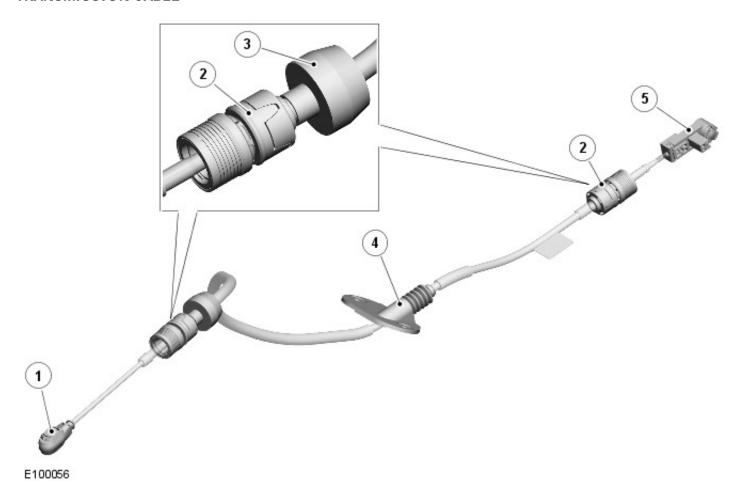
The shift interlock solenoid is located on the LH side of the selector lever assembly. The solenoid operates a locking lever which engages with the lever mechanism and locks it in the Park (P) and Neutral (N) positions. When the ignition is in power mode 6 or the engine is running, the solenoid is de-energised and prevents the lever from moving from these positions until the brake pedal is pressed.

The neutral interlock feature only operates after a period of approximately 3 seconds. This allows the driver to move the selector lever between gears ('D' to 'R') without the need to operate the brake pedal.

• NOTE: The selector lever cannot be moved from the 'Park' position if the ignition is off.

If a fault occurs with the shift interlock solenoid, the sensor module or the brake switch, an emergency release lever is provided to disconnect the interlock mechanism. The emergency release lever can be accessed by removal of the RH (right-hand) carpet panel from the floor console. The panel can be removed to gain access to the release lever which is located at the front of the selector lever assembly and is colored yellow for identification.

TRANSMISSION CABLE



Item	Part Number	Description
1	-	Transmission eye end
2	-	Abutment
3	-	Damper weight
4	-	Bulkhead grommet
5	-	Selector lever arm eye end and adjuster

The transmission cable assembly is a one-piece, push/pull cable connected between the transmission and the selector lever.

The selector lever end of the cable has an adjustable eye end which locates on a ball pin on the selector lever. An abutment on the cable outer sheath locates in an aperture in the selector lever shift housing. The transmission end of the cable also has an eye end which locates on a ball pin on the end of the transmission lever arm. An abutment on the outer sheath locates in a bracket attached to the top of the transmission. A damper weight is attached to the cable outer sheath to reduce noise and vibration being transmitted to the selector lever.

The purpose of the manual adjuster on the selector lever arm eye end is to accommodate vehicle to vehicle build tolerances. This ensures that the selector lever movements are correctly aligned with the movements of the transmission selector lever. This is essential to ensure the correct function of the selector mechanism.

Automatic Transmission/Transaxle External Controls - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - External Controls

Diagnosis and Testing

Inspection and Verification

- 1. **1.** Verify the customer concern.
- 2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.

WARNING: Danger of accident. Apply the parking brake. Shift the gear selector to **P**. Failure to follow these instructions may result in personal injury.

Visual Inspection Chart

Mechanical	Electrical
 Visibly damaged or worn parts Gear selector interlock solenoid Brake pedal switch 	Fuse(s)Wiring harness for damage or corrosionElectrical connector(s)

- 3. **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 refer to the Jaguar approved diagnostic system.

Symptom Chart

CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

- NOTE: Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.
- 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.

Symptom (general)	Symptom (specific)	Possible source	Action
	Interlock function will not operate/release	 Brake shift interlock solenoid circuit failure Brake shift interlock solenoid failure 	GO to Pinpoint Test <u>A.</u>

Diagnostic Trouble Code (DTC) Index

Five Digit DTC	Component	Description	Condition	Action
P1780 (To VIN	D-4 switch	Switch or circuit	D-4 switch inoperative or out of	GO to Pinpoint
D15361)	malfunction	malfunction	range	Test <u>B.</u>
	J-Gate input	J-Gate or circuit	Left-hand side of the J-Gate	GO to Pinpoint
D15362)		malfunction	inoperative	Test <u>C.</u>

DINIDOINT T	EST A : J-GATE SYSTEM CIRCUIT CHECKS	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS	i e e e e e e e e e e e e e e e e e e e	
A1: CHECK IC	SNITION SUPPLY TO THE J-GATE.	
	1 Disconnect the J-Gate electrical connector, IP14.	
	2 Turn the ignition switch to the ON position.	
	3 Measure the voltage between IP14, pin 01 (WR) and GROUND.	
	Is the voltage less than 10 Volts?	
	Yes	
	REPAIR the circuit between IP14 pin 01 (WR) and the ignition switch. For additional information,	
	refer to the wiring diagrams. TEST the system for normal operation.	
	No	
	<u>GO to A2</u> .	
A2: CHECK GI	A2: CHECK GROUND SUPPLY TO THE J-GATE.	
	1 Turn the ignition switch to the OFF position.	
	2 Measure the resistance between IP14, pin 02 (B) and GROUND.	
MZ. CHECK GI	1 Turn the ignition switch to the OFF position.	

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
CHECK for CAN DTCs.
REFER to Section 418-00 Module Communications Network.

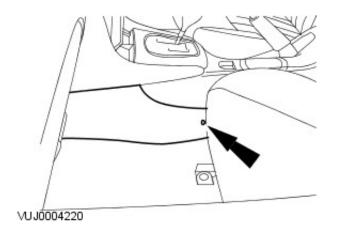
DINIDOLNIT TEGT D. DATOG D. A GWITCH MALEUNGTION (TO VIN DAEG (A)
PINPOINT TEST B: P1780. D-4 SWITCH MALFUNCTION (TO VIN D15361)
• NOTE: Incorrect adjustment of the selector cable could result in this DTC being set with no electrical fault being
present.
REFER to Selector Lever Cable Adjustment - in this section.
TEST DETAILS/RESULTS/ACTIONS
CONDITIONS
B1: CHECK IGNITION SUPPLY TO THE J-GATE.
1 Disconnect the J-Gate electrical connector, IP14.
2 Turn the ignition switch to the ON position.
3 Measure the voltage between IP14, pin 01 (WR) and GROUND.
Is the voltage less than 10 volts?
Yes
REPAIR the circuit between IP14, pin 01 (WR) and the ignition switch (this circuit includes the
Central Junction fuse box, Ignition relay, and inertia switch). For additional information, refer to
the wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No
GO to B2.
B2: CHECK GROUND SUPPLY TO THE J-GATE.
1 Turn the ignition switch to the OFF position.
2 Measure the resistance between IP14, 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
GO to B3.
B3: CHECK D-4 SWITCH SIGNAL WIRE FOR HIGH RESISTANCE.
1 Disconnect the TCM electrical connector, JB131.
2 Measure the resistance between IP14, pin 05 (BW) and JB131, pin 45 (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 J-Gate.
REFER to <u>Transmission Selector Lever -</u> in this section.
PINPOINT TEST C : P0915 J-GATE SIGNAL INPUTS TO THE TCM (FROM VIN D15362)
 NOTE: Incorrect adjustment of the selector cable could result in this DTC being set with no electrical fault being present.
REFER to Selector Lever Cable Adjustment - in this section.

<u>PINPOINT T</u>	EST C : P0915 J-GATE SIGNAL INPUTS TO THE TCM (FROM VIN D15362)
 NOTE: Incorr 	rect adjustment of the selector cable could result in this DTC being set with no electrical fault being
present.	
REFER to Select	<u>ctor Lever Cable Adjustment - in this section.</u>
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
C1: CHECK TR	RANSMISSION RANGE SENSOR CONTINUITY IN D.
	1 Disconnect TR sensor electrical connector JB156.
	2 Select D.
	3 Check for continuity between JB156, pin 08 and pin 01 at the sensor.
	Is the circuit continuous?
	Yes
	GO to C2.
	No
	Carry out the adjustment procedure for the Transmission Range Sensor.
	REFER to Transmission Range (TR) Sensor Adjustment in this section.
	Recheck the circuit. If still open circuit, INSTALL a new Transmission Range Sensor.
	REFER to <u>Transmission Range (TR) Sensor</u> in this section.
	CLEAR the DTC. TEST the system for normal operation.
C2: CHECK TR	RANSMISSION RANGE SENSOR DRIVE SIGNAL WIRE FOR HIGH RESISTANCE.
	1 Disconnect the TCM electrical connector, JB131.

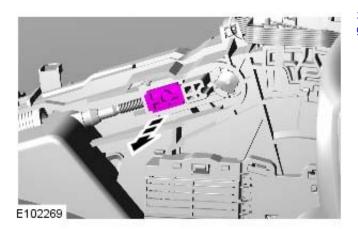
1	2 Measure the resistance between JB131, pin 27 (Y) and JB156, pin 01 (Y).
	Is the resistance greater than 5 ohms?
	Yes REPAIR the high resistance circuit. For additional information, refer to wiring diagrams. CLEAR the
	DTC. TEST the system for normal operation. No
	GO to C3.
C3: CHECK IG	NITION SUPPLY TO THE J-GATE.
	1 Disconnect the J-Gate electrical connector, IP14.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between IP14, pin 01 (WR) and ground.
	Is the voltage less than 10 volts?
	Yes REPAIR the circuit between IP14, pin 01 (WR) and the ignition switch (this circuit includes the Central Junction fuse box, Ignition relay, and inertia switch). For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation. No
CA. CHECK CI	GO to C4. ROUND SUPPLY TO THE J-GATE.
C4. CHECK G	1 Turn the ignition switch to the OFF position.
	Measure the resistance between J-Gate electrical connector IP14, 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
	GO to C5.
C5: CHECK J-	GATE SIGNAL INPUT WIRES FOR CONTINUITY (4 RANGE).
	1 Disconnect the TCM electrical connector JB131.
	2 Measure the resistance between IP14 pin 05 (BW) and JB131 pin 45 (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 Oo Look
C4 - CHECK TI	GO to C6.
C6: CHECK IF	HE J-GATE SIGNAL INPUT WIRES FOR CONTINUITY (3 RANGE).
	1 Measure the resistance between IP14 pin 15 (O) and JB131 pin 07 (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
	<u>GO to C7</u> .
C7: CHECK TH	HE J-GATE SIGNAL INPUT WIRES FOR CONTINUITY (2 RANGE).
	1 Measure the resistance between IP14 pin 14 (R) and JB131 pin 08 (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 C8.
C8: J-GATE S	IGNALS FUNCTIONALITY
	If tests between C1 and C7 have been successfully completed and the fault is still present, INSTALL a new J-Gate.
	2 CLEAR the DTC.
	3 TEST the system for normal operation.
	Does the system function correctly? Yes
	No further action required. No
	Contact dealer technical support for advice on possible module.

Automatic Transmission/Transaxle External Controls - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Selector Lever Cable Adjustment

General Procedures

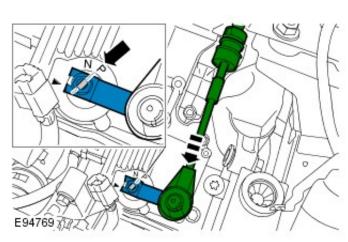


- **1.** Check the operation of the transmission selector lever.
- 2. Remove the center console LH side finisher trim panel.



3. CAUTION: Make sure that the selector lever and the gearshift mechanism are in the park (P) position.

Release the transmission selector cable adjuster.

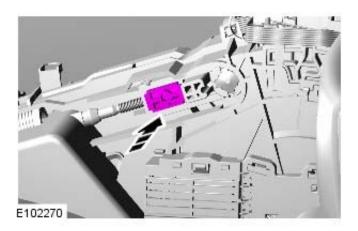


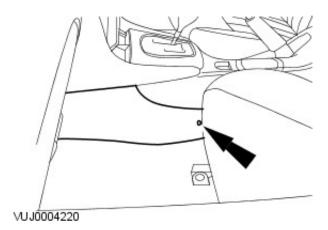
4. Remove the battery tray. For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).

5. CAUTION: Make sure that the selector lever and the gearshift mechanism are in the park (P) position.

Adjust the transmission selector cable.

6. Lock the transmission selector cable adjuster.





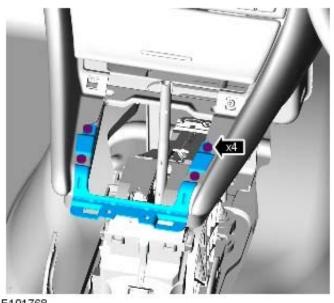
- 7. Install the battery tray.
 For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- **8.** Install the center console LH side finisher trim panel.

Automatic Transmission/Transaxle External Controls - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Selector Lever Assembly

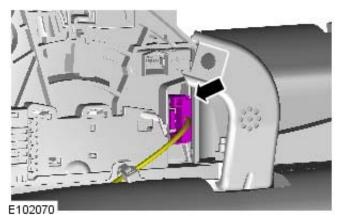
Removal and Installation

Removal

- Remove the floor console.
 For additional information, refer to: Floor Console (501-12 Instrument Panel and Console, Removal and Installation).
 - 2. Remove the floor console reinforcement bracket.
 - Remove the 4 Torx bolts.

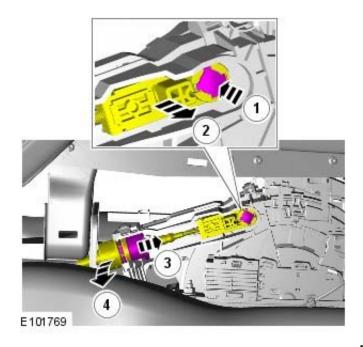


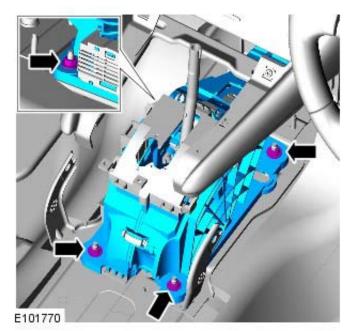
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3. Disconnect the selector lever assembly electrical connector.

- 4. Release the transmission selector cable.
 - Release from the selector lever assembly.





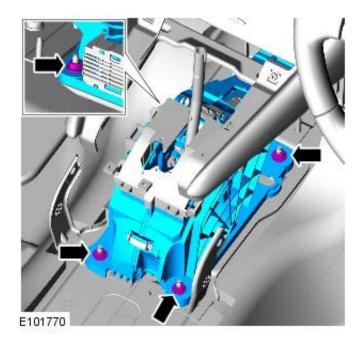
- **5.** Remove the selector lever assembly.
 - Remove the 4 nuts.

Installation

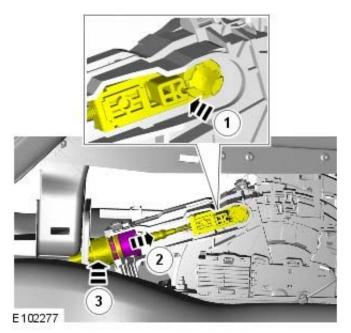
1. NOTE: Tighten the front 2 bolts first.

Install the selector lever assembly.

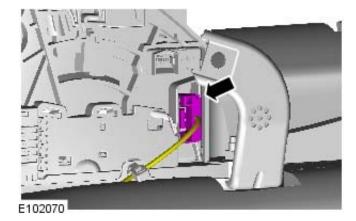
• Tighten to 10 Nm.



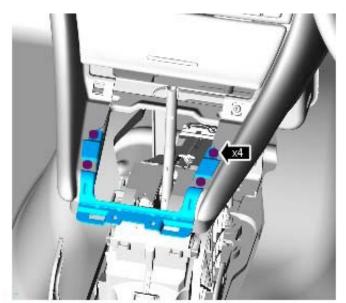
2. Attach the transmission selector lever cable.



3. Connect the selector lever assembly electrical connector.



- **4.** Install the floor console reinforcement bracket.
 - Tighten to 3 Nm.



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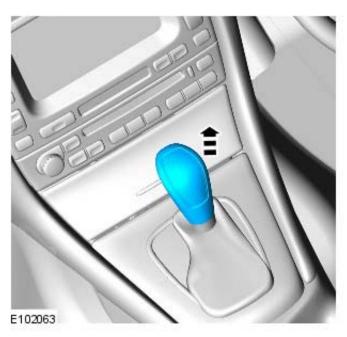
5. Install the floor console. For additional information, refer to: Floor Console (501-12 Instrument Panel and Console, Removal and Installation).

Automatic Transmission/Transaxle External Controls - Vehicles With: 6-Speed Automatic Transaxle - AWF21 - Selector Lever Knob

Removal and Installation

Removal

- E102062
- 1. Release the selector lever gaiter from the selector lever knob
 - Rotate the chrome finisher clockwise and push downwards.



2. WARNING: The selector lever knob will be released suddenly, keep face clear during removal.

Remove the selector lever knob.

• Pull the selector lever knob upwards.

Installation

1. To install, reverse the removal procedure.

Manual Transmission/Transaxle and Clutch - General Information -

Lubricants, Fluids, Sealers and Adhesives

Item	Specification
Brake fluid	ITT Super Dot 4

Manual Transmission/Transaxle and Clutch - General Information - Manual Transmission and Clutch

Description and Operation

The clutch system consists of the following components:

- A flywheel
- A clutch disc
- A clutch pressure plate
- A clutch master cylinder
- A clutch slave cylinder
- · A clutch release hub and bearing

The clutch master cylinder transmits fluid pressure to the slave cylinder, which in turn moves the clutch release hub and bearing.

The clutch master cylinder uses brake fluid and shares a common reservoir with the brake master cylinder.

The clutch is a single plate, dry-friction disc with a diaphragm-style spring clutch pressure plate. The clutch disc has a hub which is splined to the input shaft. The clutch disc has friction material where it contacts the flywheel and the pressure plate. The clutch pressure plate applies pressure to the clutch disc, holding it tightly against the surface of the flywheel.

In the engaged position, the diaphragm spring holds the clutch pressure plate against the clutch disc, so that engine torque is transmitted to the input shaft. When the clutch pedal is depressed, the clutch release hub and bearing pushes the diaphragm spring center toward the flywheel. The diaphragm spring pivots at the fulcrum, relieving the load on the clutch pressure plate. Steel spring straps riveted to the clutch pressure plate cover pull the clutch pressure plate from the clutch disc, disengaging the engine torque from the transmission and enabling the gears to be changed.

Manual Transmission/Transaxle and Clutch - General Information - Manual Transmission and Clutch

Diagnosis and Testing

Inspection and Verification - Clutch

As fault diagnosis starts when repairs are taken on, the following procedure is recommended:

- 1. **1.** Verify the customer concern by operating the system.
- 2. 2. Visually inspect for obvious signs of mechanical damage.

Visual Inspection Chart

Mechanical	Electrical
Transmission oil leakMissing screws or nuts	•

- 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. 4. If the concern is not visually evident, verify the symptom and refer to the Symptom Chart.

Inspection and Verification - Manual Transmission

The following checks should be carried out before repairing or installing a new transmission:

Transmission Noise

If transmission noises are reported, check the transmission fluid level. If damage has occurred due to a lack of fluid, install a new transmission.

Oil Leakage

- Check that the leaking fluid is actually transmission fluid and not hydraulic fluid (from the hydraulically operated clutch) or engine oil.
- Check the transmission fluid level and, as necessary, drain off any excess fluid.
- Clean the transmission and the adjacent areas carefully before the road test.

Symptom Chart - Poor gear shifting

Symptom Chart

Symptom	Possible Sources	Action
Significant effort required when downshifting or synchronizer crashing	* Gear synchronization is inadequate.	 * Check oil level. * Check gear linkage. * INSTALL a new transmission.
Gear jumps out of engagement while driving	Worn or broken synchronizer components. Manufacturing error (incorrect gear wheel toothing or synchronizer ring).	* INSTALL a new transmission.
Gearshift problems in different gears (stiff or partially seized)	* Gear linkage.	 * Check oil level. * Check gear linkage. * INSTALL a new transmission.
Brief scratching noise during gear shifting	* Inadequate gear synchronization.	* Check oil level. * Check gear linkage. * INSTALL a new transmission.

Symptom Chart - Oil leakage

Symptom Chart

Symptom	Possible Sources	Action
Leak from transmission	* Leak from breather.	* CHECK oil level.
housing	* Leak from fill plug.	* TIGHTEN fill plug.
	* Leak from drain plug.	* TIGHTEN drain plug.

 Sealing lip of the output shaft oil seal damaged. 	* INSTALL a new output shaft seal and drive flange if seal is damaged.
 Oil leaking from the selector shaft oil seal. 	* INSTALL a new selector shaft seal.
* Leak from crankshaft rear seal.	* INSTALL a new crankshaft seal.
 Leak from clutch hydraulics. 	* For additional information, refer to Pinpoint Test H.
* Sealing lip on input shaft damaged.	* INSTALL a new input shaft seal.

Symptom Chart - General Concerns

Symptom Chart		_	
Symptom	Possible Sources		Action
Clicking noises in reverse gear	* Gear wheels.	*	RUN the vehicle on wheel free ramp to establish that the noise is coming from the transmission. If the noise is coming from the transmission INSTALL a new transmission.
Gear wheels banging when shifting	* Damaged clutch.	* - -	CHECK the clutch is clearing correctly. No-For additional information, refer to Pinpoint Test A. Yes-CHECK transmission oil level. If transmission level is okay INSTALL a new transmission.
	 Selector forks or synchronizer rings. 	*	INSTALL a new transmission.
Noises in the forward gears	 Transmission fluid level low 	*	FILL the transmission with correct amount of fluid.
	 The engine/transmission assembly is in contact with the chassis/body. 	*	INSPECT for points of contact or damaged engine/transmission isolator, support insulator.
	 Engine/transmission flange bolts. 	*	TIGHTEN the transmission flange bolts. For additional information, refer to 308-03.
	 Input and output shaft bearings. 	*	INSTALL a new transmission.
Gears jump out of engagement	* Engine/transmission support insulator.* Internal components.	*	REPAIR or INSTALL new components as necessary. INSTALL a new transmission.
One of the gears cannot be selected	* Gearshift linkage malfunction.	*	CHECK gearshift linkage correctly attached to transmission case, sector arm and the rear mounted to body. CHECK gearshift linkage functions correctly.
	 * Transmission internal selection problem. 	*	INSTALL a new transmission.
Gears jumps out of engagement	 * Gearshift linkage fault. * Internal selector mechanism loose. * Synchronizer fault. 	* *	CHECK gearshift linkage for correct function. INSTALL a new transmission. INSTALL a new transmission.
Clattering, or rattling noises	* Gearshift mechanism foul to body.	*	Make sure that the gearshift mechanism is correctly located onto the gearbox. Make sure that there are no components fouling the gearshift linkage.
	* Gearshift lever joint.	*	CHECK free play in bearing between the lever and support housing, and between the lever and shift arm.
	* Gearshift lever knob loose.	*	TIGHTEN the gearshift lever knob or, INSTALL a new knob as necessary.
Gearshift linkage has excessive play	* Gear lever bearing worn.* Gearshift selector rod assembly damaged or worn	*	CHECK free play in bearing. INSTALL a new if necessary. INSTALL a new gearshift selector rod assembly
Gearshift linkage does not operate freely	 Excessive friction in lever bearing. Gearshift selector rod assembly damaged or worn Possible fault in transmission 	* *	INSTALL a new lever bearing. INSTALL new gearshift selector rod assembly INSTALL new transmission.

Symptom Chart - Clutch

Symptom Chart

Symptom	Possible Sources	Action
Clutch	* Clutch pedal free play.	* GO to Pinpoint Test A.

slippage	 * Sticking clutch pedal. * Diaphragm springs. * Clutch pressure plate. * Clutch disc facing. * Hardened or oiled clutch disc facing surface. * Flywheel. 	
	Excessive temperature. Slave cylinder sticking.	* ALLOW the clutch to fully cool. * CHECK slave cylinder travels freely over its complete travel.
Clutch chatter or shudder	* Adjuster ring at fully worn position. * Engine mounts. * Oil on clutch disc facing. * Diaphragm springs.	* INSTALL a new clutch drive plate. * GO to Pinpoint Test B.
Clutch drag	 * Clutch pressure plate. * Clutch disc facing. * Flywheel. * Insufficient brake fluid. 	* GO to Pinpoint Test C.
	 * Air in hydraulic system. * Clutch pedal free play. * Diaphragm springs. * Clutch disc. * Clutch disc splines. * Oil on clutch disc facing. 	·
	* Insufficient clutch pedal travel.	Make sure the clutch pedal has its full range of travel. Make sure the clutch pedal returns to the fully released position and the reservoir is full.
Clutch pedal pulsation	 Clutch and brake pedal pivot shaft not correctly lubricated. Flywheel. Damaged springs in pressure plate. 	* GO to Pinpoint Test E.
	* Release bearing noisy or worn.* Cover assembly.	* INSTALL a new release bearing. * CHECK run out of clutch cover. INSTALL a new clutch cover.
Clutch pedal related vibrations	 Engine component grounding against frame. Accessory drive belt. Flywheel bolts. Flywheel. Imbalanced clutch pressure plate. 	* GO to Pinpoint Test E.
Hard shifting	 * Insufficient brake fluid. * Clutch pedal free play. * Manual transmission concern. 	* GO to Pinpoint Test F.
Excessive noise	 Clutch pedal free play. Clutch release bearing. Poor lubrication of clutch release bearing. Pilot bearing. Excessive crankshaft end play. 	* GO to Pinpoint Test G.
	* If the noise is heard from the transmission when the engine is started and switched off with the clutch engaged, and the noise disappears if the clutch pedal is depressed.	* INSTALL a new flywheel.
Fluid leakage	* Clutch master cylinder. * Clutch slave cylinder. * Clutch hydraulic tubes.	* GO to Pinpoint Test H.

PINPOINT TEST A : CLUTCH SLIPPAGE		
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
A1: TEST CLU	ITCH SLIPPAGE	
	1 Lock wheels and put parking brake on .	
	2 Start the engine and engage 4th gear.	
	3 Run the engine at approximately 2000 rpm.	
	4 Release clutch pedal slowly.	
	Does the engine stall when the clutch pedal is fully released?	
	Yes	
	Clutch OK.	
	No	
	GO to A2.	

A2: TES	T CLUTCH FOR CLEARING
	1 Start engine, fully depress the clutch pedal, partially engage reverse gear, slowly engage clutch until a grating noise is heard, depress the clutch slowly until grating stops.
	2 Measure pedal travel from the pedal to the floor.
	Is the measurement between 25mm and 45mm?
	Yes
	GO to A3.
	No No
	GO to B3.
A3: TES	T FULL PEDAL TRAVEL
	1 Measure the clutch pedal travel from fully up to fully compressed.
	Is the measurement between 140mm and 150mm?
	Yes
	GO to A4.
	No
	CHECK clutch pedal for obstructions. TEST the system for normal operation.
A4: TES	T CLUTCH PEDAL
	1 Check lubrication.
	Is the clutch pedal shaft sufficiently lubricated?
	Yes
	GO to B3.
	No
	Lubricate clutch pedal shaft.

PINPOINT TEST B : CLUTCH CHATTER OR SHUDDER				
TEST	DETAILS/RESULTS/ACTIONS			
CONDITIONS	IS			
B1: TEST CLUT	CH CHATTER OR SHUDDER			
	1 Start the engine and engage 1st gear.			
	2 Run the engine between 1200 rpm and 1500 rpm.			
	3 Release clutch pedal slowly.			
	Does the vehicle jerk when it starts off?			
	Yes			
	GO to B2.			
	No Obstala OK			
DO TEOT ENGL	Clutch OK.			
B2: TEST ENGI	NE/TRANSMISSION SUPPORT INSULATOR			
	1 Check engine/transmission mountings, support insulators for damage or loose bolts.			
	Are the engine/transmission mountings, support insulators loose or damaged? Yes			
	TIGHTEN the bolts or INSTALL new engine/transmission mountings as necessary. TEST the			
	system for normal operation.			
	No			
	GO to B3.			
B3: TEST CLUT	CH PRESSURE PLATE			
	1 Remove clutch pressure plate.			
	Does the clutch pressure plate have signs of wear or damage?			
	Yes			
	INSTALL a new clutch pressure plate.			
	No			
	<u>GO to B4</u> .			
B4: TEST CLUTCH FRICTION DISC				
	1 Visually check the clutch friction disc.			
	Is the clutch friction disc oil-fouled or does it have burn marks?			
	Yes INSTALL a new clutch friction disc. TEST the evetem for normal energtion			
	INSTALL a new clutch friction disc. TEST the system for normal operation. No			
	CHECK the flywheel.			
	oneok the hywheel.			

PINPOINT TEST C : CLUTCH DRAG	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C1: CHECK BRAKE FLUID LEVEL	
NOTE: The hydraulic clutch fluid is supplied from the brake master cylinder.	
	1 Check the brake fluid level.
	Is the brake fluid level between the MAX and MIN marks on the brake fluid reservoir?

	Yes GO to C2. No FILL brake fluid, the brake and clutch system for leaks. Test system for normal operation.
C2: TEST CLUTCH P	EDAL FREE TRAVEL
	1 Operate clutch pedal manually to the point of resistance and release.
	2 Measure pedal travel.
	Is the measured dimension within 15 mm?
	Yes
	INSTALL a new clutch pressure plate. TEST the system for normal operation.
	No GO to B3.

PINPOINT TEST D : CLUTCH PEDAL PULSATION	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
D1: TEST CLUTCH PED	AL
	1 Check lubrication.
	Is the clutch pedal shaft sufficiently lubricated?
	Yes
	CHECK the flywheel.
	No
	LUBRICATE the clutch pedal shaft. TEST the system for normal operation.

	LUBRICATE the clutch pedal shaft. TEST the system for normal operation.
DINDOINT	TEST E : CLUTCH RELATED VIBRATIONS
TEST	DETAILS/RESULTS/ACTIONS
CONDITION	
	FOR ENGINE COMPONENT GROUNDING
	1 Raise and support the vehicle.
	REFER to: Jacking (100-02 Jacking and Lifting, Description and Operation).
	2 Check the engine mountings for grounding on the body frame.
	3 Check the exhaust manifold or other engine component grounding on the body or frame.
	Is there evidence of grounding on body or frame?
	Yes
	REPAIR or INSTALL a new as necessary. TEST the system for normal operation.
	GO to E2.
E2: CHECK	FOR ACCESSORY DRIVE VIBRATIONS
	1 Feel accessory vibration at clutch engage/disengage when engine torque changes.
	2 Disconnect the accessory drive belt and check for vibration.
	Does the vibration stop when the drive belt is removed from the engine?
	Yes
	REPAIR or INSTALL new accessory drive belt components. REFER to:
	Accessory Drive - 4.2L/2.5L/3.0L (303-05 Accessory Drive, Diagnosis and Testing), Noise, Vibration and Harshness (NVH) (100-04 Noise, Vibration and Harshness, Diagnosis a
	Testing).
	No
	GO to E3.
3: CHECK	FOR RELEASE BEARING NOISE
	1 Start the engine.
	2 Depress and hold clutch pedal.
	Is a whirring, grating or grinding noise present?
	Yes
	INSTALL a new clutch slave cylinder TEST the system for normal operation.
	No GO to E4.
4: INSPEC	CT FLYWHEEL
	1 Remove the transmission.
	• Five speed transmission -
	REFER to: Manual Transmission (308-03 Manual Transmission/Transaxle - Vehicles With: 5- Speed Manual Transmission, Diagnosis and Testing).
	Six speed transmission -
	REFER to: Manual Transmission (308-03 Manual Transmission/Transaxle - Vehicles With: 6-
	Speed Manual Transmission, Diagnosis and Testing).
	3,
	2 Inspect for loose flywheel bolts.

	^=rry out flywh==1 run=ut =h==k.
ls ·	the flywheel OK?
Ye	s
	DIAGNOSE engine vibration concern.
	REFER to: Engine - 4.2L/2.5L/3.0L (303-00 Engine System - General Information, Diagnosis and
	Testing).
	or
	REFER to: Engine - 2.7L Diesel (303-00 Engine System - General Information, Diagnosis and
	Testing).
No	· · · · · · · · · · · · · · · · · · ·
	TIGHTEN flywheel bolts or INSTALL a new flywheel. Test the system for normal operation.

PINPOINT TEST F : HARD SHIFTING		
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
F1: CHECK FLUID L	F1: CHECK FLUID LEVEL	
 NOTE: The hydraul 	NOTE: The hydraulic clutch fluid is supplied from the brake master cylinder.	
	1 Inspect the fluid level in the brake master cylinder reservoir.	
	Is the fluid within the MAX and MIN level marks?	
1	Yes	
	GO to C2.	
1	No	
	FILL brake fluid, CHECK for leaks in the clutch and brake system. TEST the system for leaks.	

	leaks.
	ST G : EXCESSIVE NOISE
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
G1: CHECK TR	ANSMISSION NEUTRAL POSITION
	1 Start the engine and run it in neutral.
	2 Depress clutch pedal fully.
	Are there noises when the clutch is operated?
	/es
l	GO to G2.
r	No System OK
CO. TEST CLU	System OK.
1	TCH PEDAL FREE TRAVEL
	1 Press the clutch down manually until resistance is felt, then release it again.
	2 Measure pedal travel.
I I	s the measured dimension within 15 mm? /es
	GO to G3.
	No
	INSTALL a new clutch master cylinder.
G3: TEST CLU	TCH SLAVE CYLINDER WITH RELEASE BEARING
	1 Remove the transmission.
	 Five speed transmission - REFER to: Manual Transmission (308-03 Manual Transmission/Transaxle - Vehicles With: 5- Speed Manual Transmission, Diagnosis and Testing). Six speed transmission - REFER to: Manual Transmission (308-03 Manual Transmission/Transaxle - Vehicles With: 6- Speed Manual Transmission, Diagnosis and Testing).
	2 Check the clutch slave cylinder bolts.
	3 Check the release bearing for wear and rust.
	Are the bolts loose or are there signs of wear or rust? Yes TIGHTEN the bolts or INSTALL a new clutch slave cylinder with the release bearing. TEST the system for normal operation.
	System for normal operation. No GO to G4.
G4: CHECK CLI	UTCH FRICTION DISC TORSION SPRINGS
	1 Check torsion springs for wear.
	Oo the torsion springs have signs of wear? /es INSTALL a new clutch friction disc. TEST the system for normal operation.
1	motrace a new claten metion disc. Test the system for normal operation.

- 1	1 1	I ^{n., _}
		Check crankshaft end play.
		REFER to: Camshaft End Play (303-00 Engine System - General Information, General Procedures).

PINPOINT TEST H	PINPOINT TEST H : FLUID LEAKAGE	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS	
H1: INSPECT CLUTC	H MASTER CYLINDER	
	1 Inspect the clutch master cylinder for leakage.	
	Is the clutch master cylinder OK?	
	Yes	
	GO to H2.	
	No	
	INSTALL a new clutch master cylinder as necessary.	
	REFER to: Clutch Master Cylinder (308-02 Clutch Controls, Removal and Installation).	
H2: INSPECT CLUTC	H SLAVE CYLINDER	
	1 Inspect the clutch slave cylinder for leaks.	
	Is the clutch slave cylinder OK?	
	Yes	
	GO to H3.	
	No	
	INSTALL a new clutch slave cylinder as necessary.	
H3: INSPECT SYSTE	M HYDRAULIC TUBES	
	1 Inspect the clutch hydraulic tubes for loose or damaged fittings causing leakage.	
	Are the clutch hydraulic tubes OK?	
	Yes	
	CARRY OUT road test to verify customer complaint.	
	No	
	INSTALL new components as necessary. Carry out road test.	

Manual Transmission/Transaxle and Clutch - General Information - Clutch System BleedingVehicles With: 5-Speed Manual Transmission - MT75

General Procedures

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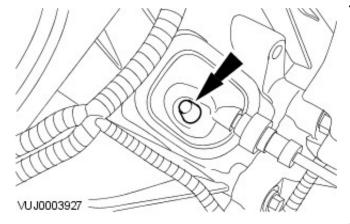
1. WARNING: Brake fluid contains polyglycol ethers and polyglycols. Avoid contact with the eyes. Wash hands thoroughly after handling. If brake fluid contacts the eyes, flush the eyes for 15 minutes with cold water. Get medical attention immediately if irritation persists. If taken internally, drink water and induce vomiting. Get medical attention immediately. Failure to follow these instructions may result in personal injury.

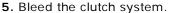
CAUTION: If brake fluid comes into contact with the paintwork, it should be washed down immediately with cold water.

- NOTE: Make sure of absolute cleanliness when filling brake fluid.
- · NOTE: Do not re-use brake fluid.

Bleed the clutch system.

- 2. Fill the brake fluid reservoir with brake fluid.
- **3.** Raise and support the vehicle. For additional information, refer to Section 100-02 Jacking and Lifting
- 4. Remove the bleed nipple cover.



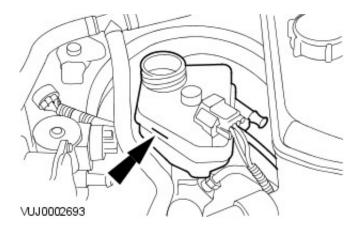


- Attach a proprietary bleed jar to the bleed nipple and open the bleed nipple one turn.
- Depress the clutch pedal repeatedly until the emerging fluid is free of bubbles; always make sure that there is sufficient fluid (5 mm above the MAX) in the reservoir.
- After bleeding, tighten the bleed nipple.
- Install the bleed nipple cover.
- Install the dust cover.
- After bleeding, depress the clutch ten times and check that it is functioning correctly.

6. NOTE: Make sure of absolute cleanliness when filling brake fluid.

Check the brake fluid level.

 The fluid level should be between the MIN and MAX marks. If the level drops below the MIN mark, the brake warning indicator will light up.



• As necessary, fill the brake fluid reservoir with brake fluid.

Manual Transmission/Transaxle and Clutch - General Information - Clutch System BleedingVehicles With: 6-Speed Manual Transaxle - MMT6

General Procedures

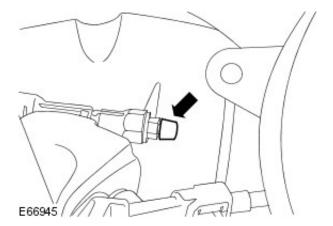
1. WARNING: Brake fluid contains polyglycol ethers and polyglycols. Avoid contact with the eyes. Wash hands thoroughly after handling. If brake fluid contacts the eyes, flush the eyes for 15 minutes with cold water. Get medical attention immediately if irritation persists. If taken internally, drink water and induce vomiting. Get medical attention immediately. Failure to follow these instructions may result in personal injury.

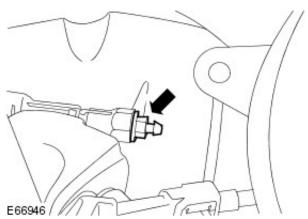
CAUTION: If brake fluid comes into contact with the paintwork, it should be washed down immediately with cold water.

- NOTE: Make sure of absolute cleanliness when filling brake fluid.
- · NOTE: Do not re-use brake fluid.

Bleed the clutch system.

- 2. Fill the brake fluid reservoir with brake fluid.
- 3. Raise and support the vehicle. For additional information, refer to For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- 4. Remove the bleed nipple cover.



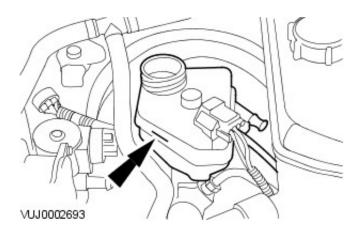


- **5.** Bleed the clutch system.
 - Attach a proprietary bleed jar to the bleed nipple and open the bleed nipple one turn.
 - Depress the clutch pedal repeatedly until the emerging fluid is free of bubbles; always make sure that there is sufficient fluid (5 mm above the MAX) in the reservoir.
 - After bleeding, tighten the bleed nipple.
 - Install the bleed nipple cover.
 - Install the dust cover.
 - After bleeding, depress the clutch ten times and check that it is functioning correctly.

6. NOTE: Make sure of absolute cleanliness when filling brake fluid.

Check the brake fluid level.

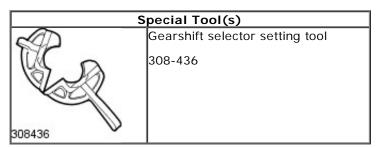
• The fluid level should be between the MIN and MAX

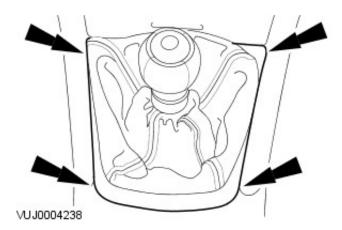


• As necessary, fill the brake fluid reservoir with brake fluid.

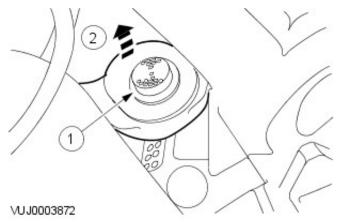
Manual Transmission/Transaxle and Clutch - General Information - Gearshift Cable Adjustment

General Procedures





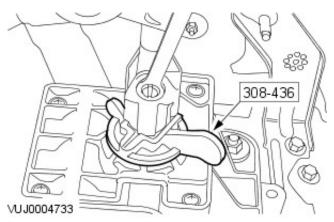
- Remove the wheel and tire. For additional information, refer to Section <u>204-04 Wheels and Tires</u>
- 2. Detach the gearshift lever surround.



3. NOTE: Upper selector cable shown, lower shift cable similar.

Detach the shift and selector cables.

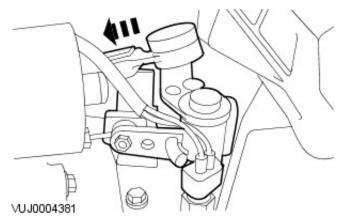
- 1. Press the button.
- 2. Detach the selector cable.



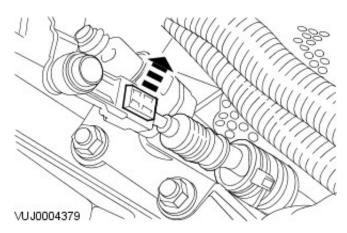
4. NOTE: Lift the reverse gear selector to fit special tool.

Using the special tool, make sure the gearshift lever is in the neutral position.

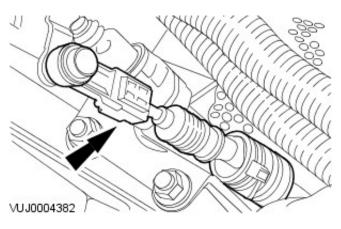
5. Make sure the transmission selector is in the fourth gear position.



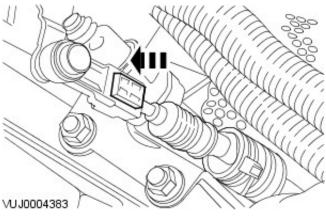
• NOTE: Shift cable has a black cover to cable end and the selector cable has a white cover to cable end.



6. Detach the red locking tab on the shift cable.

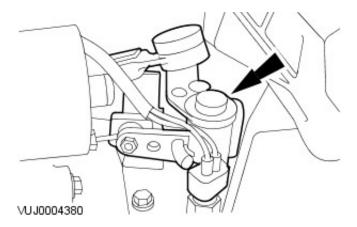


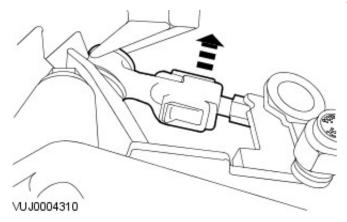
7. Attach the shift cable to the ball pin on the transmission selector.



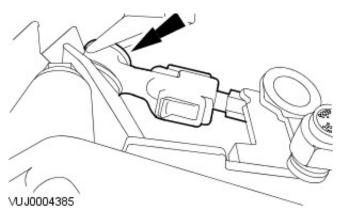
8. Press the red locking tab to secure the position of the shift cable.

9. Place the transmission selector into the neutral position.

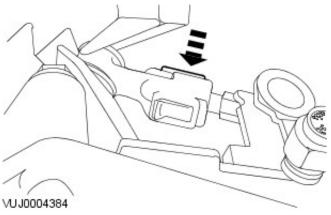




10. Detach the red locking tab on the selector cable.

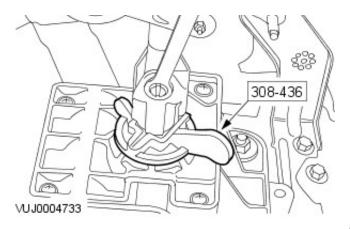


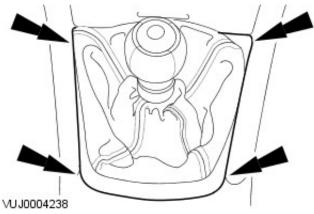
11. Attach the selector cable to the ball pin on the gearbox mass damper.



12. Press the red locking tab to secure the position of the selector cable.

13. Remove the gearshift selector setting tool.





14. Install the gearshift lever surround.

- **15.** Check for correct operation of gear controls.
- **16.** Install the wheel and tire. For additional information, refer to Section 204-04 Wheels and Tires

Manual Transmission/Transaxle and Clutch - General Information - Release Hub and Bearing Check

General Procedures

1. Turn the clutch release hub and bearing in both directions and check for any binding or abnormal noise.

2. CAUTION: The clutch release hub and bearing is sealed and must not be immersed in any type of cleaning fluid.

Check for worn or damaged clutch release hub and bearing contact surfaces.

3. Install the clutch release hub and bearing on the input shaft and check for a smooth sliding condition.

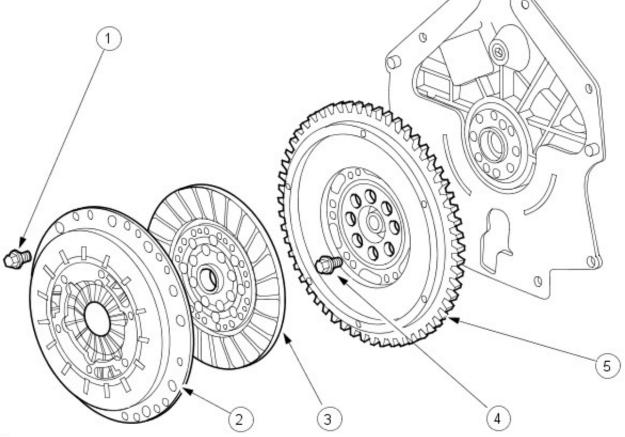
Clutch -

Torque Specifications

Description	Nm	lb-ft	lb-in
Pressure plate retaining bolts		18	-

Clutch - Clutch

Description and Operation



VUJ0004131

Item	Part Number	Description
1	_	Pressure plate retaining bolt
2	_	Pressure plate
3	_	Clutch disc
4	_	Flywheel retaining bolt
5	_	Flywheel

The clutch transfers the engine torque to the transmission.

The clutch consists of a disc and a pressure plate with a diaphragm spring, bolted to the flywheel.

When the clutch pedal is operated the power transmission from the engine to the transmission is interrupted. The clutch is therefore engaged when the pedal is not depressed. Pressing down the pedal disengages the clutch.

Clutch - Clutch Diagnosis and Testing

For additional information, refer to Section 308-00 Manual Transmission/Transaxle and Clutch - General Information.

Clutch - Clutch Disc and Pressure Plate

Removal and Installation

Special Tool(s)		
	Clutch alignment tool	
	308-441	
308-441		

Removal

All except vehicles with diesel engine

Remove the manual transmission.
 For additional information, refer to: <u>Transaxle - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27</u> (308-03 Manual Transmission/Transaxle, Removal).

Vehicles with diesel engine

2. Remove the manual transmission.

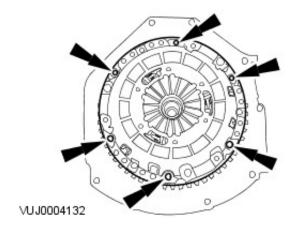
For additional information, refer to: Transaxle - 2.0L

<u>Duratorg-TDCi</u> (308-03 Manual Transmission/Transaxle, Removal) /

<u>Transaxle - 2.2L Duratorg-TDCi (110kW/150PS) - Puma</u> (308-03 Manual Transmission/Transaxle, Removal).

All vehicles

- 3. Remove the clutch disc and pressure plate.
 - Remove the pressure plate bolts in a uniform sequence.

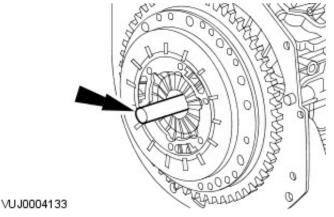


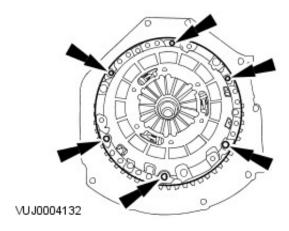
Installation

All except vehicles with diesel engine

 $\begin{tabular}{ll} \textbf{1.} & \begin{tabular}{ll} \textbf{NOTE:} & \textbf{The clutch disc is marked "Transmission side" for correct installation. \end{tabular}$

Using the special tool, align the clutch assembly.





2. NOTE: The clutch disc is marked "Transmission side" for correct installation.

Locate the clutch pressure plate on the flywheel dowels and tighten the bolts progressively in a diagonal sequence.

• Tighten to 25 Nm.

Vehicles with diesel engine

3. NOTE: Make sure that the input shaft of the transmission is moved squarely into the hub of the clutch disc. Do not bend in any direction.

Install the manual transmission.
For additional information, refer to: Transaxle - 2.0L
Duratorg-TDCi
(308-03 Manual Transmission/Transaxle, Installation).

Transaxle - 2.2L Duratorg-TDCi (110kW/150PS) - Puma (308-03 Manual Transmission/Transaxle, Installation).

All except vehicles with diesel engine

- 4. Remove the special tool.
- **5.** NOTE: Make sure that the input shaft of the transmission is moved squarely into the hub of the clutch disc. Do not bend in any direction.

Install the manual transmission. For additional information, refer to: <u>Transaxle - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27</u> (308-03 Manual Transmission/Transaxle, Installation).

Clutch Controls -

General Specifications

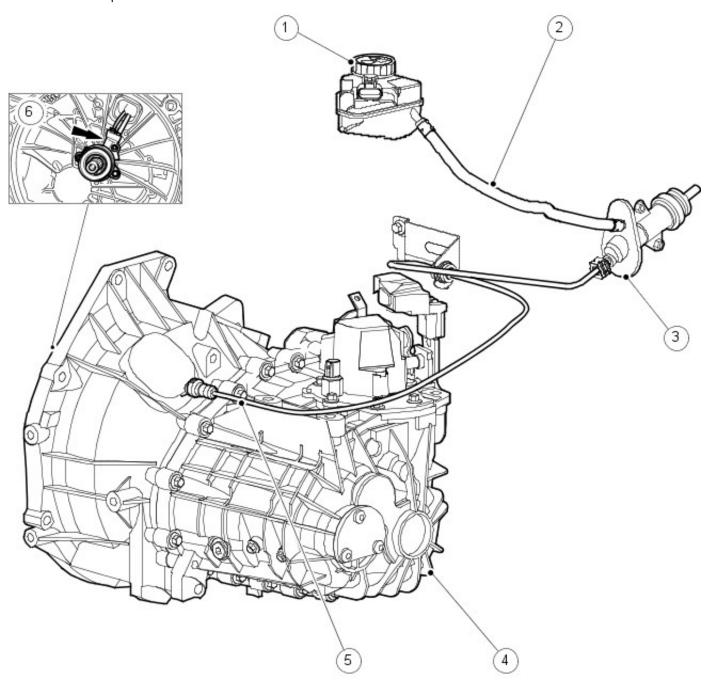
Item	Specification
Brake fluid	ITT super dot 4

Torque Specifications

Description		lb-ft	lb-in
Clutch slave cylinder retaining bolts	10	7	-
Clutch master cylinder retaining nuts and bolts	10	7	-
Clutch pedal retaining nut		17	-
Engine wiring harness bracket retaining bolts	10	7	-

Clutch Controls - Clutch Controls Description and Operation

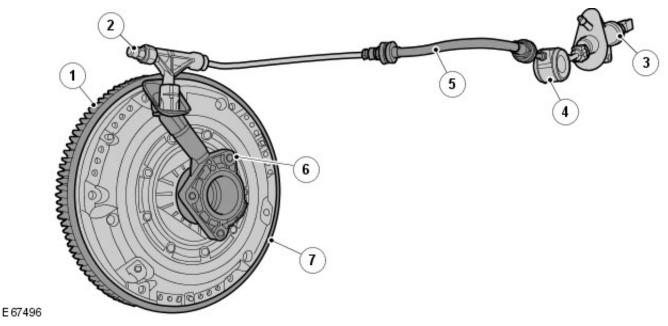
Vehicles with 5-speed manual transmission



VUJ0004195

Item	Part Number	Description
1	_	Brake fluid reservoir
2	_	Clutch master cylinder supply line
3	_	Clutch master cylinder
4	_	Transmission
5	_	Clutch slave cylinder supply line
6	_	Clutch slave cylinder

Vehicles with 6-speed manual transmission



Item	Part Number	Description
1	-	Flywheel
2	-	Bleed nipple
3	-	Clutch master cylinder
4	-	Vibration damper
5	-	Hydraulic line
6	-	Clutch slave cylinder
7	-	Self-adjusting clutch

This vehicle has a hydraulically operated clutch. The brake master cylinder reservoir has a separate chamber and is used to supply the hydraulic clutch system with fluid.

Depressing the clutch pedal builds up pressure in the clutch master cylinder and operates the release bearing integrated in the clutch slave cylinder.

The hydraulic clutch system has the following advantages:

- Automatic adjustment.
- Low operating effort.
- Minimal wear.

Reservoir

The brake fluid reservoir supplies both the hydraulic clutch system and the brake system with brake fluid.

The hydraulic clutch system and the brake system are separate inside the brake fluid reservoir. In the event of any leaks in the hydraulic clutch system the brake system remains fully operative.

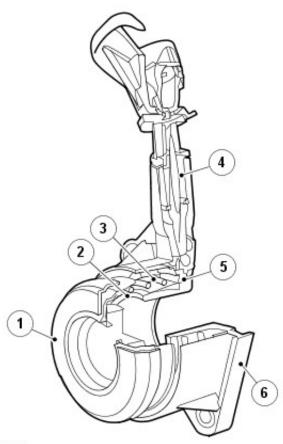
Clutch Master Cylinder

The pressure required to operate the clutch system is produced in the clutch master cylinder.

When the clutch pedal is depressed the piston rod moves the piston in the clutch master cylinder. This displaces the hydraulic fluid in the clutch master cylinder, which in turn displaces the hydraulic fluid in the clutch slave cylinder via the high - pressure line.

Clutch Slave Cylinder

Vehicles with 6-speed manual transmission



E67497

Item	Part Number	Description
1	-	Release bearing
2	-	Protective cap
3	-	Pressure spring
4	-	Hydraulic channel
5	-	Oil seal
6	-	Plastic housing

The central slave cylinder is fixed to the clutch housing with three bolts, together with an integrated release bearing. The release bearing is a press - fit on the clutch slave cylinder.

The hydraulic fluid which is displaced by the master cylinder piston moves the piston in the clutch slave cylinder, which in turn moves the release bearing in an axial direction. The release bearing presses against the tongues of the diaphragm spring with the inner bearing ring. This breaks the friction contact between the clutch disc and the flywheel.

When the clutch pedal is released the diaphragm spring returns the piston in the clutch slave cylinder to its original position. This restores the friction contact between the clutch disc and the flywheel.

Clutch Controls - Clutch Controls

Diagnosis and Testing

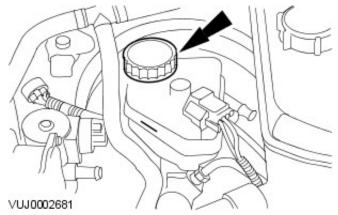
For additional information, refer to Section 308-00 Manual Transmission/Transaxle and Clutch - General Information

Clutch Controls - Clutch Master Cylinder

Removal and Installation

Removal

All vehicles

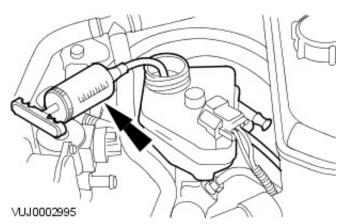


1. WARNING: Do not allow brake fluid to contact the skin or eyes. If brake fluid comes into contact with the skin or eyes, rinse the affected places immediately with water. Failure to follow this instructions can result in personal injury.

CAUTION: If brake fluid is spilt on the paintwork, the affected area must be immediately washed down with cold water.

• NOTE: Make sure the filler cap does not become contaminated.

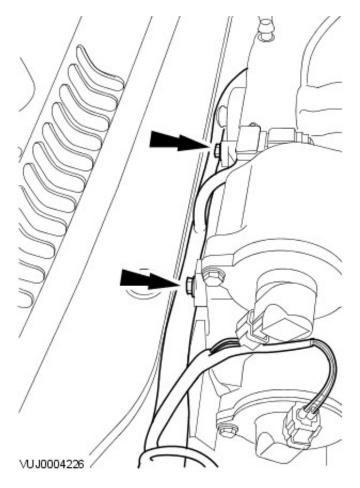
Remove the brake fluid reservoir filler cap.



2. Using a suitable suction device drain the brake fluid reservoir.

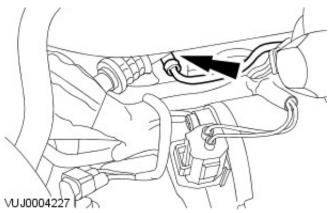
All except vehicles with diesel engine

3. Detach the engine wiring harness from the intake manifold.

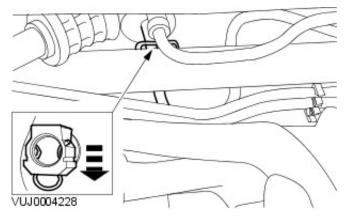


All vehicles

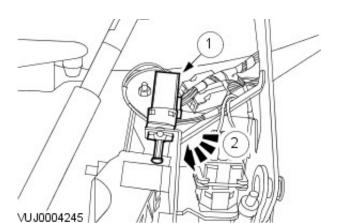
4. Disconnect the clutch master cylinder supply line.



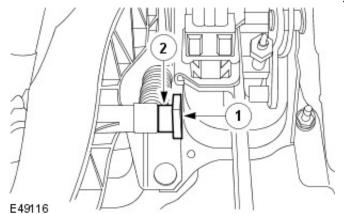
- **5.** Disconnect the clutch slave cylinder supply line from the clutch master cylinder.
 - Release the retaining clip to disconnect the line.



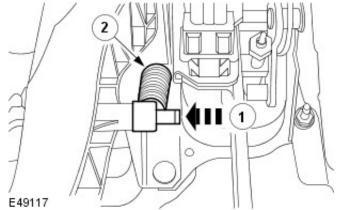
- **6.** Remove the clutch pedal position switch.
 - 1. Disconnect the electrical connector.



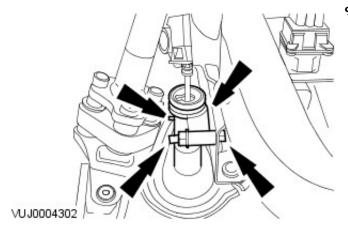
2. Remove the clutch pedal position switch.



- **7.** Remove the clutch pedal return spring pin retaining clip and spacer.
 - 1. Remove the clutch pedal return spring pin retaining clip.
 - 2. Remove the clutch pedal return spring pin spacer.

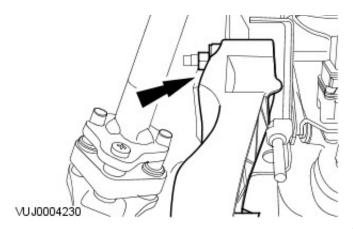


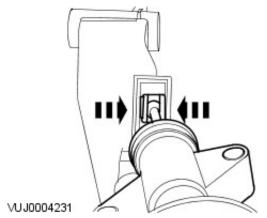
- 8. Remove the clutch pedal return spring.
 - 1. Remove the clutch pedal return spring pin.
 - 2. Remove the clutch pedal return spring.



9. Remove the clutch master cylinder retaining nuts and bolts.

10. Remove the clutch master cylinder and clutch pedal.



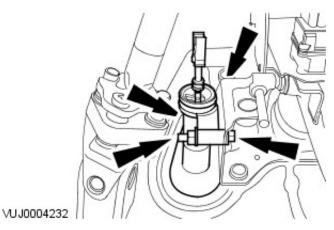


11. Remove the clutch master cylinder from the clutch pedal.

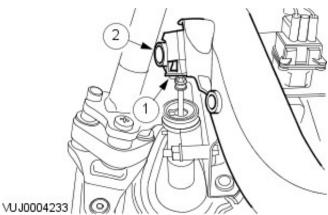
Installation

All vehicles

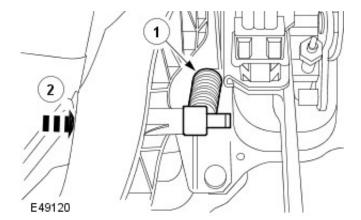
- **1.** Install the clutch master cylinder.
 - Tighten to 10 Nm.



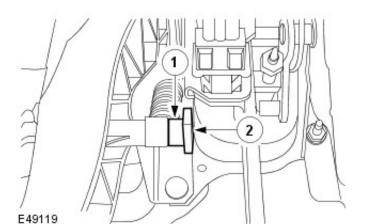
- 2. Install the clutch pedal.
 - 1. Attach the clutch pedal to the clutch master cylinder.
 - 2. Attach the clutch pedal to the support bracket. $\,$ 1. Tighten to 23 Nm.



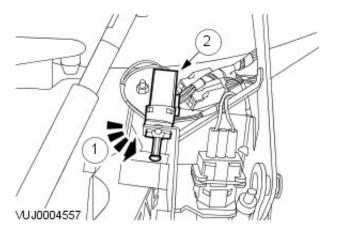
3. Install the clutch pedal return spring pin.



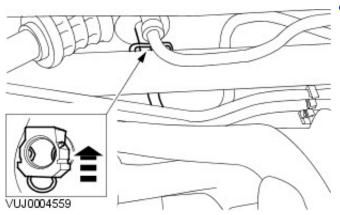
- 1. Install the clutch pedal return spring.
- 2. Install the clutch pedal return spring pin.



- **4.** Install the clutch pedal return spring pin spacer and retaining clip.
 - 1. Install the clutch pedal return spring pin spacer.
 - 2. Install the clutch pedal return spring pin retaining clip.



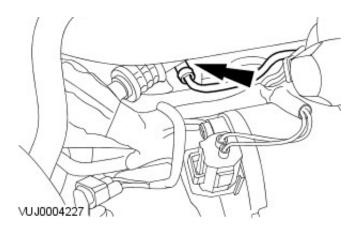
- **5.** Install the clutch pedal position switch.
 - 1. Install the clutch pedal position switch.
 - 2. Connect the electrical connector.



6. NOTE: Reposition the retaining clip.

Connect the clutch slave cylinder supply line to the clutch master cylinder.

7. Connect the clutch master cylinder supply line.



VUJ0004226

All except vehicles with diesel engine

- **8.** Attach the engine wiring harness to the intake manifold.
 - Tighten to 10 Nm.

All vehicles

9. Bleed the hydraulic clutch system.

For additional information, refer to: Clutch System Bleeding

- Vehicles With: 6-Speed Manual Transaxle - MMT6 (308-00 Manual Transmission/Transaxle and Clutch - General Information, General Procedures).

Clutch Controls - Clutch Slave CylinderVehicles With: 5-Speed Manual Transmission - MT75

Removal and Installation

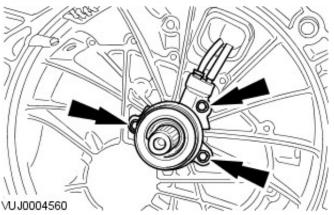
Removal

1. NOTE: The clutch slave cylinder assembly must be replaced whenever it is removed.

Remove the manual transmission.

For additional information, refer to: <u>Transaxle - 2.0L</u> <u>Duratorq-TDCi</u> (308-03 Manual Transmission/Transaxle, Removal) /

<u>Transaxle - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27</u> (308-03 Manual Transmission/Transaxle, Removal).



2. WARNING: Do not allow brake fluid to contact the skin or eyes. If brake fluid comes into contact with the skin or eyes, rinse the affected areas immediately with water. Failure to follow this instructions can result in personal injury.

CAUTION: Brake fluid will escape when the lines are disconnected.

Remove the clutch slave cylinder.

- Detach the rubber grommet.
- · Remove the clutch slave cylinder.

Installation

- 1. NOTE: Apply suitable tape to the input shaft to protect the slave cylinder seal from damage. Remove the tape when the slave cylinder is installed.
- NOTE: Apply sealer to the mating faces of the clutch slave cylinder and the transmission housing.

Install the clutch slave cylinder.

- Attach the rubber grommet.
- Tighten to 10 Nm.
- 2. Install the manual transmission.

For additional information, refer to: <u>Transaxle - 2.0L</u> <u>Duratorq-TDCi</u> (308-03 Manual Transmission/Transaxle, Installation) /

<u>Transaxle - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27</u> (308-03 Manual Transmission/Transaxle, Installation).

3. Bleed the hydraulic clutch system.

For additional information, refer to: <u>Clutch System Bleeding</u> - <u>Vehicles With: 5-Speed Manual Transmission - MT75</u> (308-00 Manual Transmission/Transaxle and Clutch - General Information, General Procedures).

Clutch Controls - Clutch Slave CylinderVehicles With: 6-Speed Manual Transaxle - MMT6

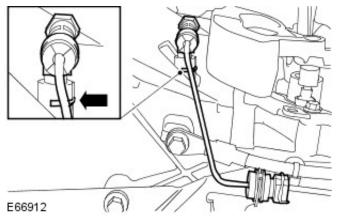
Removal and Installation

Removal

1. NOTE: The clutch slave cylinder assembly must be replaced whenever it is removed.

Remove the manual transmission.

For additional information, refer to: <u>Transaxle - 2.2L Duratorq-TDCi (110kW/150PS) - Puma</u> (308-03 Manual Transmission/Transaxle, Removal).

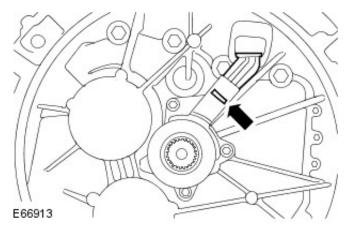


2. WARNING: Do not allow brake fluid to contact the skin or eyes. If brake fluid comes into contact with the skin or eyes, rinse the affected areas immediately with water. Failure to follow this instructions can result in personal injury.

CAUTION: Brake fluid will escape when the lines are disconnected.

Remove the clutch slave cylinder high pressure pipe from the retaining bracket and clutch slave cylinder bleed union.

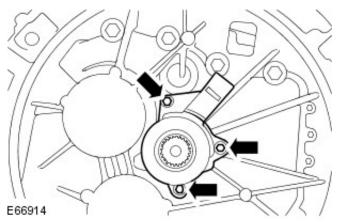
· Release the retaining clip.



3. CAUTION: Brake fluid will escape when the lines are disconnected.

Remove the clutch slave cylinder bleed union.

Release the retaining clip.

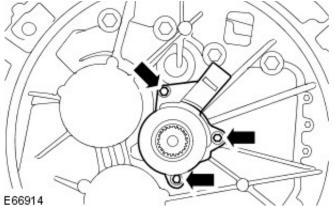


4. CAUTION: Brake fluid will escape when the lines are disconnected.

Remove the clutch slave cylinder.

Installation

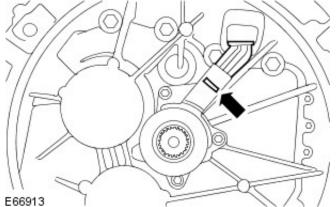
- 1. NOTE: Apply suitable tape to the input shaft to protect the slave cylinder seal from damage. Remove the tape when the slave cylinder is installed.
- NOTE: Apply sealer to the mating faces of the clutch slave



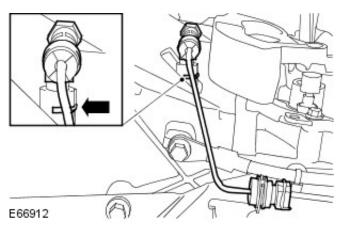
cylinder and the transmission housing.

Install the clutch slave cylinder.

• Tighten to 10 Nm.



- 2. Install the clutch slave cylinder bleed union.
 - Fully seat the retaining clip.



- **3.** Install the clutch slave cylinder high pressure pipe to the retaining bracket and clutch slave cylinder bleed union.
 - Fully seat the retaining clip.

- **4.** Install the manual transmission. For additional information, refer to: Transaxle 2.2L Duratorq-TDCi (110kW/150PS) Puma (308-03 Manual Transmission/Transaxle, Installation).
- 5. Bleed the hydraulic clutch system.

 For additional information, refer to: Clutch System Bleeding

 Vehicles With: 6-Speed Manual Transaxle MMT6 (308-00

 Manual Transmission/Transaxle and Clutch General
 Information, General Procedures).

Manual Transmission/Transaxle -

Lubricants, Fluids, Sealers and Adhesives

Description	Specification	
Manual transaxle fluid	WSD-M2C200-C	

Capacities

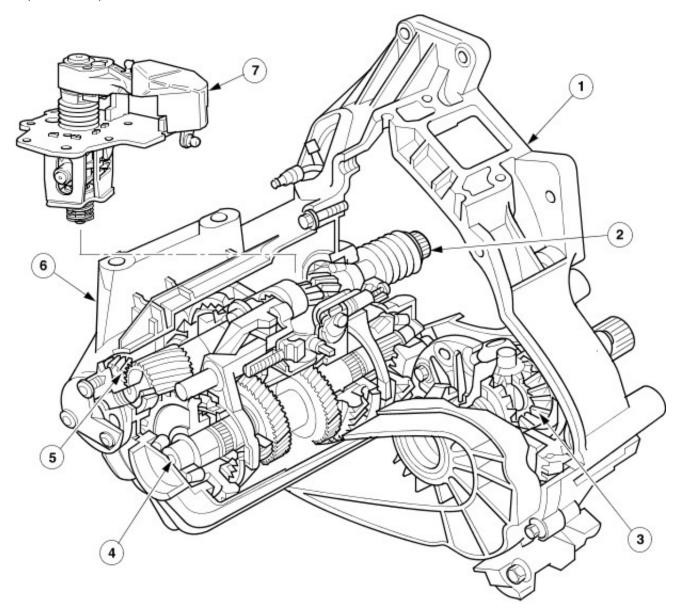
Description	Quantity
Manual transmission fluid	1.75 Liters or 0 - 5 mm (0 - 0.20 in) below the lower edge of the fill plug bore

Torque Specifications

Torque Specifications			
Description	Nm	lb-ft	lb-in
Transaxle retaining bolts	48	35	-
Reversing lamp switch	20	15	-
Starter motor retaining bolts - vehicles with 2.0L, 2.5L and 3.0L engine	35	26	-
Transaxle mount retaining bolt and studs	80	59	-
Transaxle mount retaining nut	133	98	
Transaxle drain plug	45	33	
Transaxle fill plug	45	33	
Starter motor retaining bolts - vehicles with diesel engine	25	18	
Starter motor electrical connector retaining nut	12	9	
Starter motor solenoid electrical connector retaining nut	6	-	53
Intake manifold support bracket retaining bolts	10	-	89
Gearshift cable support bracket retaining nuts	25	18	
Air cleaner mount bracket retaining nuts and bolt - vehicles with 2.0L, 2.5L and 3.0L engine	6	-	53
Left-hand driveshaft retaining nuts - vehicles with 2.0L or diesel engine	25	18	-
Vacuum solenoids and vacuum reservoir mount bracket retaining bolts - vehicles with diesel engine	23	17	-
Shock absorber and spring assembly securing nuts	25	18	-
Wiring harness to camshaft cover retaining stud, retaining nut	6	-	53
Engine cover rear mount bracket retaining bolts - vehicles with diesel engine	23	17	-
Charge air cooler pipe	4	-	35

Manual Transmission/Transaxle - Manual TransaxleVehicles With: 5-Speed Manual Transmission - MT75

Description and Operation



VUJ0004405

Item	Part Number	Description
1	_	Transaxle housing - clutch side
2	_	Input shaft
3	_	Differential
4	_	Output shaft
5	_	Reverse gear idler
6	_	Transaxle housing
7	_	Selector mechanism

The MTX 75 manual transaxle is a 2-shaft transaxle.

MTX 75 means:

- M = Manual
- \bullet T = Transmission
- X = Transaxle (front wheel drive)
- 75 = The distance from the input and output shafts in mm

The aluminium housing consists of two closed sections. The reinforced ribs on the transaxle housing are to reduce the noise and vibration. With the '2-shaft transaxle' all the gear wheels are in permanent mesh. In each gear the required

ratio is achieved by means of a pair of geared wheels. When reverse is selected, an idler gear changes the direction of rotation of the output. The input and output shafts run taper roller bearings. To further improve stability and gear shifting, a maintenance free cable operating mechanism is used. all gear wheels, including reverse gear, are beveled cut, synchronized and run on needle roller bearings 1st, 2nd, 3rd, gear have doubled synchronization.

The engine rotational torque is transmitted from the crankshaft through the clutch to the transaxle input shaft, which then transmits drive to the output shaft by utilizing an arrangement of gears. When reverse gear is selected, the direction of the output shaft is changed by an idler gear assembly.

In neutral, none of the gears are connected to the input or output shaft through the relevant synchronizer unit. No torque is transmitted to the differential.

Manual Transmission/Transaxle - Manual TransaxleVehicles With: 6-Speed Manual Transaxle - MMT6

Description and Operation

This vehicle is equipped with a transversely mounted manual transaxle, which combines both the transmission and differential in one unit.

The transaxle is a 6-speed, 3-shaft design with all pairs of gears in continuous mesh.

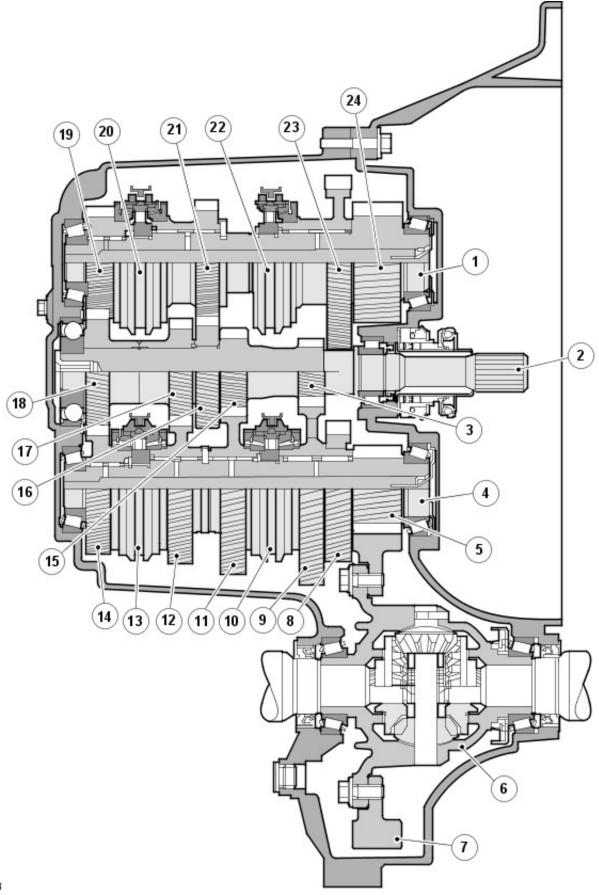
Each forward gear ratio is produced through a pair of dedicated gears, with the exception of 4th and 6th gears which share the same input shaft gear.

All gear wheels rotate on needle-roller bearings, and are helical-cut, this type of gearing enables a higher gear contact ratio, which mesh with minimum rolling noise; resulting in a quiet transaxle operation.

Torque is transmitted from the selected output shaft to the differential, which transmits the torque to the halfshafts to drive the front wheels. With neutral selected, the gears are not connected via the synchronizers to the output shafts, therefore no torque is transmitted to the differential.

The aluminum transaxle housing consists of two sections, reinforced by a web of strengthening ribs. The ribs also serve to reduce noise and vibration, and aid the cooling of the transaxle.

Gear Train

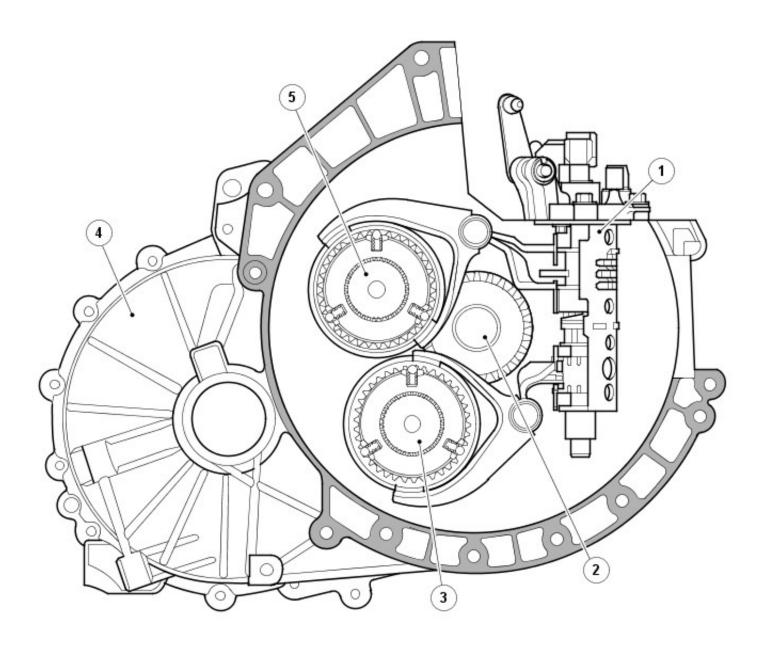


E67473

Item	Description	Item	Description
1	Output shaft — 5th/6th and reverse gears	13	Synchronizer assembly – 3rd/4th gear
2	Input shaft	14	4th gear wheel
3	1st gear wheel	15	2nd gear wheel

4	Output shaft — 1st to 4th gears	16	5th gear wheel
5	Pinion	17	3rd gear wheel
6	Differential assembly	18	4th/6th gear wheel
7	Crown wheel	19	6th gear wheel
8	Reverse idler gear	20	Synchronizer assembly – 5th/6th gear
9	1st gear wheel	21	5th gear wheel
10	Synchronizer assembly – 1st/2nd gear	22	Synchronizer assembly — reverse gear
11	2nd gear wheel	23	Reverse gear wheel
12	3rd gear wheel	24	Pinion

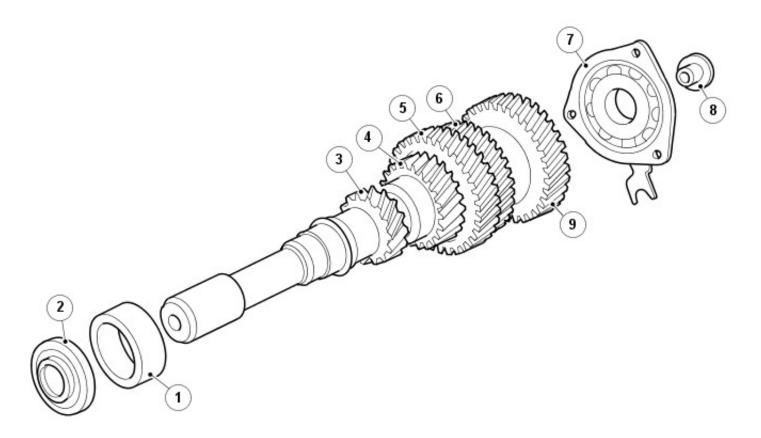
Shafts and Selector Mechanism



E 67474

Item	Description
1	Selector mechanism
2	Input shaft
3	Output shaft — 1st to 4th gears
4	Differential housing
	Directitual Housing

Input Shaft



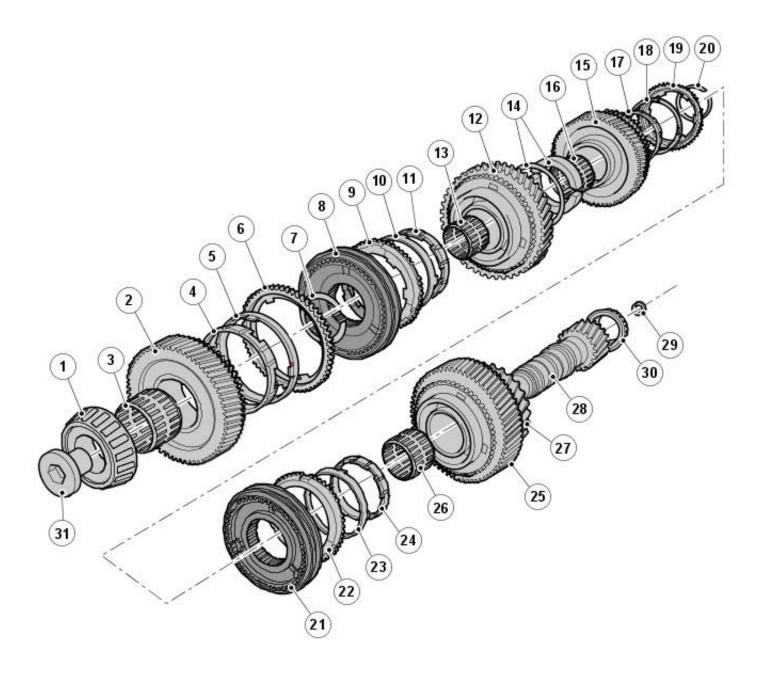
E67475

Item	Description	Item	Description
1	Clutch housing roller bearing	6	3rd gear wheel
2	Oil seal	7	Bearing retainer
3	1st gear wheel	8	Bearing retaining screw
4	2nd gear wheel	9	4th/6th gear wheel
5	5th gear wheel		

The input-shaft is a solid unit, which rotates:

- in a ball-bearing at the clutch-housing-end of the transaxle, and
- a roller bearing at the rear of the transaxle,
- due to this mounting arrangement, the bearings do not require preload adjustment on assembly.
- 1st and 2nd gear wheels are an integral part of the input shaft.
- 3rd and 5th gear wheels and 4th/6th gear wheel are pressed onto the input shaft.

Output Shaft 1st to 4th Gears



E67476

Item	Description	Item	Description
1	Taper roller bearing, transmission housing	17	Inner synchronizer ring
2	4th gear wheel	18	2nd gear synchronizer cone
3	Needle bearing	19	Outer synchronizer ring - 2nd gear
4	Inner synchronizer ring	20	Snap ring
5	4th gear synchronizer cone	21	Synchronizer assembly - 1st/2nd gear
6	Outer synchronizer ring - 4th gear	22	Outer synchronizer ring - 1st gear
7	Snap ring	23	1st gear synchronizer cone
8	Synchronizer assembly - 3rd/4th gear	24	Inner synchronizer ring
9	Outer synchronizer ring - 3rd gear	25	1st gear wheel
10	3rd gear synchronizer cone	26	Needle bearing
11	Inner synchronizer ring	27	Reverse idler gear
12	3rd gear wheel	28	Output shaft 1st/4th gear
13	Needle bearing	29	Oil collector ring
14	Thrust washers	30	Taper roller bearing, clutch housing
15	2nd gear wheel	31	Bearing retaining bolt (left-hand thread)

16 Needle bearing

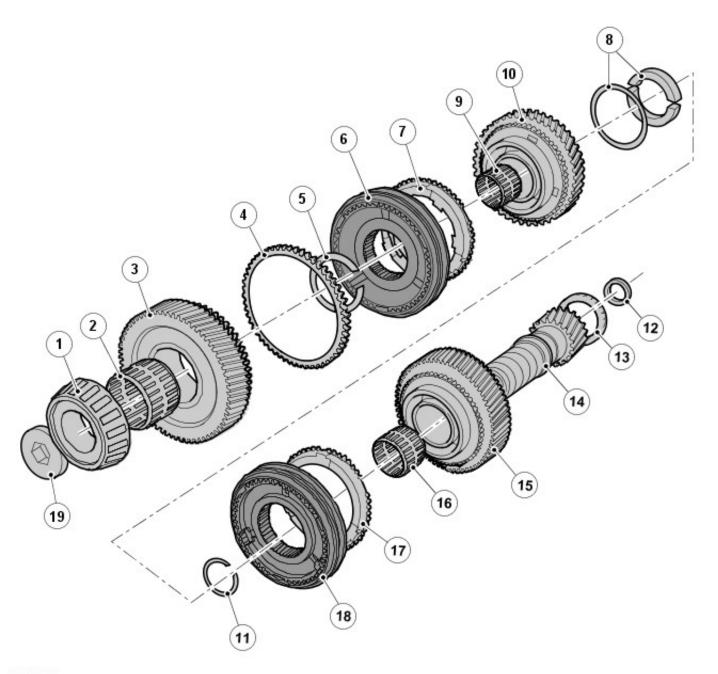
The 1st to 4th gear output shaft is a hollow unit, which rotates in tapered roller-bearings; this arrangement requires adjustment of the bearing's preload on assembly.

The output pinion is an integral part of the output shaft. The synchronizer assemblies of the 1st, 2nd, and 3rd, 4th gears are located on the output shaft.

Internal oil-ways in the output shaft provide lubrication to the gear wheel's needle-roller bearings and synchronizer assemblies.

An integrated oil-collector ring and oil-thrower, located on the clutch-housing-end of the output shaft, guides the transmission oil into the oilway of the output shaft.

Output Shaft — 5th/6th and Reverse Gears



E67477

Item	Description	Item	Description
1	Transmission housing taper roller bearing	11	Snap ring
2	Needle bearing	12	Oil collector ring
3	6th gear wheel	13	Taper roller bearing, clutch housing

4	6th gear synchronizer ring	14	Output shaft 5th/6th/reverse gear
			Reverse gear wheel
6	Synchronizer assembly - 5th/6th gear	16	Needle bearing
7	5th gear synchronizer ring	17	Reverse gear synchronizer ring
8	Thrust washers	18	Synchronizer assembly — reverse gear
9	Needle bearing	19	Bearing retaining bolt (left-hand thread)
10	5th gear wheel		

The 5th/6th and reverse gear output shaft is a hollow unit, which rotates in tapered roller-bearings; this arrangement requires adjustment of the bearing's preload on assembly.

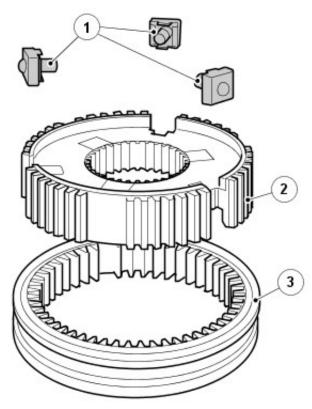
The output pinion is an integral part of the output shaft.

The synchronizer assemblies of the 5th/6th and reverse gears are located on the output shaft.

Internal oil-ways in the output shaft provide lubrication to the gear wheel's needle-roller bearings and synchronizer assemblies.

An integrated oil-collector ring and oil-thrower, located on the clutch-housing-end of the output shaft, guides the transmission oil into the oilway of the output shaft.

Synchronizer Assemblies



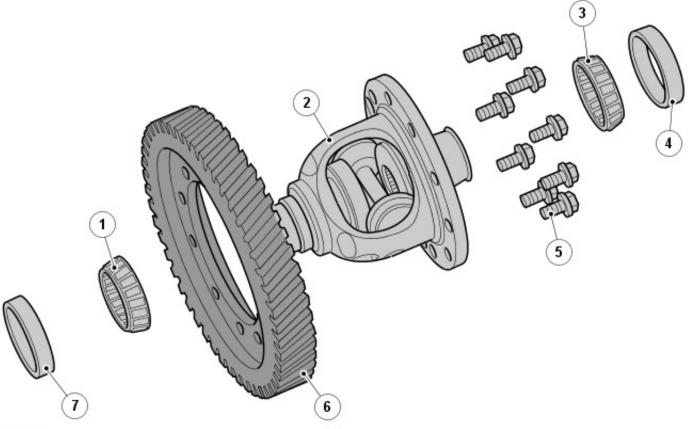
E67478

Item	Description		
1	Sliding block assembly		
2	Synchronizer hub		
3	Sliding collar		

The gears 1st, 2nd, 3rd and 4th have double cone synchronizers, 5th, 6th and reverse gears have single cone synchronizers.

The detent balls, springs and sliding blocks form one unit, this arrangement aids an easier assembly of the synchronizer.

Differential Assembly



E67481

Item	Description	Item	Description
1	Taper roller bearing, transmission housing	5	Crown wheel bolts
2	Differential assembly	6	Crown wheel
3	Taper roller bearing, clutch housing	7	Bearing shell, taper roller bearing
4	Bearing shell, taper roller bearing		

The differential is identical to that used in the 5 speed transmission, with the exception of the vehicle speed sensor, which has been deleted along with the sender wheel. Vehicle speed sensing is provided by the wheel-speed sensors.

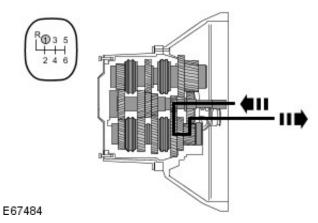
The differential is mounted on taper-roller bearings, this arrangement requires adjustment of the bearing's preload on assembly.

Gear Selection Power Flow

• NOTE: The position of the transaxle shafts has been altered for clarity.

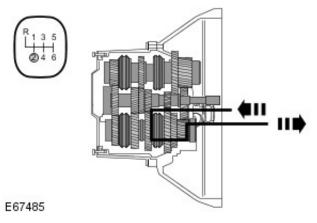
The following diagrams show a schematic representation of the power-flow through transaxle for each gear selection. The power flow is transmitted through the positively engaged pair of gears onto the output pinion of the relevant output shaft and then to the crown wheel of the differential.

First Gear



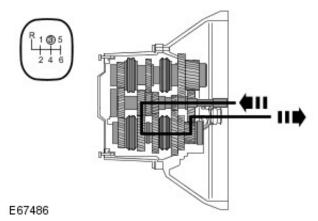
The 1st gear-wheel on the input shaft is positively connected to the 1st gear-wheel on the output shaft by the 1st/2nd gear synchronizer.

Second Gear



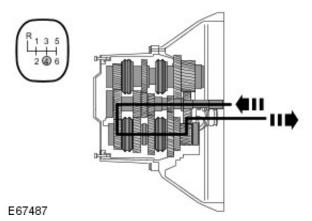
The 2nd gear-wheel on the input shaft is positively connected to the 2nd gear-wheel on the output shaft by the 1st/2nd gear synchronizer.

Third Gear



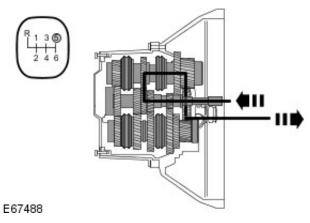
The 3rd gear-wheel on the input shaft is positively connected to the 3rd gear-wheel on the output shaft by the 3rd/4th gear synchronizer.

Fourth Gear



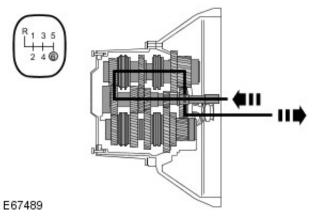
The 4th/6th gear-wheel on the input shaft is positively connected to the 4th gear-wheel on the output shaft by the 3rd/4th gear synchronizer.

Fifth Gear



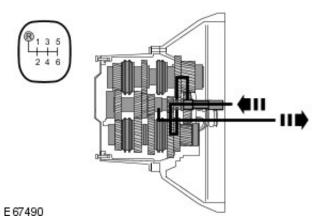
The 5th gear-wheel on the input shaft is positively connected to the 5th gear-wheel on the output shaft by the 5th/6th gear synchronizer.

Sixth Gear



The 4th/6th gear-wheel on the input shaft is positively connected to the 6th gear-wheel on the output shaft by the 5th/6th gear synchronizer.

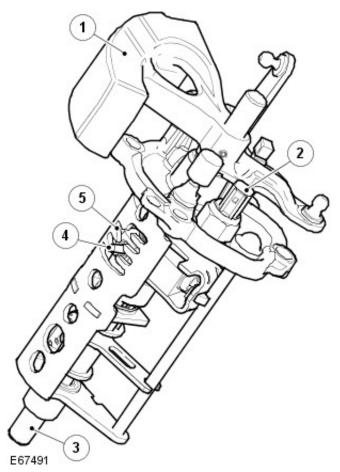
Reverse Gear



• NOTE: The reverse idler-gear in turn transmits the drive to the reverse gear on the opposite output shaft.

The reverse gear synchronizer, transfers drive from the 1st gear-wheel on the input shaft, to the 1st gear-wheel on the output shaft, which is fixed to the reverse idler-gear.

Internal Selector Mechanism



Item	Description	
1	Counterbalance	
2	Reverse gear switch	
	Selector shaft	
4	Selector finger	
5	Selector gate	

The selector interlock mechanism and selector finger are mounted on a sleeve in the selector mechanism housing. A spring-loaded ball maintains the engagement of the selected gear. A counterbalance weight dampens the synchronized shift resistance of gear selection to provide a smooth gear change operation.

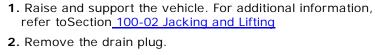
The reverse lamp switch is mounted on the housing's cover.

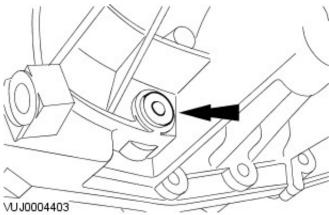
Manual Transmission/Transaxle - Manual Transaxle Diagnosis and Testing

For additional information, refer to Section 308-00 Manual Transmission/Transaxle and Clutch - General Information

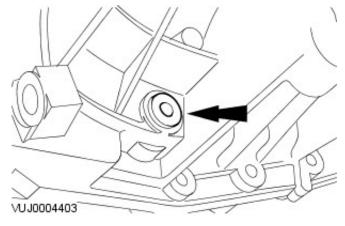
Manual Transmission/Transaxle - Transaxle Draining and FillingVehicles With: 5-Speed Manual Transmission - MT75

General Procedures

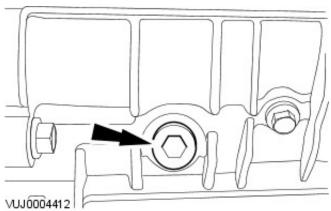




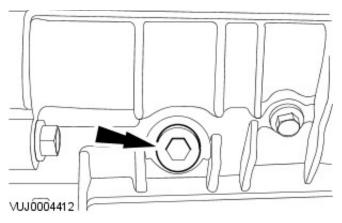
3. Install the drain plug.



4. Remove the fill plug.



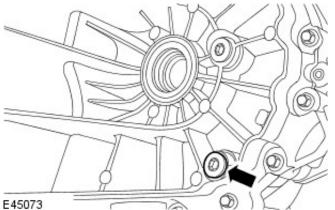
- **5.** Fill the transaxle to 0.5 mm (0.02 in) below the lower edge of the fill plug bore.
- 6. Install the fill plug.
 - Tighten to 45 Nm.



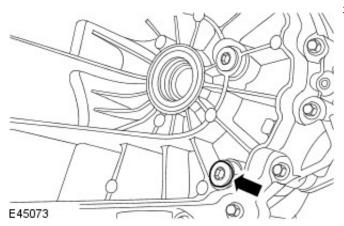
7. Lower the vehicle.

Manual Transmission/Transaxle - Transaxle Draining and FillingVehicles With: 6-Speed Manual Transaxle - MMT6

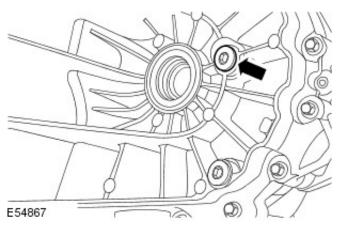
General Procedures



- **1.** Raise and support the vehicle. For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- 2. Remove the drain plug and drain the fluid into a suitable container

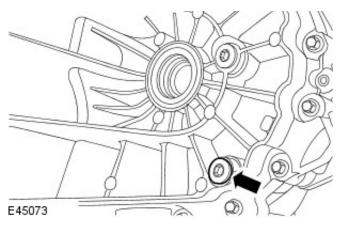


- 3. Install the drain plug.
 - Tighten to 35 Nm.



4. Remove the fill plug.

- **5.** Fill the transaxle to 0 5 mm (0 0.20 in) below the lower edge of the fill plug bore.
- 6. Install the fill plug.
 - Tighten to 35 Nm.



7. Lower the vehicle.

Manual Transmission/Transaxle - Halfshaft Seal LH

In-vehicle Repair

Special Tool(s)			
	Link shaft oil seal installer		
	205-115		
205-115			
E 20	Pinion oil seal remover		
	308-208		
TO STATE OF THE PARTY OF THE PA			
308-208			

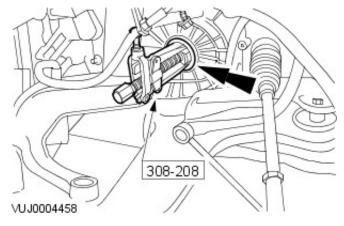
Removal

1. Drain the transmission.

For additional information, refer to: <u>Transaxle Draining and Filling - Vehicles With: 5-Speed Manual Transmission - MT75</u> (308-03 Manual Transmission/Transaxle, General Procedures) / <u>Transaxle Draining and Filling - Vehicles With: 6-Speed</u>

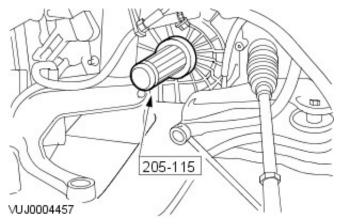
<u>Manual Transaxle - MMT6</u> (308-03 Manual Transmission/Transaxle, General Procedures).

- 2. Remove the left-hand halfshaft.
 For additional information, refer to: Front Halfshaft LH (205-04 Front Drive Halfshafts, Removal and Installation).
- **3.** Using the special tool, remove the halfshaft oil seal.



Installation

1. Using the special tool, install the halfshaft oil seal.



2. Install the left-hand halfshaft.

For additional information, refer to: Front Halfshaft LH (205-04 Front Drive Halfshafts, Removal and Installation).

3. Refill the transmission.

For additional information, refer to: <u>Transaxle Draining and</u> Filling - Vehicles With: 5-Speed Manual Transmission - MT75 (308-03 Manual Transmission/Transaxle, General Procedures) /

Transaxle Draining and Filling - Vehicles With: 6-Speed Manual Transaxle - MMT6 (308-03 Manual Transmission/Transaxle, General Procedures).

Manual Transmission/Transaxle - Halfshaft Seal RH

In-vehicle Repair

Special Tool(s)			
	Link shaft oil seal installer		
	205-115		
205-115			
- R	Pinion oil seal remover		
	308-208		
TO STATE OF THE PARTY OF THE PA			
308-208			

1. Drain the transmission.

For additional information, refer to: <u>Transaxle Draining and Filling - Vehicles With: 5-Speed Manual Transmission - MT75</u> (308-03 Manual Transmission/Transaxle, General Procedures) /

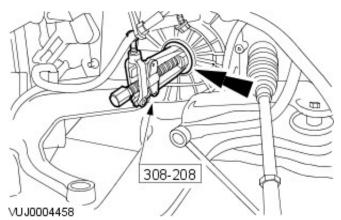
<u>Transaxle Draining and Filling - Vehicles With: 6-Speed Manual Transaxle - MMT6</u> (308-03 Manual Transmission/Transaxle, General Procedures).

2. Remove the right-hand halfshaft.
For additional information, refer to: Front Halfshaft RH - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (205-04 Front Drive Halfshafts, Removal and Installation) / Front Halfshaft RH - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi (205-04 Front Drive Halfshafts, Removal and Installation).

Removal

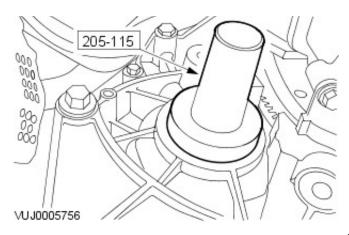
1. NOTE: Left-hand shown, right-hand similar.

Using the special tool, remove the halfshaft oil seal.



Installation

1. Using the special tool, install the halfshaft oil seal.



2. Install the right-hand halfshaft.

For additional information, refer to: Front Halfshaft RH - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (205-04 Front Drive Halfshafts, Removal and Installation) / Front Halfshaft RH - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi (205-04 Front Drive Halfshafts, Removal and Installation).

3. Refill the transmission.

For additional information, refer to: <u>Transaxle Draining and Filling - Vehicles With: 5-Speed Manual Transmission - MT75</u>

(308-03 Manual Transmission/Transaxle, General Procedures) /

<u>Transaxle Draining and Filling - Vehicles With: 6-Speed Manual Transaxle - MMT6</u> (308-03 Manual Transmission/Transaxle, General Procedures).

Manual Transmission/Transaxle - Input Shaft Seal

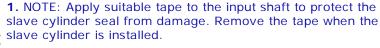
In-vehicle Repair

Removal

1. Remove the clutch slave cylinder.
For additional information, refer to: Clutch Slave Cylinder - Vehicles With: 5-Speed Manual Transmission - MT75 (308-02 Clutch Controls, Removal and Installation) / Clutch Slave Cylinder - Vehicles With: 6-Speed Manual Transaxle - MMT6 (308-02 Clutch Controls, Removal and Installation).

Installation

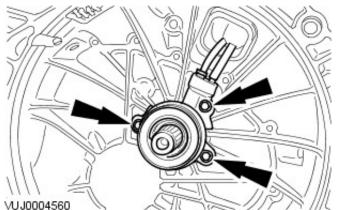
Vehicles with 5-speed manual transaxle



• NOTE: Apply sealer to the mating faces of the clutch slave cylinder and the transmission housing.

To install, reverse the removal procedure.

• Tighten to 10 Nm.

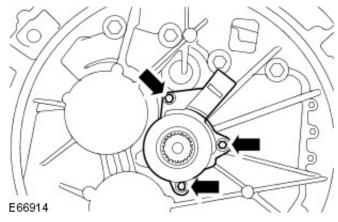


Vehicles with 6-speed manual transaxle

2. NOTE: Apply suitable tape to the input shaft to protect the slave cylinder seal from damage. Remove the tape when the slave cylinder is installed.

• NOTE: Apply sealer to the mating faces of the clutch slave cylinder and the transmission housing.

Tighten to 10 Nm.



Manual Transmission/Transaxle - Selector MechanismVehicles With: 5-Speed Manual Transmission - MT75

In-vehicle Repair

Special Tool(s)		
	Engine Support Beam	
	303-021	
303-021	Engine Support Brackets	
6/		
E46047	303-1068	
	Engine lifting eye	
	303-1067	
E44745		
(D)	Gearshift selector setting tool	
	308-436	
308436		

Materials Name

Gasket Eliminator Sealant

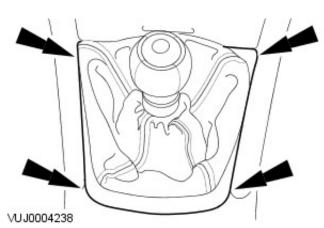
Specification

WSK-M2G348-A5

Removal

All vehicles

1. Detach the gearshift lever surround.



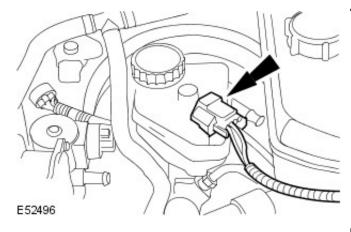
2. Remove the air cleaner. For additional information, refer to:

Air Cleaner (303-12A Intake Air Distribution and Filtering - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 -

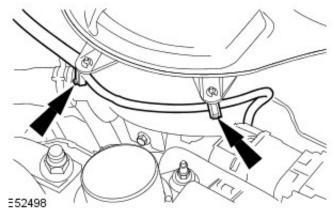


- 3. Remove the battery tray.

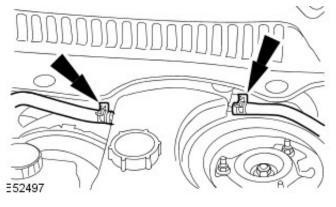
 For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- **4.** Disconnect the brake fluid low level warning indicator electrical connector.



5. Detach the brake fluid low level warning indicator wiring harness from the coolant expansion tank.

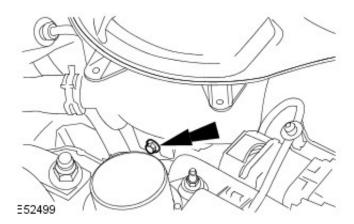


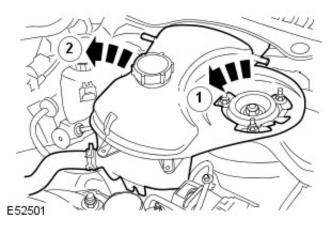
6. NOTE: Install blanking plugs to the cooling system vent hoses and the coolant expansion tank.



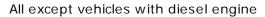
Detach the cooling system vent hoses from the coolant expansion tank.

7. Remove the coolant expansion tank retaining bolt.

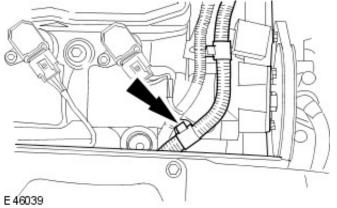




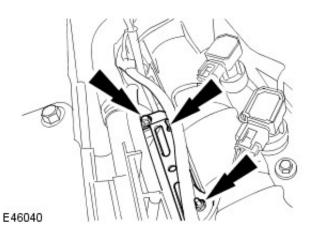
- 8. Reposition the coolant expansion tank.
 - 1. Detach the coolant expansion tank.
 - 2. Reposition the coolant expansion tank.



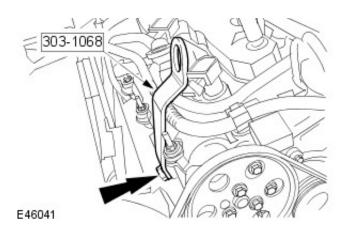
9. Detach the generator wiring harness retaining clip from the camshaft cover retaining clip.

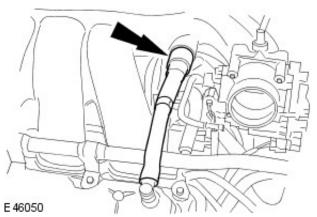


10. Remove the air cleaner mount bracket.

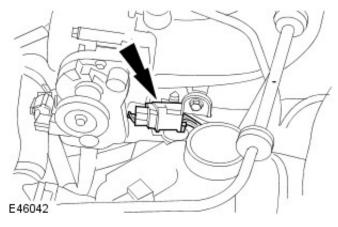


11. Install the special tool.

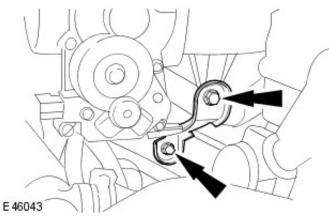




12. Detach the positive crankcase ventilation (PCV) hose from the intake manifold.

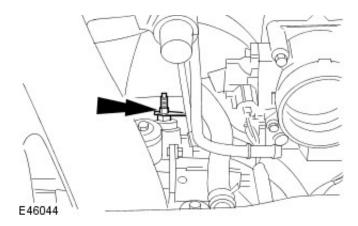


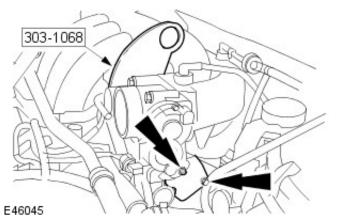
13. Detach the electrical connector from the intake manifold support bracket.



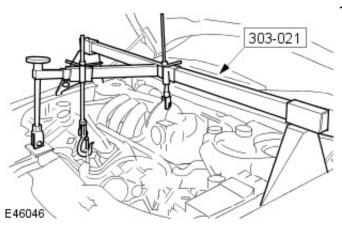
14. Remove the intake manifold support bracket.

15. Detach the wiring harness from the camshaft cover retaining stud.





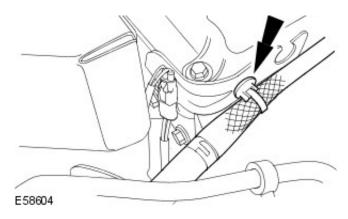
16. Install the special tool.



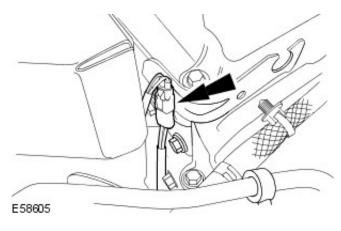
- **17.** Install the special tool.
 - Adjust the engine support bracket to support the weight of the powertrain assembly.

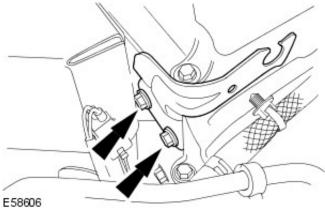
Vehicles with diesel engine

18. Detach the engine harness.

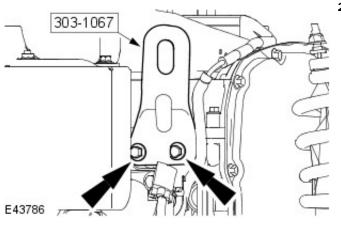


19. Detach the electrical connector.

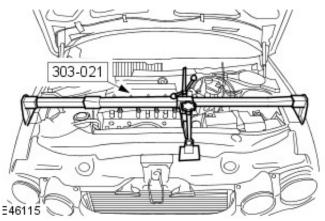




20. Remove the engine cover rear mount bracket.



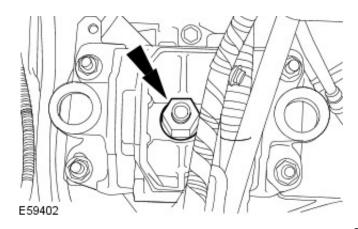
21. Install the special tool.

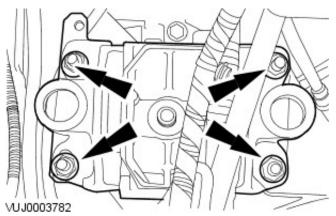


22. Using the special tool, support the engine and transmission assembly.

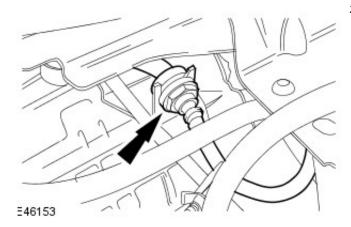
All vehicles

23. Remove the transaxle mount bracket securing nut.

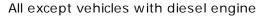




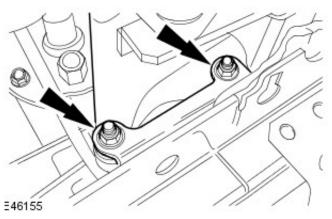
24. Remove the transaxle support insulator.



25. Detach the clutch master cylinder to clutch slave cylinder high pressure pipe from the support bracket.

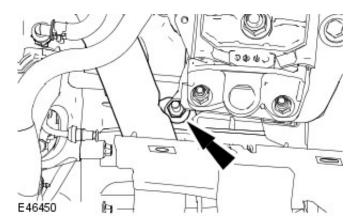


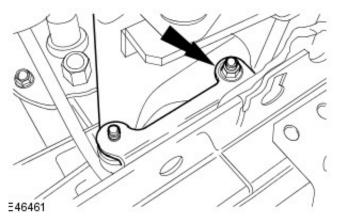
26. Remove the clutch master cylinder to clutch slave cylinder high pressure pipe support bracket.



Vehicles with diesel engine

27. Remove the charge air cooler pipe retaining nut.

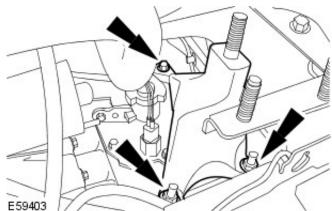




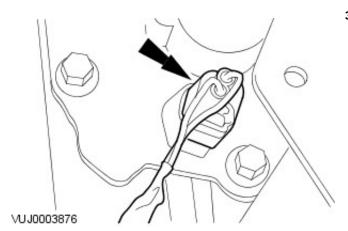
28. Remove the clutch master cylinder to clutch slave cylinder high pressure pipe support bracket.

All vehicles

29. Remove the transaxle mount bracket.

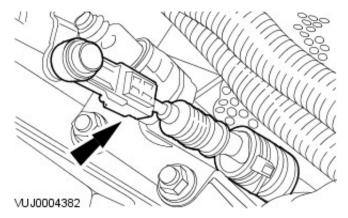


30. Disconnect the reverse lamp switch electrical connector.

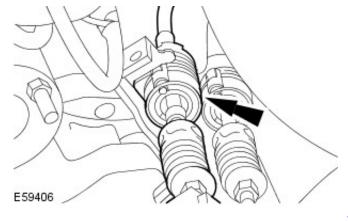


- **31.** NOTE: Shown from the under side of the vehicle for clarity.
- NOTE: Lower shift cable shown, upper shift cable similar.

 Disconnect the shift cables from the transavle selectors

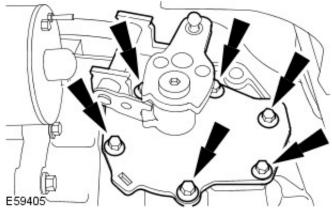


32. Detach the upper shift cable from the retaining bracket.



33. NOTE: Clean the selector mechanism mating surfaces and make sure all the sealant is removed.

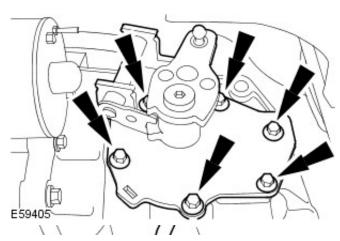
Remove the selector mechanism.



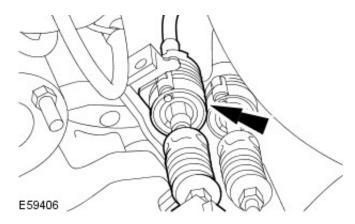
Installation

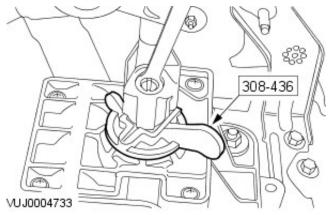
All vehicles

- **1.** Apply <u>sealant</u> to the selector mechanism mating surfaces (bead diameter: 2 mm).
- 2. Install the selector mechanism.
 - Tighten to 20 Nm.



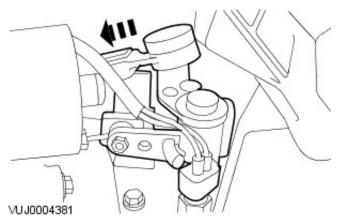
3 Attach the unner shift cable to the retaining bracket



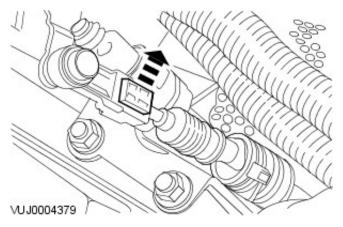


4. NOTE: Lift the reverse gear selector to fit special tool.

Using the special tool, make sure the gearshift lever is in the neutral position.



5. Make sure the transmission selector is in the fourth gear position.

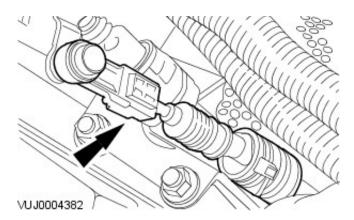


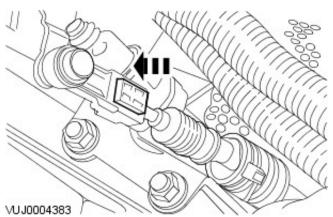
6. NOTE: Shown from the under side of the vehicle for clarity.

Detach the red locking tab on the shift cable.

7. NOTE: Shown from the under side of the vehicle for clarity.

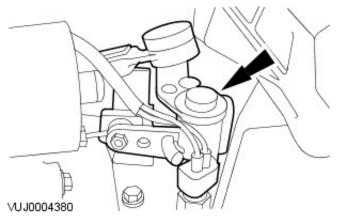
Attach the shift cable to the ball pin on the transmission selector.



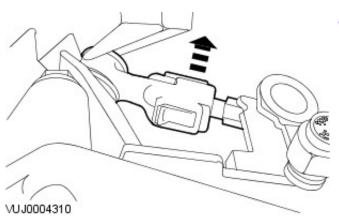


8. NOTE: Shown from the under side of the vehicle for clarity.

Press the red locking tab to secure the position of the shift cable.



9. Place the transmission selector into the neutral position.

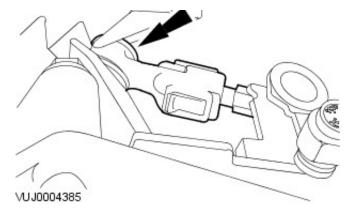


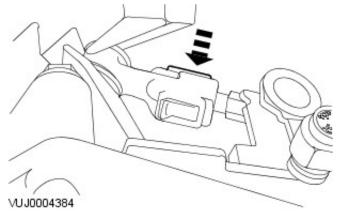
 $\begin{tabular}{ll} \textbf{10.} & \textbf{NOTE: Shown from the under side of the vehicle for clarity.} \end{tabular}$

Detach the red locking tab on the selector cable.

11. NOTE: Shown from the under side of the vehicle for clarity.

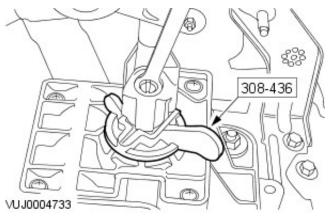
Attach the selector cable to the ball pin on the gearbox mass damper.



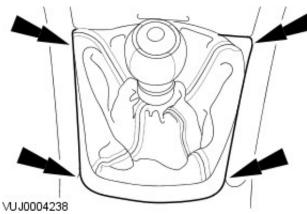


$\begin{tabular}{ll} \bf 12. \ NOTE: \ Shown \ from \ the \ under \ side \ of \ the \ vehicle \ for \ clarity. \end{tabular}$

Press the red locking tab to secure the position of the selector cable.

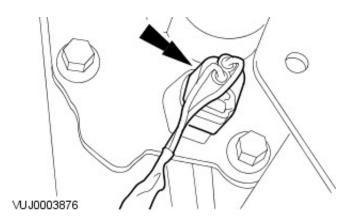


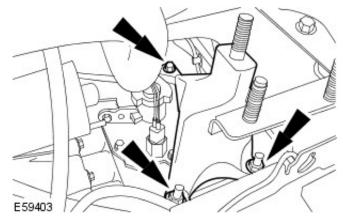
13. Remove the special tool.



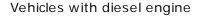
14. Attach the gearshift lever surround.

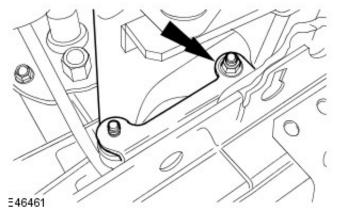
- **15.** Check for correct operation of gear controls.
- **16.** Connect the reverse lamp switch electrical connector.



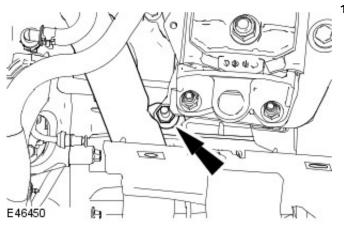


- **17.** Install the transaxle mount bracket.
 - Tighten to 80 Nm.





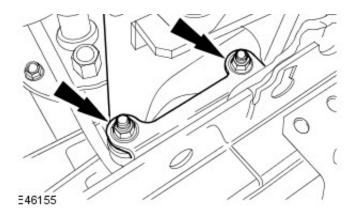
18. Install the clutch master cylinder to clutch slave cylinder high pressure pipe support.



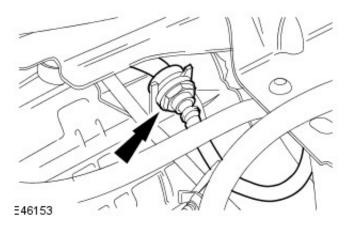
19. Install the charge air cooler pipe retaining nut.

All except vehicles with diesel engine

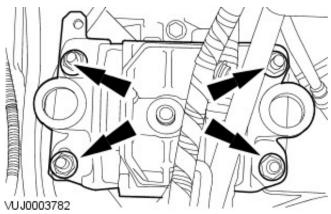
20. Install the clutch master cylinder to clutch slave cylinder high pressure pipe support bracket.



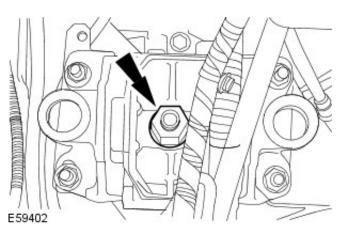
All vehicles



21. Attach the clutch master cylinder to clutch slave cylinder high pressure pipe to the support bracket.



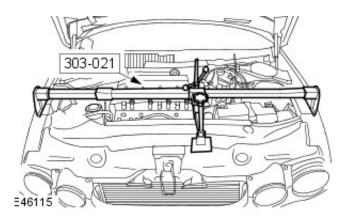
- **22.** Install the transaxle support insulator.
 - Tighten to 47 Nm.

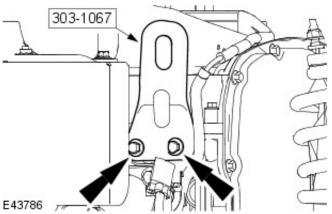


- 23. Install the transaxle mount bracket securing nut.
 - Tighten to 133 Nm.

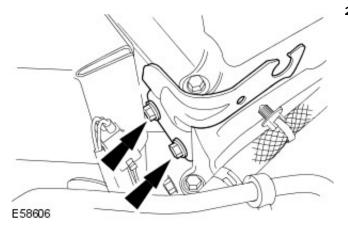
Vehicles with diesel engine

24. Remove the special tool.



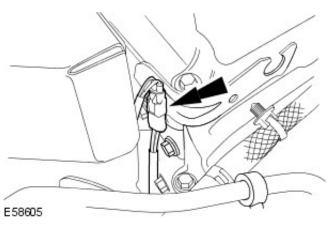


25. Remove the special tool.



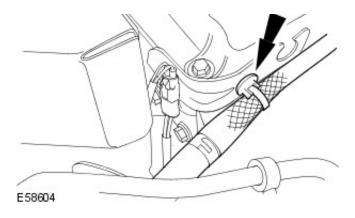
26. Install the engine cover rear mount bracket.

• Tighten to 23 Nm.



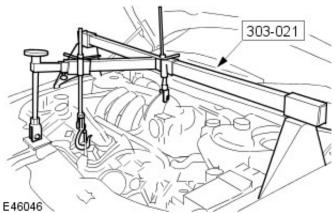
27. Attach the electrical connector.

28. Attach the engine harness.

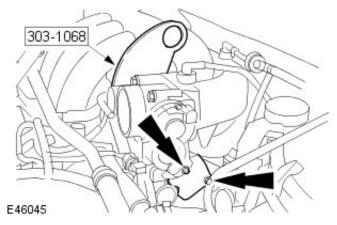


All vehicles

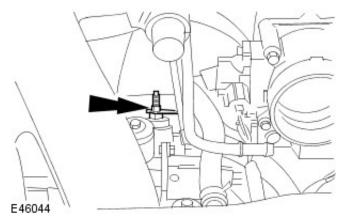
29. Remove the special tool.



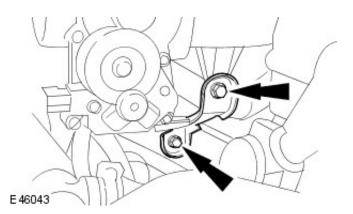
30. Remove the special tool.

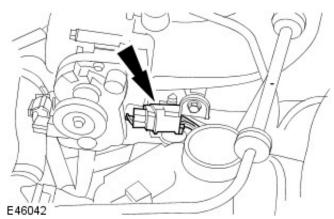


- **31.** Attach the wiring harness to the camshaft cover retaining stud.
 - Tighten to 6 Nm.

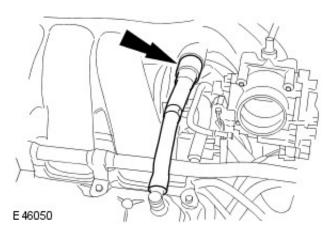


- **32.** Install the intake manifold support bracket.
 - Tighten to 10 Nm.

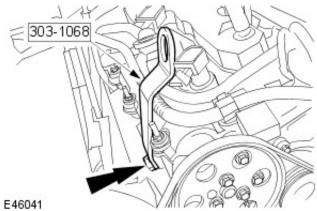




33. Attach the electrical connector to the intake manifold support bracket.

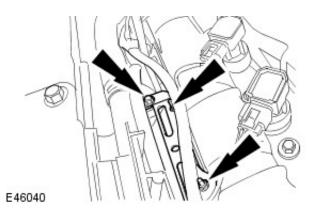


34. Attach the PCV hose to the intake manifold.

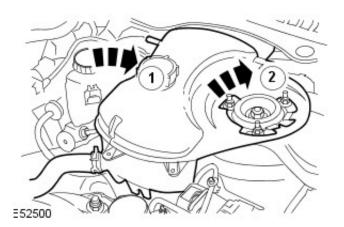


35. Remove the special tool.

- **36.** Install the air cleaner mount bracket.
 - Tighten to 6 Nm.

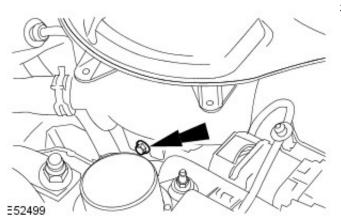


37. Attach the generator wiring harness retaining clip to the camshaft cover retaining clip.



E 46039

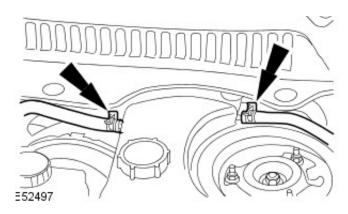
- **38.** Attach the coolant expansion tank.
 - 1. Reposition the coolant expansion tank.
 - 2. Attach the coolant expansion tank.

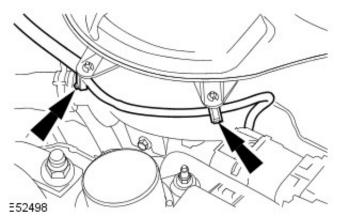


- 39. Install the coolant expansion tank retaining bolt.
 - Tighten to 3 Nm.

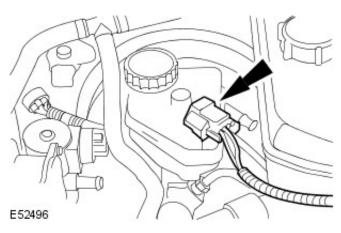
40. NOTE: Remove the blanking plugs from the cooling system vent hoses and the coolant expansion tank.

Attach the cooling system vent hoses to the coolant expansion tank.





41. Attach the brake fluid low level warning indicator wiring harness to the coolant expansion tank.



42. Connect the brake fluid low level warning indicator electrical connector.

- **43.** Install the battery tray. For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- **44.** Install the air cleaner. For additional information, refer to:

Air Cleaner (303-12A Intake Air Distribution and Filtering - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation),

<u>Air Cleaner</u> (303-12B Intake Air Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).

Manual Transmission/Transaxle - Selector MechanismVehicles With: 6-Speed Manual Transaxle - MMT6

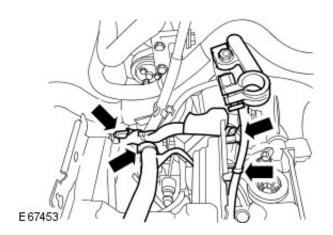
In-vehicle Repair

Materials

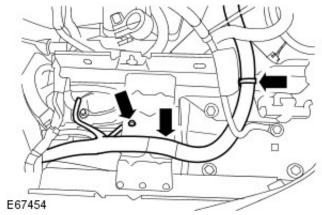
Name Specification
Gasket Eliminator Sealant WSK-M2G348-A5

Removal

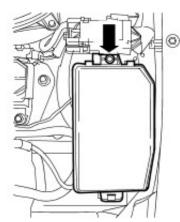
- 1. Remove the battery tray.
 For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- 2. Detach the wiring harnesses.



3. Detach the wiring harnesses.

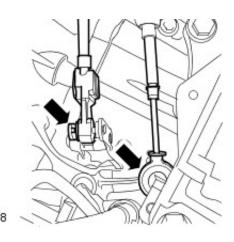


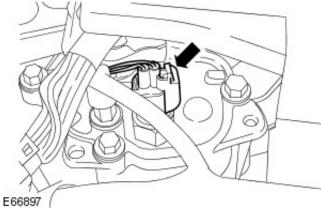
4. Detach the fuse box.



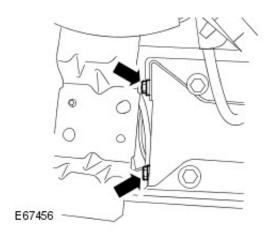
E 67455

5. Detach the selector cables.

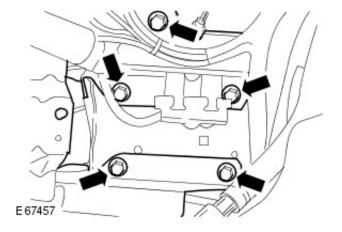




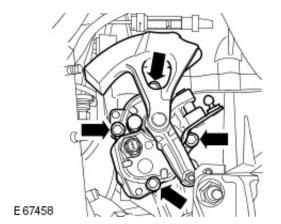
 $\textbf{6.} \ \ \text{Disconnect the reverse lamp switch electrical connector}.$



7. Remove the battery tray retaining bracket retaining bolts.



- **8.** Remove the battery tray retaining bracket retaining bolts.
 - Reposition the battery tray

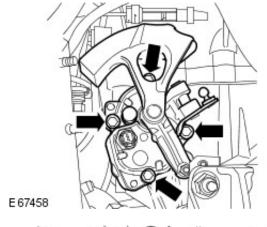


make sure all the sealant is removed.

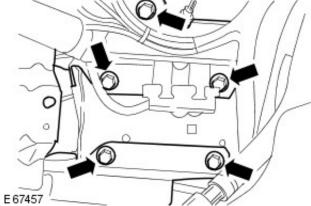
Remove the selector mechanism.

Installation

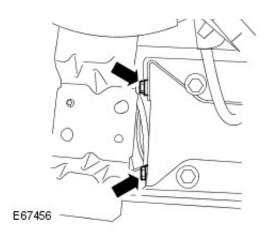
- **1.** Apply <u>sealant</u> to the selector mechanism mating surfaces (bead diameter: 2 mm).
- 2. Install the selector mechanism.
 - Tighten to 20 Nm.

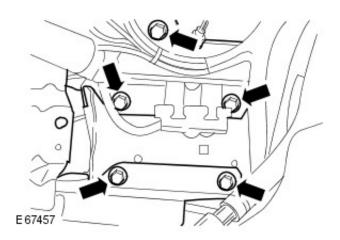


- **3.** Loosly install the battery tray retaining bracket retaining bolts.
 - Reposition the battery tray.

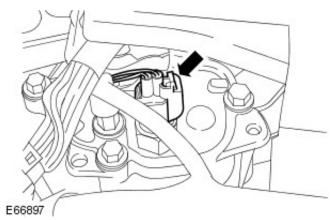


4. Install the battery tray retaining bracket retaining bolts.

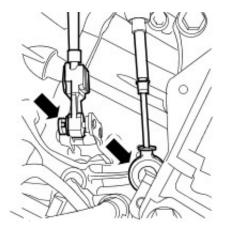




5. Fully tighten the battery tray retaining bracket retaining bolts.

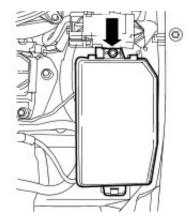


6. Connect the reverse lamp switch electrical connector.

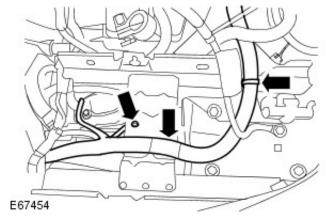


7. Attach the selector cables.

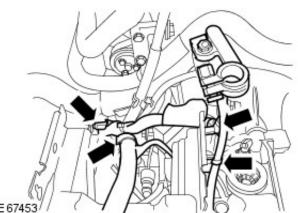
8. Attach the fuse box.



E 67455



9. Attach the wiring harnesses.



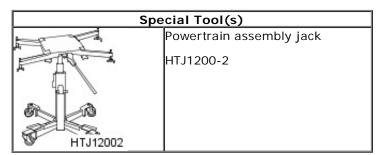
10. Attach the wiring harnesses.

11. Install the battery tray.

For additional information, refer to: Battery Tray (414-01 Battery, Mounting and Cables, Removal and Installation).

Manual Transmission/Transaxle - Support Insulator

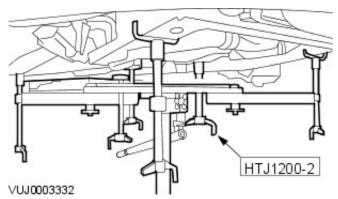
In-vehicle Repair



Removal

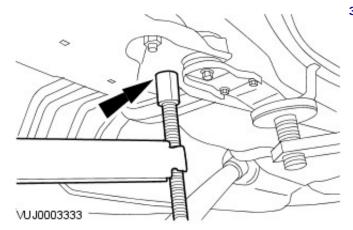
All vehicles

- **1.** Raise and support the vehicle. For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- 2. Install the special tool.



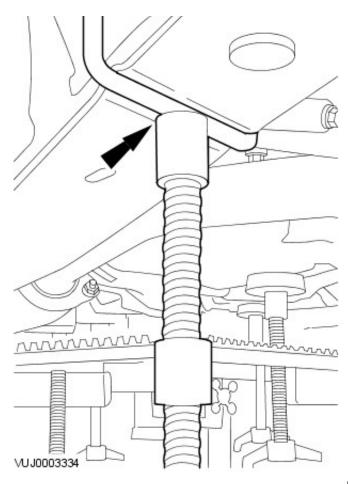
3. NOTE: Left-hand shown, right-hand similar.

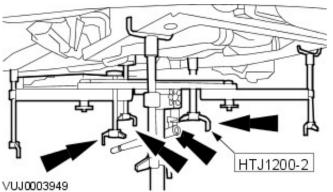
Position and adjust the special tool height rear adjuster.



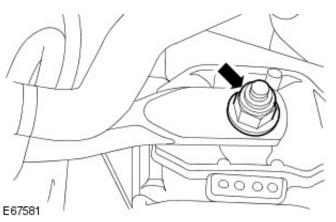
4. NOTE: Right-hand shown, left-hand similar.

Position and adjust the special tool front height adjuster.





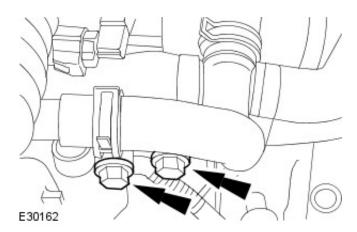
5. Position and adjust the special tool engine height adjusters.

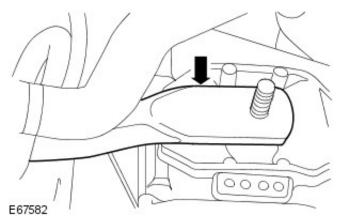


6. Remove the retaining nut.

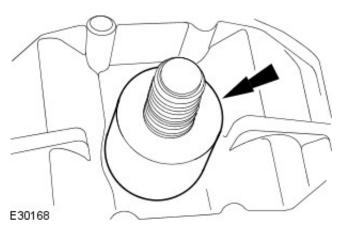
Vehicles with 5-speed manual transaxle

7. Detach the support bar.



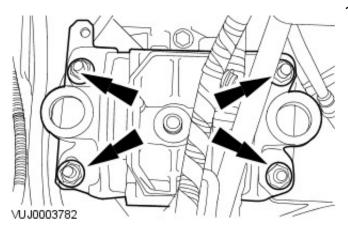


8. Remove the support bar.



9. Remove the spacer.

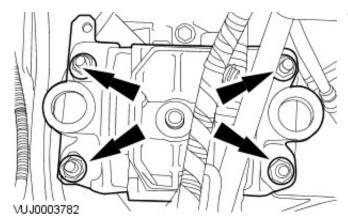




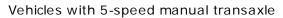
- 10. Remove the transmission mount.
 - Remove the transmission mount retaining nuts.

Installation

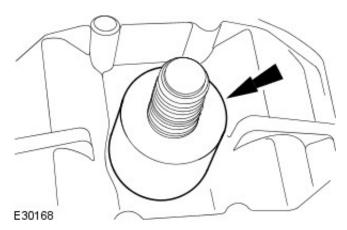
All vehicles



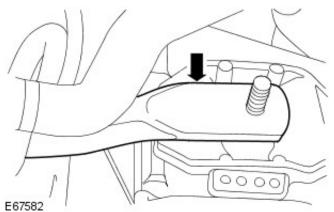
- 1. Install the transmission mount.
 - Tighten to 47 Nm.



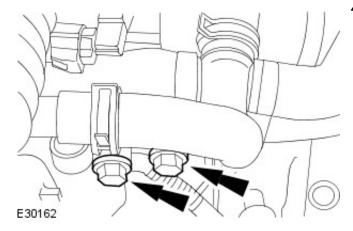
2. Install the spacer.



3. Install the support bar.

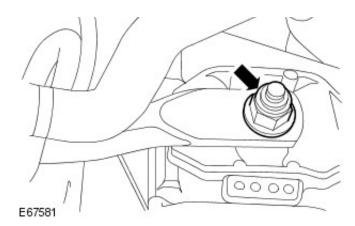


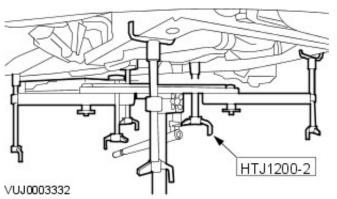
4. Tighten to 25 Nm.



All vehicles

5. Tighten to 133 Nm.



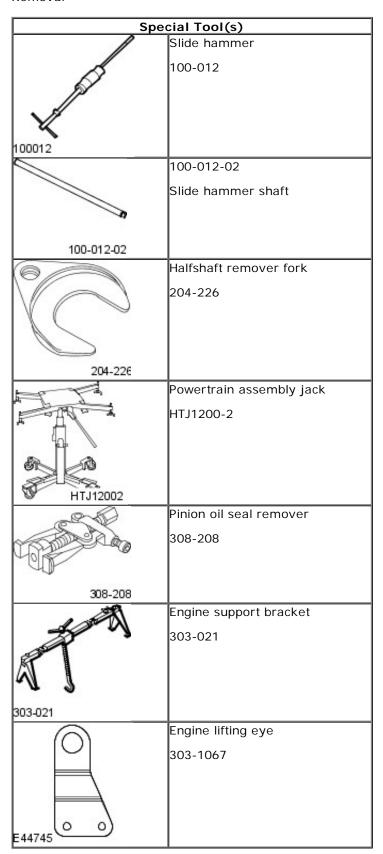


6. Remove the special tool.

7. Lower the vehicle.

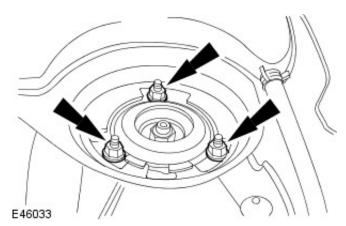
Manual Transmission/Transaxle - Transaxle2.0L Duratorq-TDCi

Removal



Removal

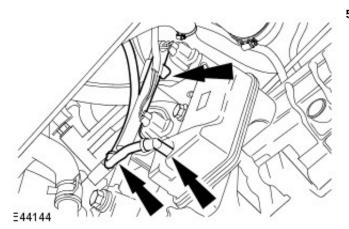
- Remove the battery tray.
 For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- 2. Remove the air cleaner.



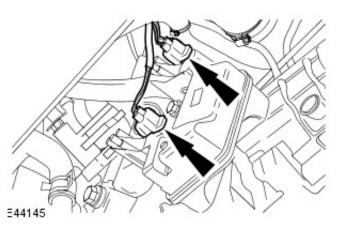
For additional information, refer to: <u>Air Cleaner</u> (303-12B Intake Air Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).

3. NOTE: Left-hand shown, right-hand similar.

Loosen the shock absorber and spring assembly securing nuts.

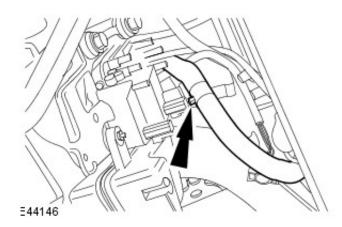


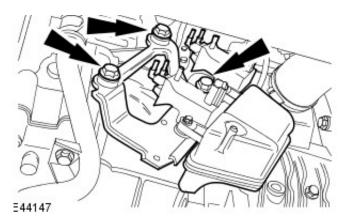
- 4. Remove the front subframe.
 For additional information, refer to: Front Subframe 2.2L
 Duratorq-TDCi (110kW/150PS) Puma/2.0L Duratorq-TDCi
 (502-00 Uni-Body, Subframe and Mounting System,
 Removal and Installation).
- **5.** Disconnect the vacuum pipes from the vacuum solenoid valves and the vacuum reservoir.



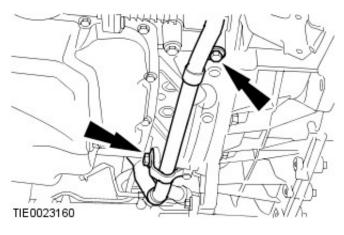
6. Disconnect the vacuum solenoid valves electrical connectors.

7. Detach the wiring harness from the vacuum solenoids and vacuum reservoir mount bracket.

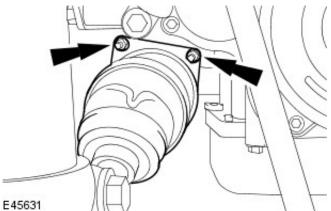




8. Remove the vacuum solenoids and vacuum reservoir mount bracket assembly.



9. Detach the coolant pipe from the engine.



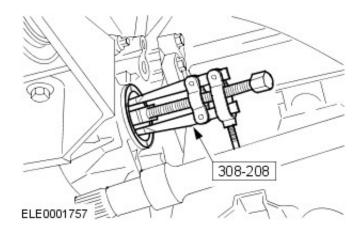
10. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

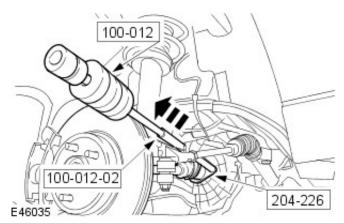
Detach the right-hand halfshaft.

- Disengage the right-hand halfshaft from the transaxle.
- Secure the right-hand halfshaft to one side.

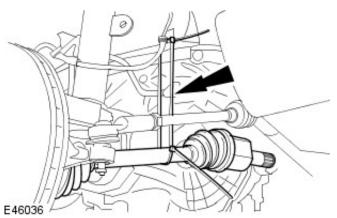
11. NOTE: Plug the transaxle to prevent fluid loss or dirt ingress.

Using the special tool, remove the right-hand halfshaft seal.



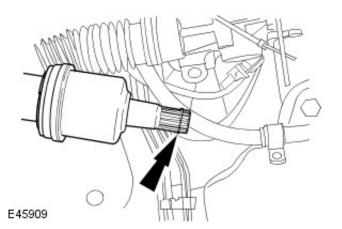


12. Using the special tools, detach the left-hand halfshaft.



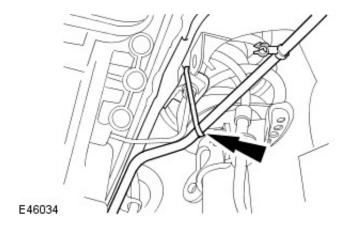
13. CAUTION: Make sure the halfshaft CV joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

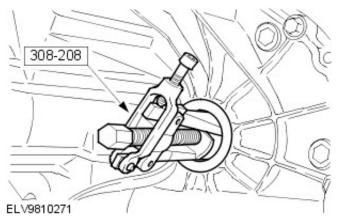
Support the left-hand halfshaft.



14. Remove and discard the left-hand halfshaft snap ring.

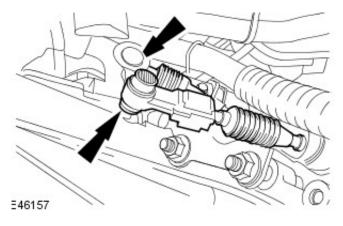
15. Support the power steering fluid pipe.



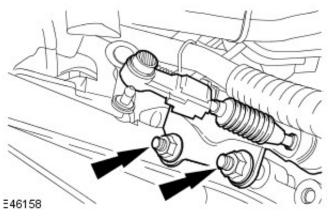


16. NOTE: Plug the transaxle to prevent fluid loss or dirt ingress.

Using the special tool, remove the left-hand halfshaft seal.

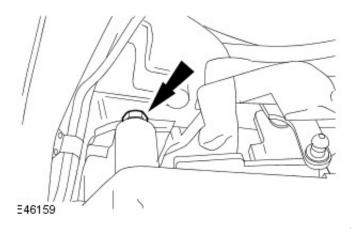


17. Detach the gearshift cables from the transaxle.

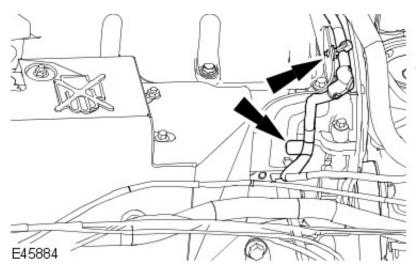


18. Detach the gearshift cable support bracket from the transaxle.

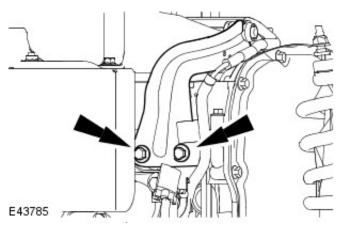
19. Remove the transaxle mount bracket retaining bolt.



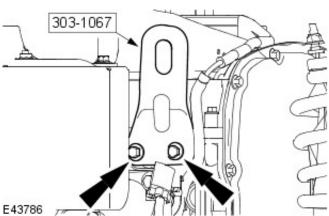
20. Lower the vehicle.



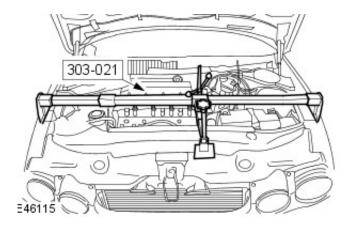
21. Detach the generator and starter motor positive cable from the engine cover mounting bracket.



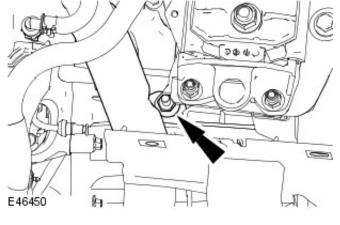
22. Remove the engine cover rear mount bracket.



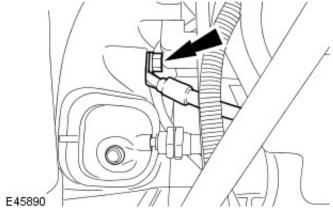
23. Install the special tool.



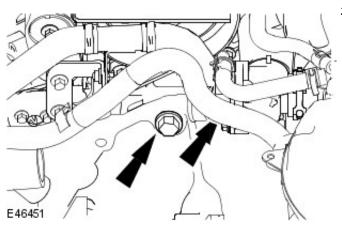
25. Detach the charge air cooler pipe.



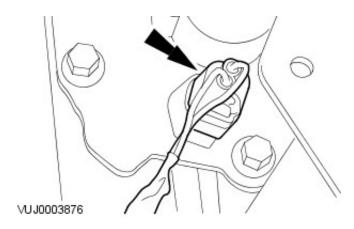
26. Detach the transaxle ground cable.

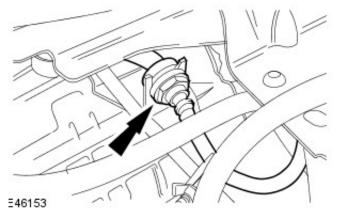


27. Remove the transaxle upper retaining bolts.



28. Disconnect the reverse lamp switch electrical connector.

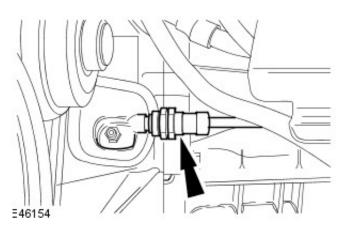




29. CAUTION: If brake fluid is split on the paintwork, the affected area must be washed down immediately with cold water. Failure to follow this instruction may result in damage to the vehicle.

Detach the clutch master cylinder to clutch slave cylinder high pressure pipe from the support bracket.

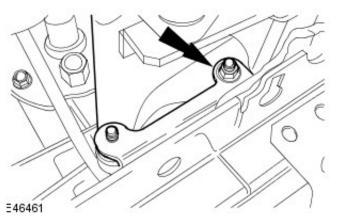
• Install a suitable pipe clamp to the clutch master cylinder to clutch slave cylinder high pressure pipe.



30. CAUTION: If brake fluid is split on the paintwork, the affected area must be washed down immediately with cold water. Failure to follow this instruction may result in damage to the vehicle.

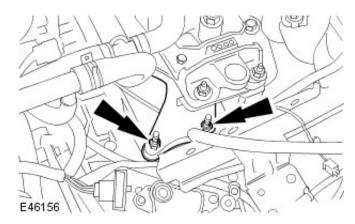
Detach the clutch master cylinder to clutch slave cylinder high pressure pipe from the clutch slave cylinder.

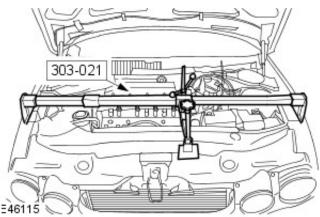
• Remove the clutch master cylinder to clutch slave cylinder high pressure pipe retaining clip.



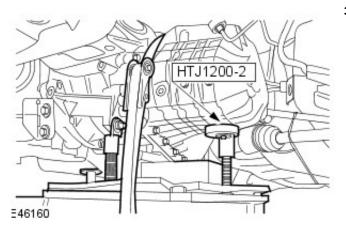
31. Remove the clutch master cylinder to clutch slave cylinder high pressure pipe support bracket.

32. Remove the transaxle mount bracket retaining studs.

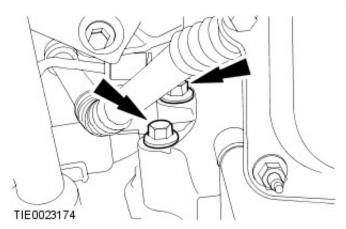




33. Using the engine support bracket lower the powertrain assembly approximately 60 mm (2.36 inches) between the transaxle and transaxle mount bracket.



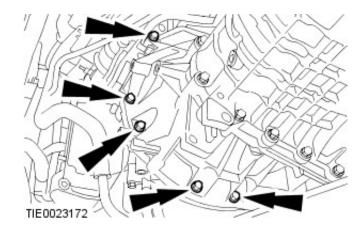
- **34.** Raise the vehicle.
- **35.** Align the powertrain assembly jack to the transaxle.
 - Secure the transaxle to the powertrain assembly jack.

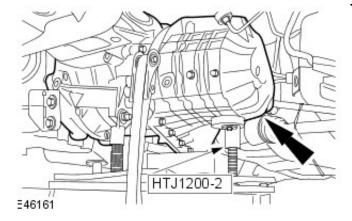


36. Remove the transaxle retaining bolts.

37. NOTE: Shown with the powertrain assembly jack removed for clarity.

Remove the transaxle retaining bolts.





38. Remove the transaxle.

- Detach the transaxle from the clutch plate.
- Lower the powertrain assembly jack and transaxle assembly.

Manual Transmission/Transaxle - Transaxle2.2L Duratorq-TDCi (110kW/150PS) - Puma

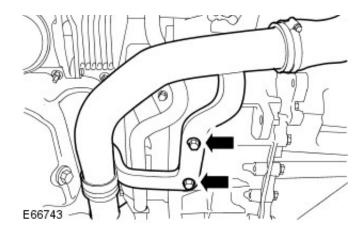
Removal

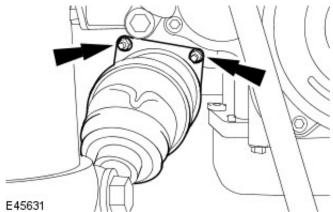
Special Tool(s)	
	Slide hammer
	100-012
100012	100-012-02
*	Slide hammer shaft
100-012-02	
	Halfshaft remover fork 204-226
204-22€	Powertrain assembly jack
	HTJ1200-2
HTJ12002	
68 D	Pinion oil seal remover
	308-208
308-208	
-	Engine support bracket 303-021
	333 32.
303-021	

Removal

- 1. Remove the battery tray.

 For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- Remove the front subframe.
 For additional information, refer to: Front Subframe 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).
- **3.** Remove the charge air cooler intake pipe retaining bolts.

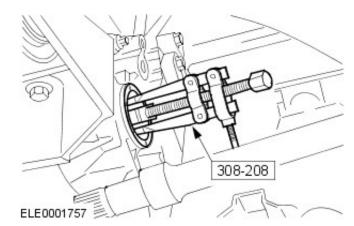




4. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

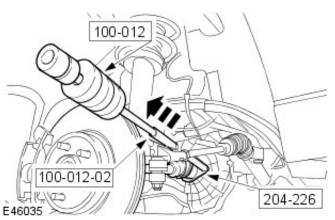
Detach the right-hand halfshaft.

- Disengage the right-hand halfshaft from the transaxle.
- Secure the right-hand halfshaft to one side.



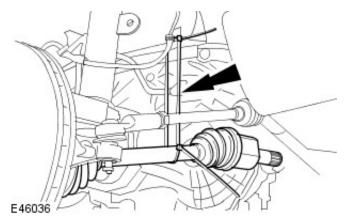
5. NOTE: Plug the transaxle to prevent fluid loss or dirt ingress.

Using the special tool, remove the right-hand halfshaft seal.

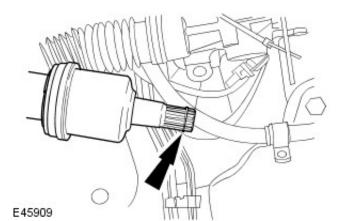


6. Using the special tools, detach the left-hand halfshaft.

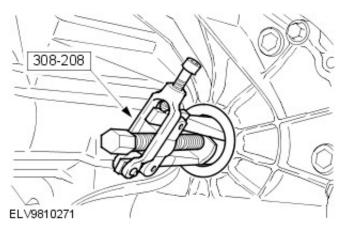
7. CAUTION: Make sure the halfshaft CV joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.



NOTE: Secure the right-hand halfshaft using tie strap.
 Support the left-hand halfshaft.

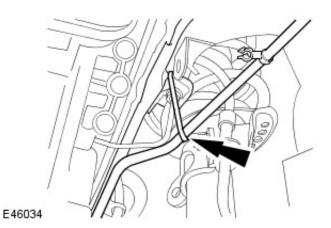


8. Remove and discard the left-hand halfshaft snap ring.



9. NOTE: Plug the transaxle to prevent fluid loss or dirt ingress.

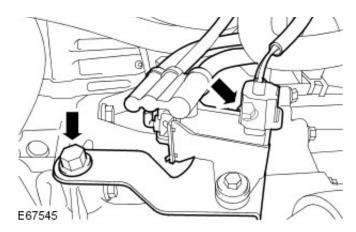
Using the special tool, remove the left-hand halfshaft seal.

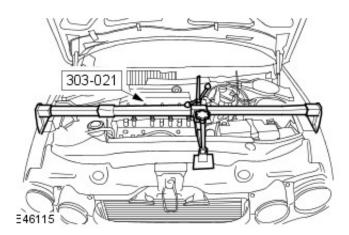


10. NOTE: Secure the power steering fluid pipe using tie straps.

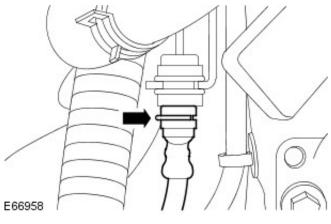
Support the power steering fluid pipe.

- **11.** Detach the vacuum solenoid valve assembly.
 - Remove the retaining bolts.
 - Secure the vacuum solenoid valve assembly to one side.





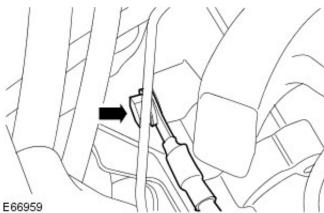
- 12. Lower the vehicle.
- **13.** Using the special tool, support the engine and transmission assembly.



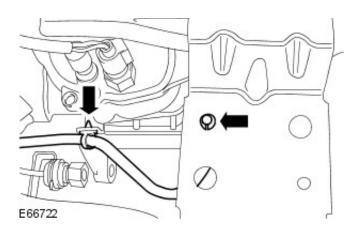
14. CAUTION: If brake fluid is split on the paintwork, the affected area must be washed down immediately with cold water. Failure to follow this instruction may result in damage to the vehicle.

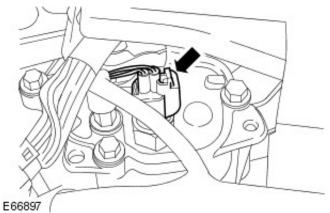
Disconnect the clutch master cylinder to clutch slave cylinder high pressure hose from the clutch slave cylinder high pressure pipe.

- Install a suitable pipe clamp to the clutch master cylinder to clutch slave cylinder high pressure hose.
- **15.** Detach the battery ground cable.

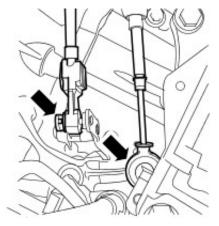


16. Detach the battery ground cable.



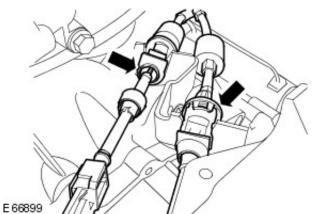


17. Disconnect the reverse lamp switch electrical connector.



E66898

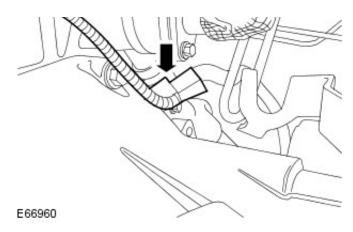
18. Detach the selector cables.

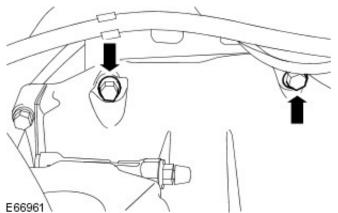


19. NOTE: Secure the selector cables using tie straps.

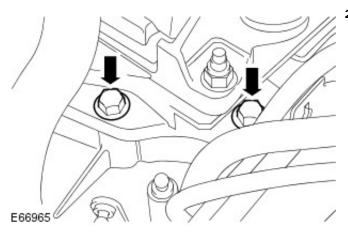
Detach the selector cables.

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

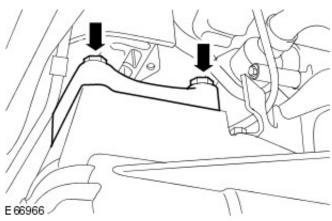




21. Remove the transaxle upper retaining bolts.

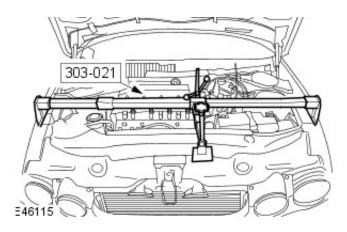


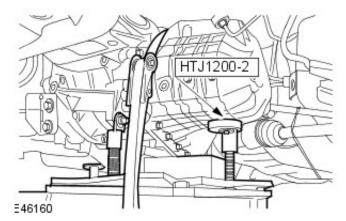
22. Remove the transaxle mount bracket retaining bolts.



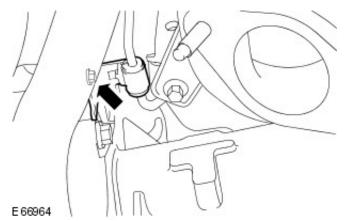
- 23. Detach the transaxle mount.
 - Remove the transaxle mount bracket retaining bolts.

24. Using the special tool, lower the powertrain assembly approximately 60 mm (2.36 inches) between the transaxle and transaxle mount bracket.

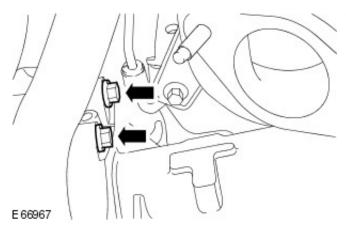




- 25. Raise the vehicle.
- **26.** Align the special tool to the transaxle.
 - Secure the transaxle to the powertrain assembly jack.



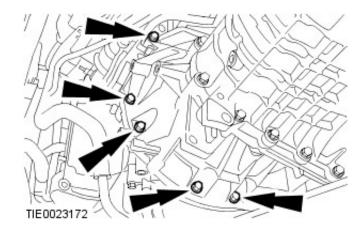
- **27.** Detach the turbocharger oil feed pipe retaining bracket.
 - Reposition the retaining bracket.

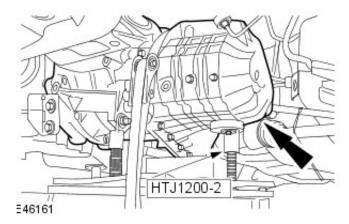


28. Remove the transaxle retaining bolts.

29. NOTE: Shown with the special tool removed for clarity.

Remove the transaxle retaining bolts.





- **30.** Using the special tool, remove the transaxle.
 - Detach the transaxle from the clutch plate.
 - Lower the powertrain assembly jack and transaxle assembly.

Manual Transmission/Transaxle - Transaxle2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27

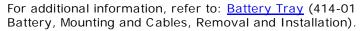
Removal

Special Tool(s)	
Spe	Slide hammer
	100-012
100012	
	100-012-02
*	Slide hammer shaft
100-012-02	Lalfah oft nama ayan faril
	Halfshaft remover fork
	204-226
204-226	Dowortrain assembly inck
	Powertrain assembly jack
HTJ12002	HTJ1200-2
6 C C	Pinion oil seal remover
	308-208
308-208	
	Engine support bracket 303-021
303-021	
6/	Engine support brackets
	303-1068
№ E46047	

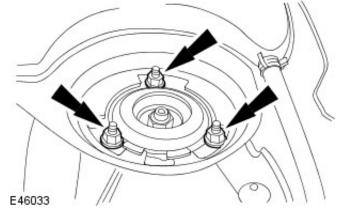
Removal

All vehicles

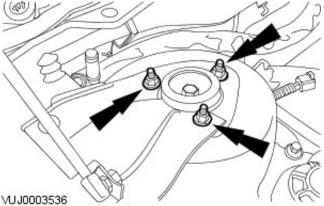
1. Remove the battery tray.



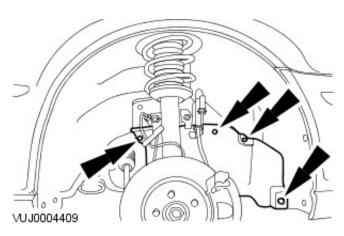
- Remove the air cleaner.
 For additional information, refer to: <u>Air Cleaner</u> (303-12A Intake Air Distribution and Filtering 2.5L NA V6 AJV6/2.0L NA V6 AJV6/3.0L NA V6 AJ27, Removal and Installation).
- **3.** Loosen the left-hand shock absorber and spring assembly securing nuts.



4. Loosen the right-hand shock absorber and spring assembly securing nuts.



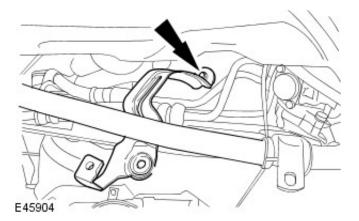
5. Remove the front subframe.
For additional information, refer to: Front Subframe - 2.5L
NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

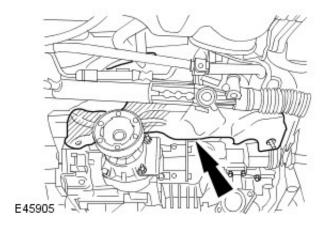


6. Remove the fender splash shield access panel.

Vehicles with 2.5L or 3.0L engine

7. Remove the steering gear heat shield bracket.

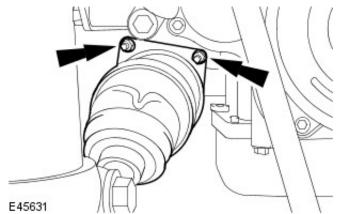




8. Remove the steering gear heat shield.

9. Remove the transfer case. For additional information, refer to: <u>Transfer Case</u> (308-07 Transfer Case, Removal).

Vehicles with 2.0L engine



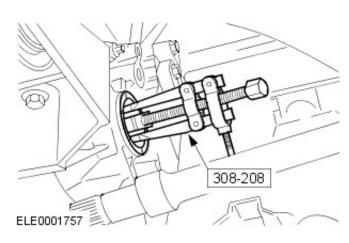
10. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Detach the right-hand halfshaft.

- Disengage the right-hand halfshaft from the transaxle.
- Secure the right-hand halfshaft to one side.

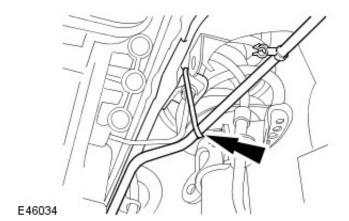
11. NOTE: Plug the transaxle to prevent fluid loss or dirt ingress.

Using the special tool, remove the halfshaft seal.



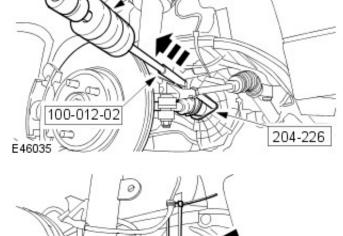
All vehicles

12. Support the power steering fluid pipe.



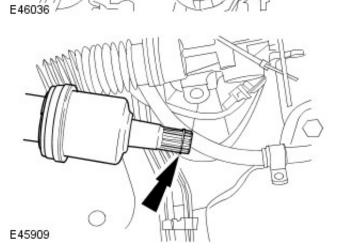
100-012

13. Using the special tools, detach the left-hand halfshaft.



14. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

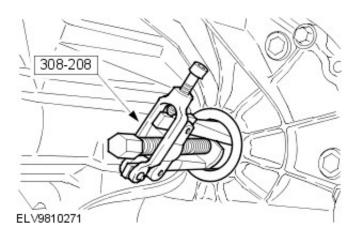
Support the halfshaft.

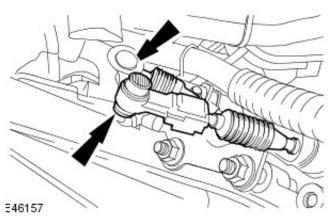


15. Remove and discard the halfshaft snap ring.

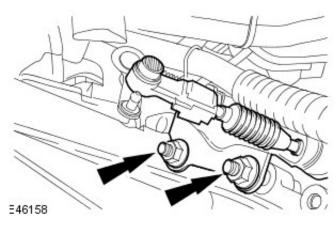
16. NOTE: Plug the transaxle to prevent fluid loss or dirt ingress.

Using the special tool, remove the halfshaft seal.

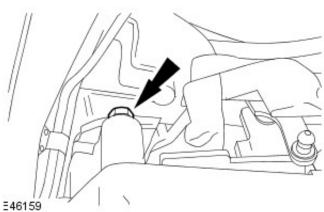




17. Detach the gearshift cables from the transaxle.

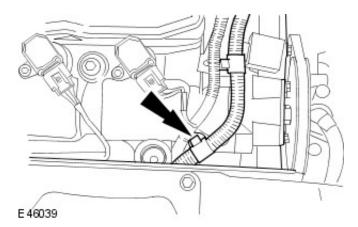


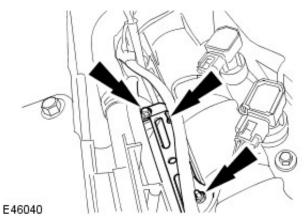
18. Detach the gearshift cable support bracket from the transaxle.



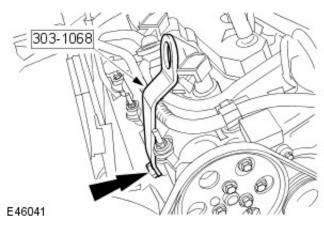
19. Remove the transaxle mount bracket retaining bolt.

- 20. Lower the vehicle.
- **21.** Detach the generator wiring harness retaining clip from the camshaft cover retaining clip.

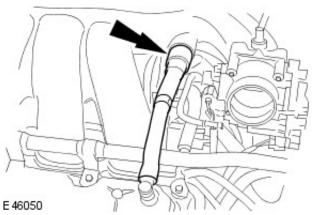




22. Remove the air cleaner mount bracket.

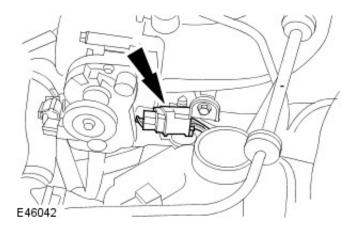


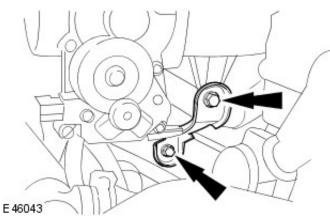
23. Install the engine support bracket.



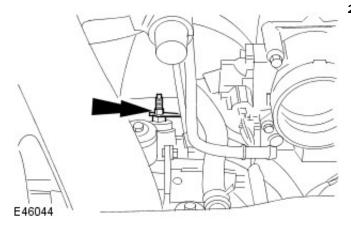
24. Detach the positive crankcase ventilation (PCV) hose from the intake manifold.

25. Detach the electrical connector from the intake manifold support bracket.

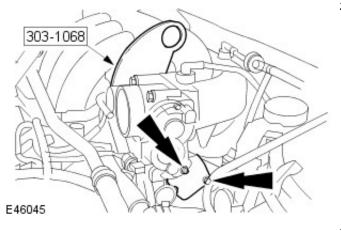




26. Remove the intake manifold support bracket.

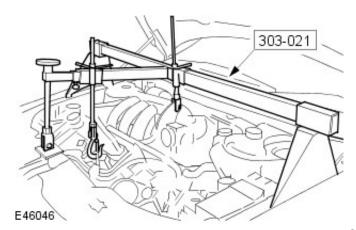


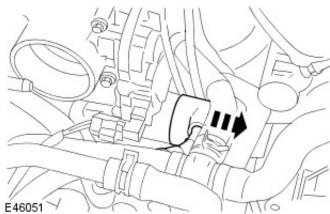
27. Detach the wiring harness from the camshaft cover retaining stud.



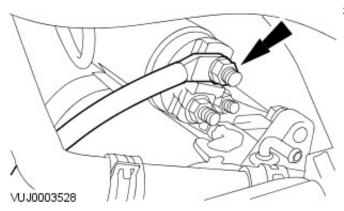
28. Install the engine support bracket.

- 29. Install the engine support bracket.
 - Adjust the engine support bracket to support the weight of the powertrain assembly.

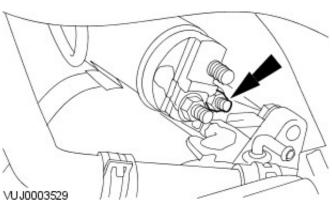




30. Detach the starter motor solenoid cover.

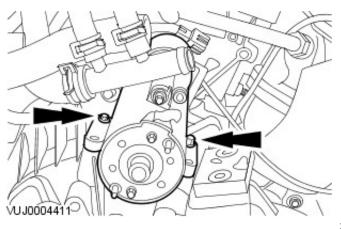


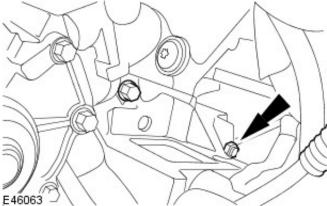
31. Detach the starter motor electrical connector.



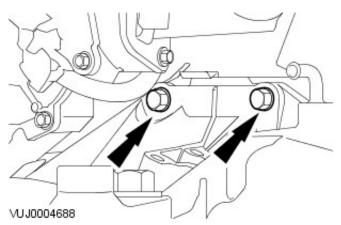
32. Detach the starter motor solenoid electrical connector.

33. Remove the starter motor.

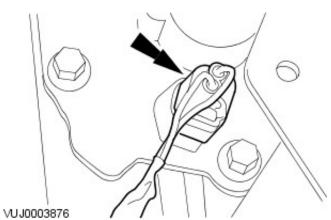




34. Remove the transaxle retaining bolt.



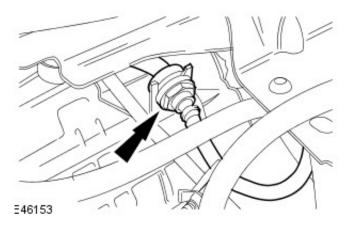
35. Remove the transaxle retaining bolts.



36. Disconnect the reverse lamp switch electrical connector.

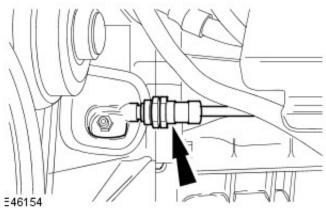
37. CAUTION: If brake fluid is split on the paintwork, the affected area must be washed down immediately with cold water. Failure to follow this instruction may result in damage to the vehicle.

Detach the clutch master cylinder to clutch slave cylinder



high pressure pipe from the support bracket.

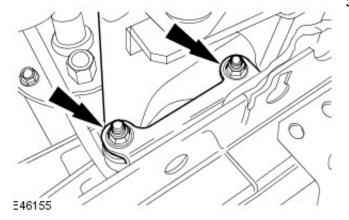
 Install a suitable pipe clamp to the clutch master cylinder to clutch slave cylinder high pressure pipe



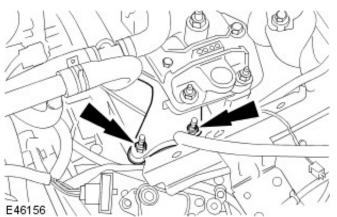
38. CAUTION: If brake fluid is split on the paintwork, the affected area must be washed down immediately with cold water. Failure to follow this instruction may result in damage to the vehicle.

Detach the clutch master cylinder to clutch slave cylinder high pressure pipe from the clutch slave cylinder.

• Remove the clutch master cylinder to clutch slave cylinder high pressure pipe retaining clip.

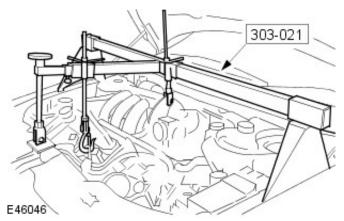


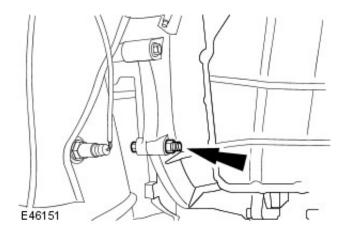
39. Remove the clutch master cylinder to clutch slave cylinder high pressure pipe support.



40. Remove the transaxle mount bracket securing studs.

41. Using the engine support bracket lower the powertrain assembly approximately 60 mm between the transaxle and transaxle mount bracket.

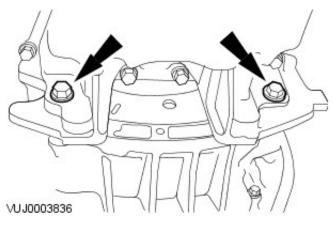




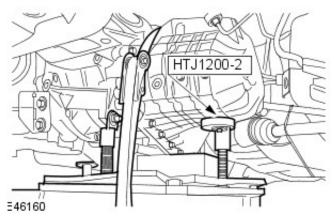
42. Raise the vehicle.

43. NOTE: The transaxle retaining bolt remains captive to the cylinder block flange.

Remove the transaxle retaining nut.

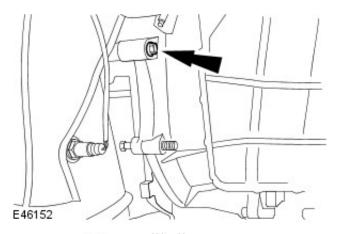


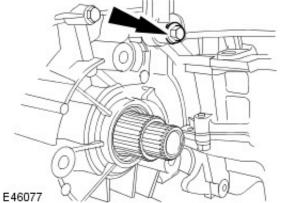
44. Remove the transaxle retaining bolts.



- **45.** Align the powertrain assembly jack to the transaxle.
 - Secure the transaxle to the powertrain assembly jack.

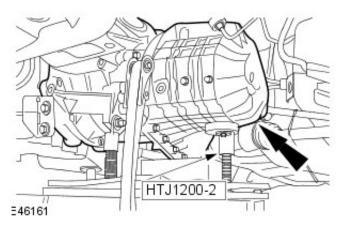
46. Remove the transaxle retaining bolt.





47. NOTE: Vehicles with 2.5L and 3.0L engines shown, vehicles with 2.0L engine similar.

Remove the transaxle retaining bolt.

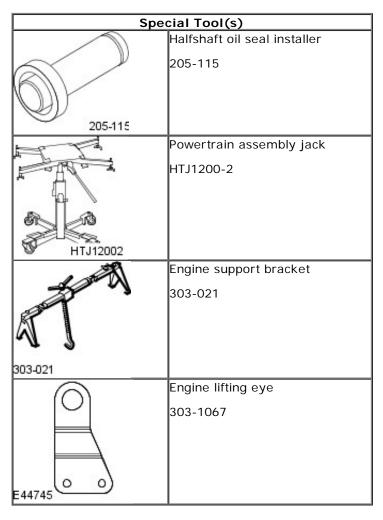


48. Remove the transaxle.

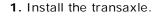
- Detach the transaxle from the clutch plate.
- Lower the powertrain assembly jack and transaxle assembly.

Manual Transmission/Transaxle - Transaxle 2.0L Duratorq-TDCi

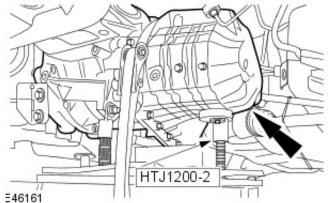
Installation



Installation



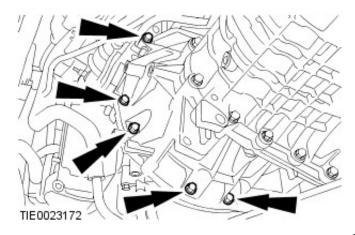
- Raise the powertrain assembly jack and transaxle assembly.
- Align the transaxle to the clutch plate.

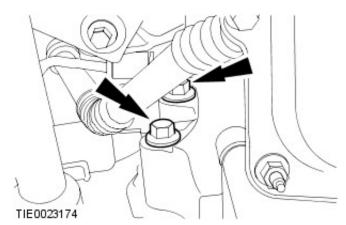


2. NOTE: Shown with the powertrain assembly jack removed for clarity.

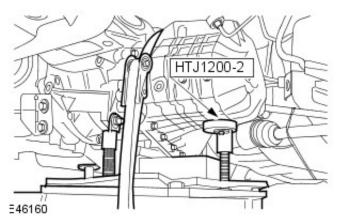
Install the transaxle retaining bolts.

• Tighten to 48 Nm.

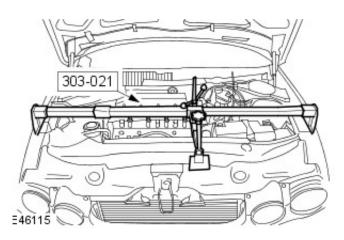




- 3. Install the transaxle retaining bolts.
 - Tighten to 48 Nm.



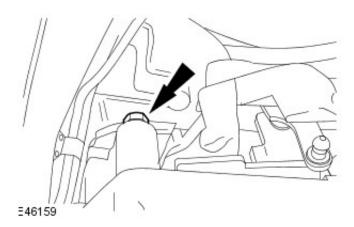
- 4. Remove the powertrain assembly jack.
 - Remove the transaxle to the powertrain assembly jack securing strap.

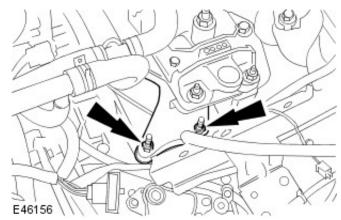


- **5.** Lower the vehicle.
- **6.** Using the engine support bracket raise the powertrain assembly.
 - Adjust the engine support bracket to align the transaxle to the transaxle mount bracket.

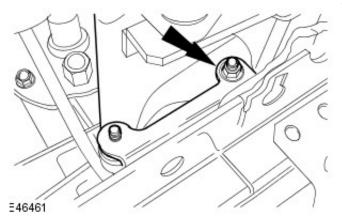
7. NOTE: Shown from under the vehicle for clarity.

Loosely install the transaxle mount bracket retaining bolt.

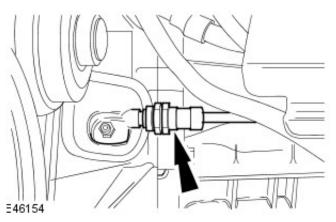




- **8.** Install the transaxle mount bracket retaining studs.
 - Tighten to 80 Nm.



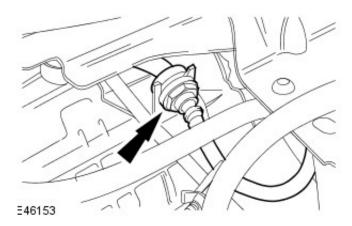
9. Install the clutch master cylinder to clutch slave cylinder high pressure pipe support bracket.

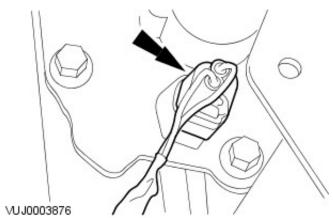


10. CAUTION: If brake fluid is split on the paintwork, the affected area must be washed down immediately with cold water. Failure to follow this instruction may result in damage to the vehicle.

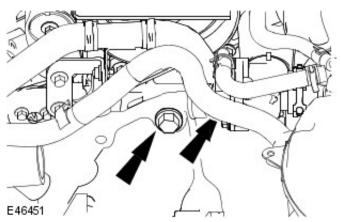
Attach the clutch master cylinder to clutch slave cylinder high pressure pipe to the clutch slave cylinder.

- Install the clutch master cylinder to clutch slave cylinder high pressure pipe retaining clip.
- **11.** Attach the clutch master cylinder to clutch slave cylinder high pressure pipe to the support bracket.
 - Remove the pipe clamp from the clutch master cylinder to clutch slave cylinder high pressure pipe.

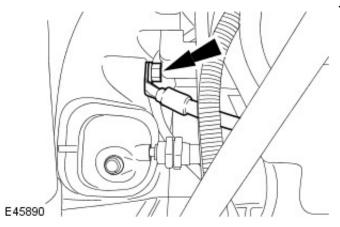




12. Connect the reverse lamp switch electrical connector.

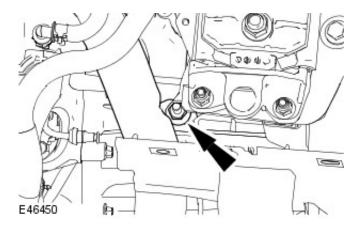


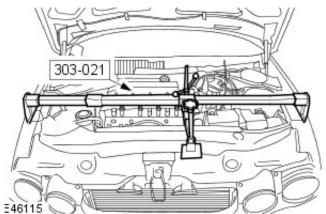
- **13.** Install the transaxle upper retaining bolts.
 - Tighten to 48 Nm.



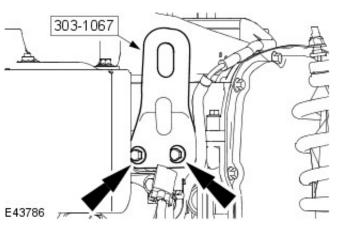
14. Attach the transaxle ground cable.

15. Attach the charge air cooler pipe retaining nut.

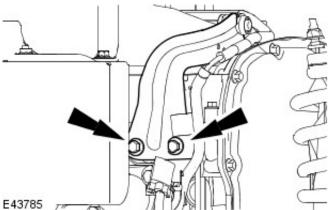




16. Remove the engine support bracket.

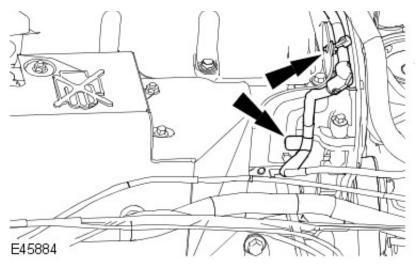


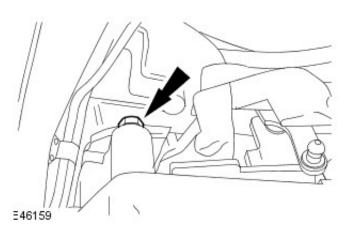
17. Remove the special tool.



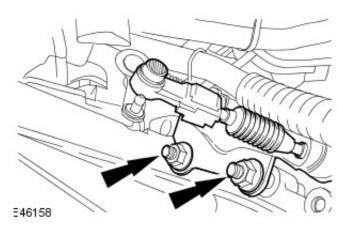
- **18.** Install the engine cover rear mount bracket.
 - Tighten to 23 Nm.

19. Attach the generator and starter motor positive cable from the engine cover mounting bracket.

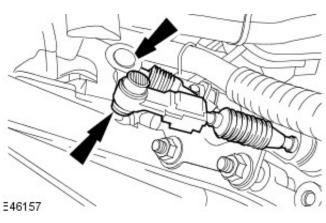




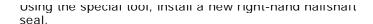
- 20. Raise the vehicle.
- **21.** Tighten the transaxle mount bracket retaining bolt.
 - Tighten to 80 Nm.

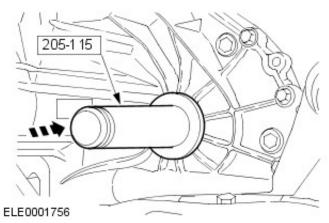


- **22.** Attach the gearshift cable support bracket to the transaxle.
 - Tighten to 25 Nm.

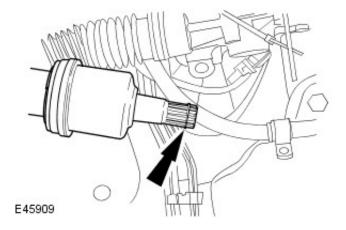


23. Attach the gearshift cables to the transaxle.



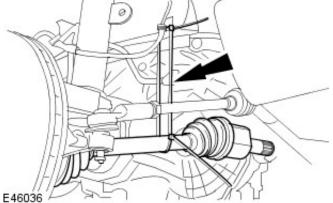


25. Install a new right-hand halfshaft snap ring.

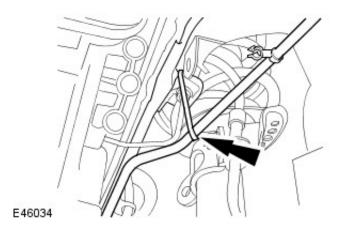


26. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Detach the right-hand halfshaft.

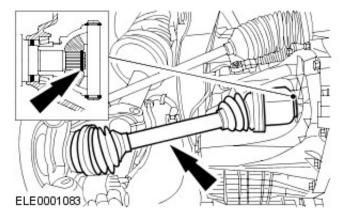


27. Detach the power steering fluid pipe.



28. CAUTIONS:

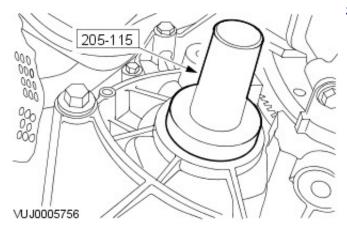
Make sure the halfshaft CV joints do not over articulate. Failure to follow this instruction may result in



Make sure the halfshaft seal is not damaged. Failure to follow this instruction may result in an transaxle fluid leak.

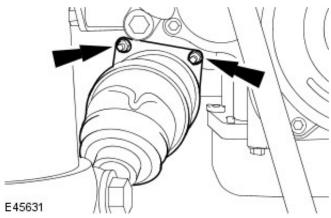
Attach the right-hand halfshaft to the transaxle.

• Make sure the halfshaft snap ring is correctly seated.



29. NOTE: Remove the transaxle plug.

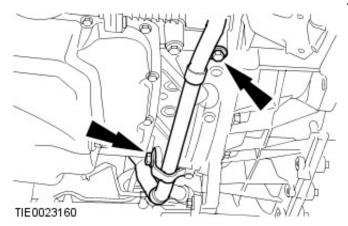
Using the special tool, install a new left-hand halfshaft seal.



30. CAUTION: Make sure the halfshaft CV joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

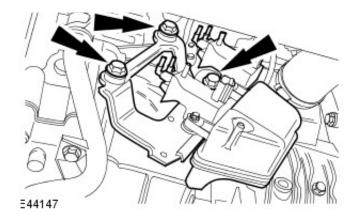
Attach the left-hand halfshaft.

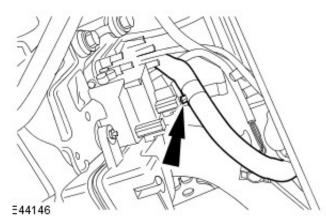
- Engage the left-hand halfshaft to the transaxle.
- Tighten to 25 Nm.



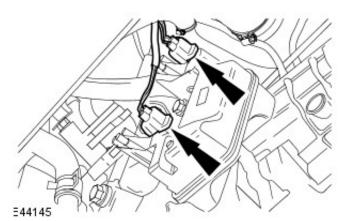
- **31.** Attach the coolant pipe to the engine.
 - Tighten to 40 Nm.

- **32.** Install the vacuum solenoids and vacuum reservoir mount bracket assembly.
 - Tighten to 23 Nm.

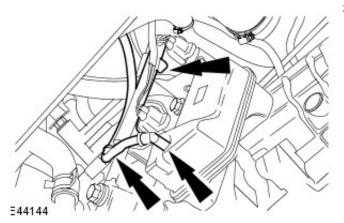




33. Attach the wiring harness to the vacuum solenoids and vacuum reservoir mount bracket.



34. Connect the vacuum solenoid valves electrical connectors.



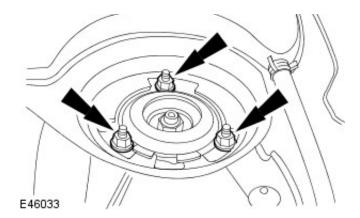
35. Connect the vacuum pipes to the vacuum solenoid valves and the vacuum reservoir.

36. Install the front subframe.

For additional information, refer to: Front Subframe - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

37. NOTE: Left-hand shown, right-hand similar.

Tighten the shock absorber and spring assembly securing



nuts.

• Tighten to 25 Nm.

38. Install the air cleaner.

For additional information, refer to: <u>Air Cleaner</u> (303-12B Intake Air Distribution and Filtering - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Removal and Installation).

39. Install the battery tray. For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).

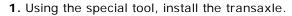
40. Fill the manual transaxle to the correct oil level. For additional information, refer to: Transaxle - MMT6 (308-03 Manual Transmission/Transaxle, General Procedures).

Manual Transmission/Transaxle - Transaxle2.2L Duratorq-TDCi (110kW/150PS) - Puma

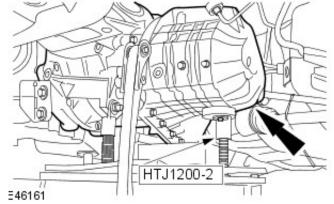
Installation

2 11 2 1/2				
	cial Tool(s)			
	Halfshaft oil seal installer			
	205-115			
205-115				
	Powertrain assembly jack			
all a y	HTJ1200-2			
A 10				
LIT MOODS				
HTJ12002				
	Engine support bracket			
	303-021			
N J				
202 021				
303-021				



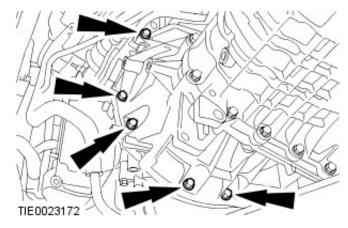


- Using the special tool raise the transaxle assembly.
- Align the transaxle to the clutch plate.

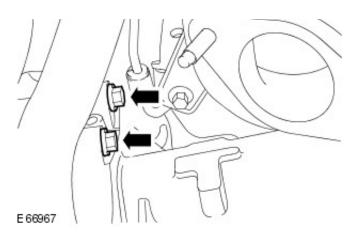


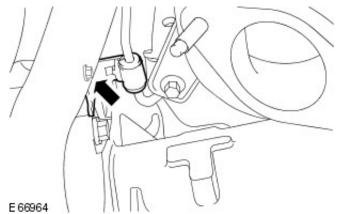
- 2. NOTE: Shown with the special tool removed for clarity.

 Install the transaxle retaining bolts.
 - Tighten to 48 Nm.

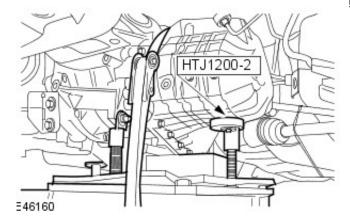


- 3. Install the transaxle retaining bolts.
 - Tighten to 48 Nm.

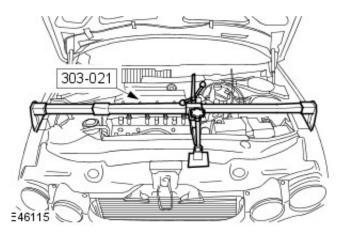




- **4.** Attach the turbocharger oil feed pipe retaining bracket.
 - Tighten to 22 Nm.

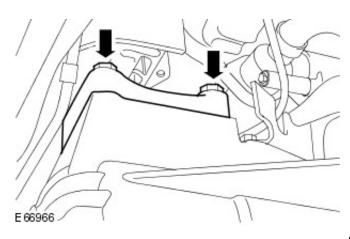


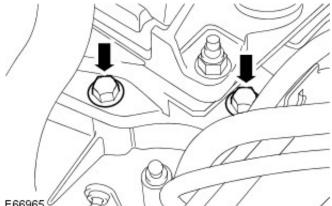
- **5.** Remove the special tool.
 - Remove the special tool securing strap.



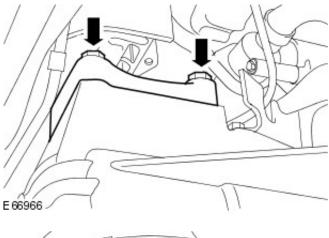
- **6.** Lower the vehicle.
- **7.** Using the special tool raise the powertrain assembly.
 - Adjust the engine support bracket to align the transaxle to the transaxle mount bracket.

8. Loosely install the transaxle mount bracket retaining bolts.

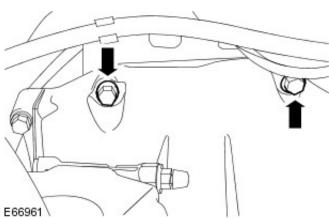




- **9.** Install the transaxle mount bracket retaining bolts.
 - Tighten to 80 Nm.

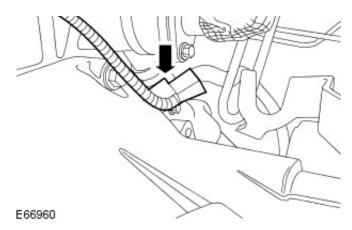


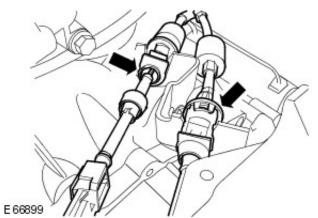
10. Tighten to 80 Nm.



- **11**. Install the transaxle upper retaining bolts.
 - Tighten to 48 Nm.

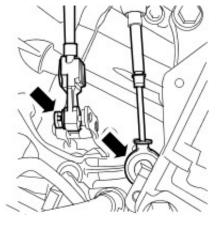
12. Connect the crankshaft position (CKP) sensor electrical connector.





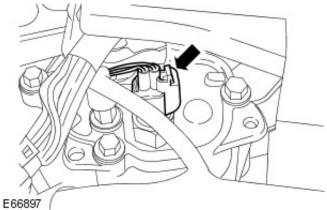
13. NOTE: Remove the selector cable tie straps.

Attach the selector cables.



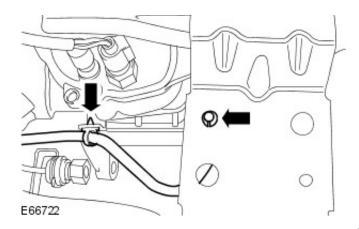
E66898

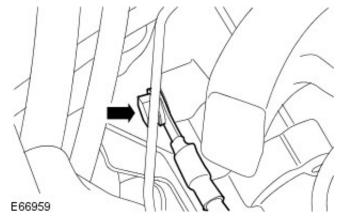
14. Attach the selector cables.



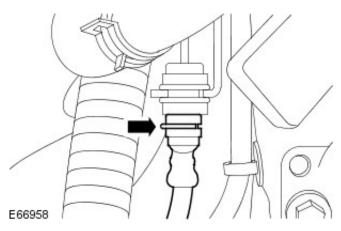
 $\textbf{15.} \ \textbf{Connect the reverse lamp switch electrical connector}.$

16. Attach the battery ground cable.





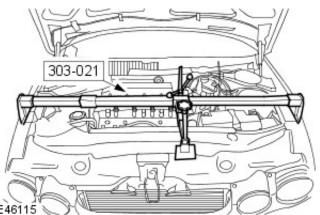
17. Attach the battery ground cable.



18. CAUTION: If brake fluid is split on the paintwork, the affected area must be washed down immediately with cold water. Failure to follow this instruction may result in damage to the vehicle.

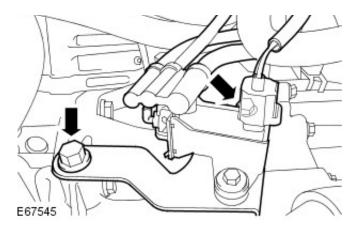
Connect the clutch master cylinder to clutch slave cylinder high pressure hose.

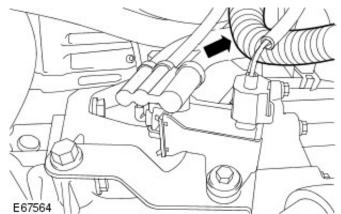
 Remove the pipe clamp from the clutch master cylinder to clutch slave cylinder high pressure hose.



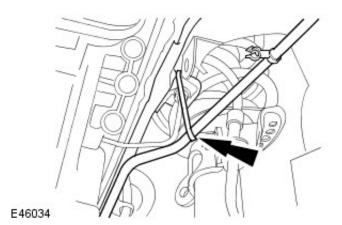
19. Remove the special tool.

- 20. Raise the vehicle.
- 21. Attach the vacuum solenoid valve assembly.
 - Install the retaining bolts.



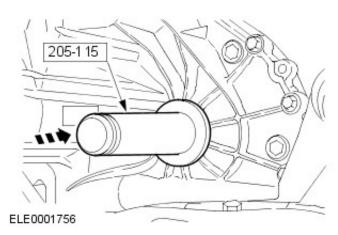


22. Attach the engine wiring harness.



23. NOTE: Remove the power steering fluid pipe tie strap.

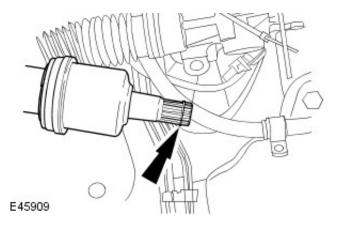
Detach the power steering fluid pipe.

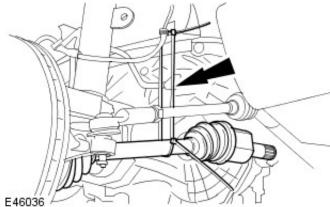


24. NOTE: Remove the transaxle plug.

Using the special tool, install a new right-hand halfshaft seal.

25. Install a new right-hand halfshaft snap ring.

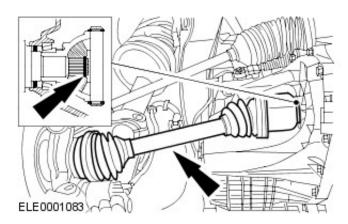




26. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

• NOTE: Remove the right-hand halfshaft tie strap.

Detach the right-hand halfshaft.



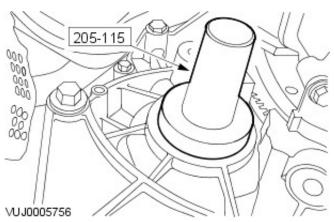
27. CAUTIONS:

Make sure the halfshaft CV joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Make sure the halfshaft seal is not damaged. Failure to follow this instruction may result in an transaxle fluid leak.

Attach the right-hand halfshaft to the transaxle.

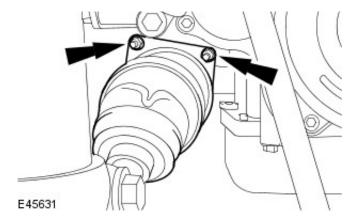
• Make sure the halfshaft snap ring is correctly seated.



28. NOTE: Remove the transaxle plug.

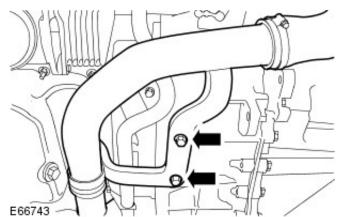
Using the special tool, install a new left-hand halfshaft seal.

29. CAUTION: Make sure the halfshaft CV joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.



Attach the left-hand halfshaft.

- Engage the left-hand halfshaft to the transaxle.
- Tighten to 25 Nm.



30. Install the charge air cooler intake pipe retaining bolts.

• Tighten to 35 Nm.

31. Install the front subframe.

For additional information, refer to: Front Subframe - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

- **32.** Install the battery tray. For additional information, refer to: <u>Battery Tray</u> (414-01 Battery, Mounting and Cables, Removal and Installation).
- **33.** Fill the manual transaxle to the correct oil level. For additional information, refer to: Transaxle MMT6 (308-03 Manual Transmission/Transaxle, General Procedures).

Manual Transmission/Transaxle - Transaxle2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27

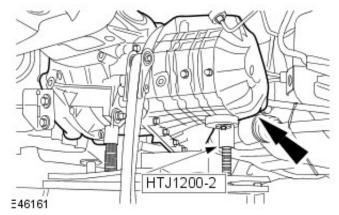
Installation

Special Tool(s)				
	Halfshaft oil seal installer			
	205-115			
205-115	Dowortrain accombly inch			
T.	Powertrain assembly jack			
To Allow	HTJ1200-2			
HTJ12002				
. 4	Engine support bracket			
-	303-021			
47				
303-021				
6	Engine support brackets			
)}	303-1068			
E46047				

Installation

All vehicles

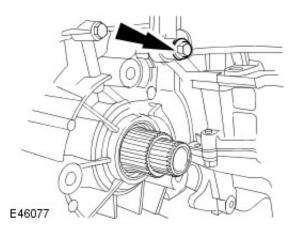
- 1. Install the transaxle.
 - Raise the powertrain assembly jack and transaxle assembly.
 - Align the transaxle to the clutch plate.

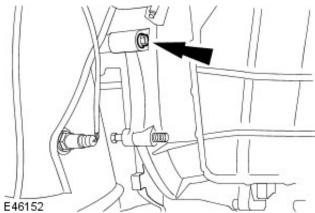


2. NOTE: Vehicles with 2.5L and 3.0L engines shown, vehicles with 2.0L engine similar.

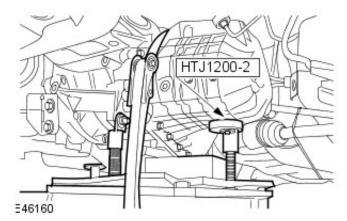
Install the transaxle retaining bolt.

• Tighten to 48 Nm.

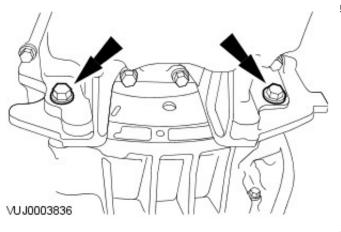




- 3. Install the transaxle retaining bolt.
 - Tighten to 48 Nm.

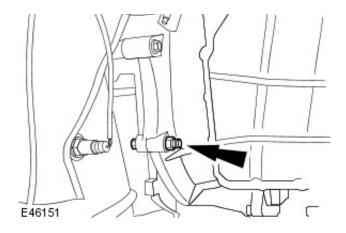


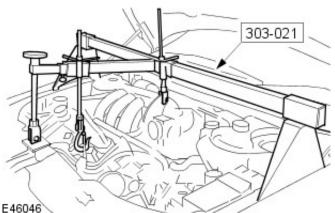
- **4.** Remove the powertrain assembly jack.
 - Remove the transaxle to the powertrain assembly jack securing strap.



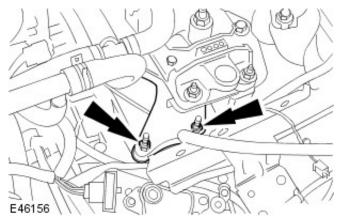
- **5.** Install the transaxle retaining bolts.
 - Tighten to 48 Nm.

- 6. Install the transaxle retaining nut.
 - Tighten to 48 Nm.

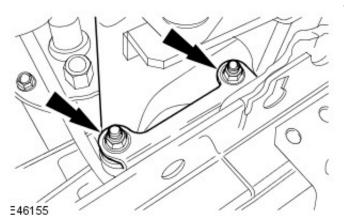




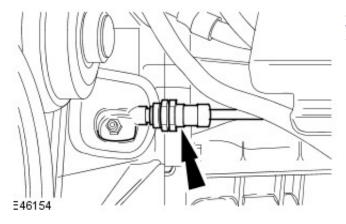
- **7.** Lower the vehicle. For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- **8.** Using the engine support bracket raise the powertrain assembly.
 - Adjust the engine support bracket to align the transaxle to the transaxle mount bracket.



- $\textbf{9.} \ \textbf{Install the transaxle mount bracket securing studs}.$
 - Tighten to 80 Nm.



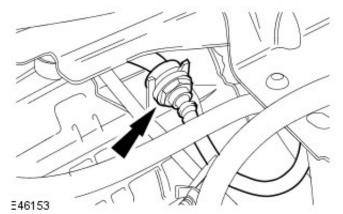
10. Install the clutch master cylinder to clutch slave cylinder high pressure pipe support bracket.



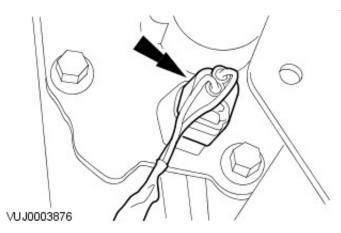
affected area must be washed down immediately with cold water. Failure to follow this instruction may result in damage to the vehicle.

Attach the clutch master cylinder to clutch slave cylinder high pressure pipe to the clutch slave cylinder.

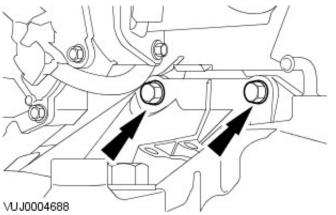
• Install the clutch master cylinder to clutch slave cylinder high pressure pipe retaining clip.



- **12.** Attach the clutch master cylinder to clutch slave cylinder high pressure pipe to the support bracket.
 - Remove the pipe clamp from the clutch master cylinder to clutch slave cylinder high pressure pipe.

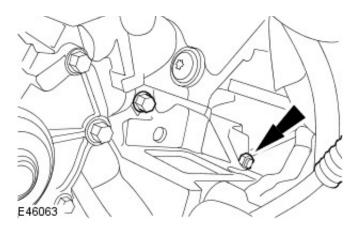


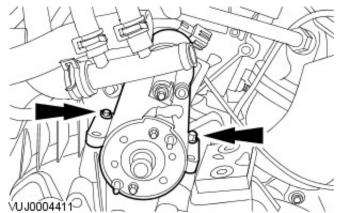
13. Connect the reverse lamp switch electrical connector.



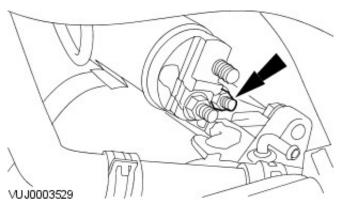
- 14. Install the transaxle retaining bolts.
 - Tighten to 48 Nm.

- 15. Install the transaxle retaining bolt.
 - Tighten to 48 Nm.

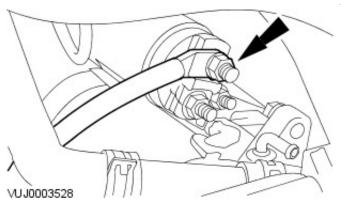




- **16.** Install the starter motor.
 - Tighten to 35 Nm.

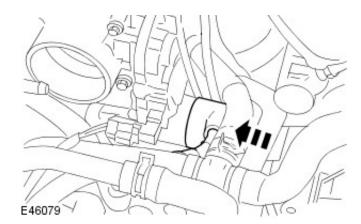


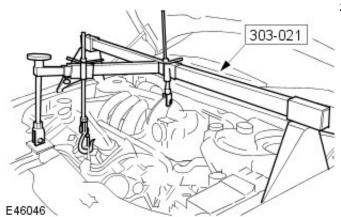
- **17.** Attach the starter motor solenoid electrical connector.
 - Tighten to 6 Nm.



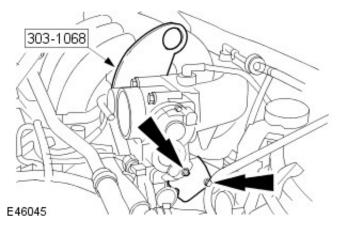
- **18.** Attach the starter motor electrical connector.
 - Tighten to 12 Nm.

19. Attach the starter motor solenoid cover.

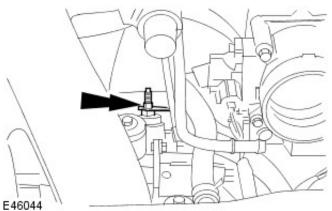




20. Remove the engine support bracket.

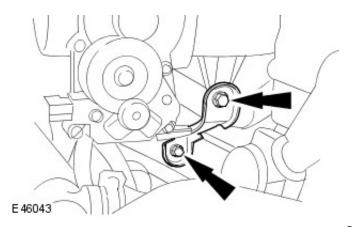


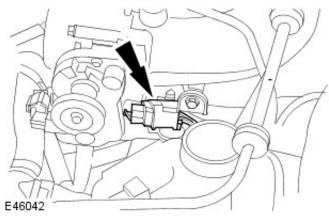
21. Remove the engine support bracket.



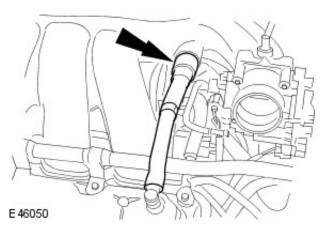
- **22.** Attach the wiring harness to the camshaft cover retaining stud.
 - Tighten to 6 Nm.

- 23. Install the intake manifold support bracket.
 - Tighten to 10 Nm.

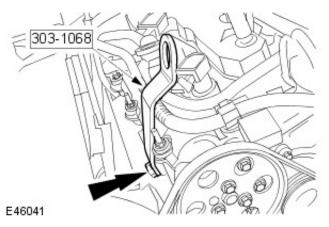




24. Attach the electrical connector to the intake manifold support bracket.

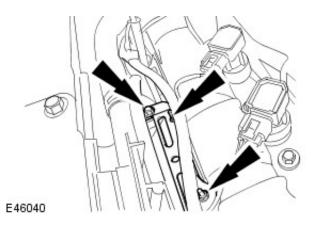


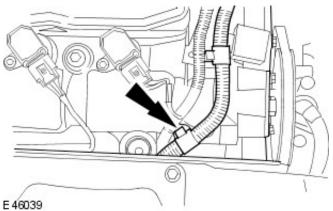
25. Attach the positive crankcase ventilation (PCV) hose to the intake manifold.



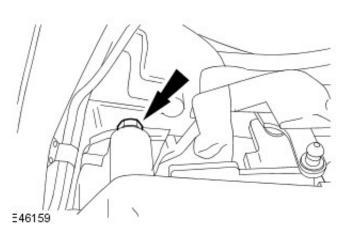
26. Remove the engine support bracket.

- 27. Install the air cleaner mount bracket.
 - Tighten to 6 Nm.





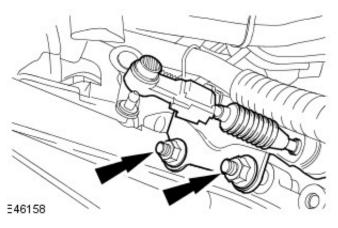
28. Attach the generator wiring harness retaining clip to the camshaft cover retaining clip.



29. Raise the vehicle.

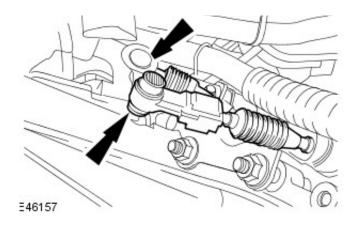
For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).

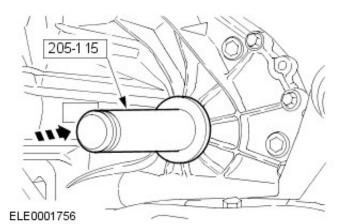
- **30.** Install the transaxle mount bracket retaining bolt.
 - Tighten to 80 Nm.



- **31.** Attach the gearshift cable support bracket to the transaxle.
 - Tighten to 25 Nm.

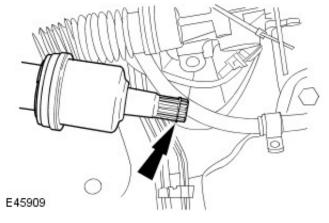
32. Attach the gearshift cables to the transaxle.



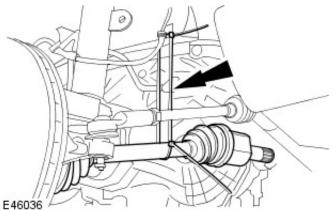


33. NOTE: Remove the transaxle plug.

Using the special tool, install a new halfshaft seal.



34. Install a new halfshaft snap ring.

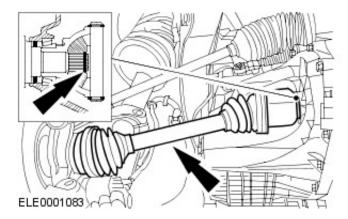


35. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Detach the left-hand halfshaft.

36. CAUTIONS:

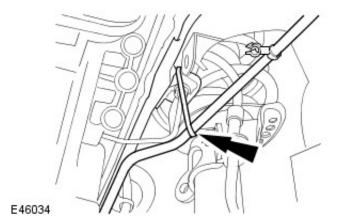
Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may



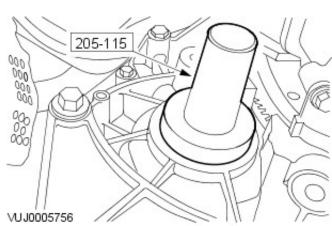
Make sure the halfshaft seal is not damaged. Failure to follow this instruction may result in an transaxle fluid leak.

Attach the left-hand halfshaft to the transaxle.

• Make sure the halfshaft snap ring is correctly seated.



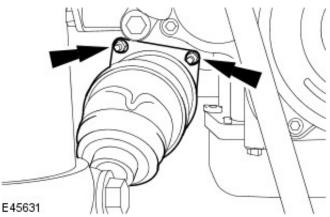
37. Detach the power steering fluid pipe.



Vehicles with 2.0L engine

38. NOTE: Remove the transaxle plug.

Using the special tool, install a new halfshaft seal.



39. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Attach the right hand halfshaft.

- Engage the right-hand halfshaft from the transaxle.
- Tighten to 25 Nm.

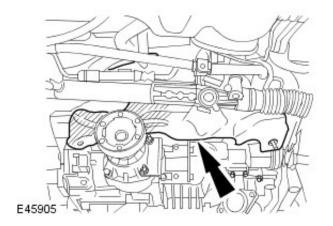
Vehicles with 2.5L or 3.0L engine

40. Install the transfer case.

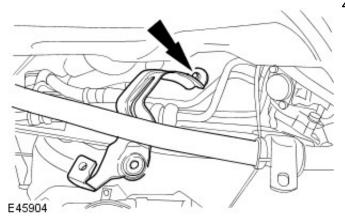
For additional information, refer to: Transfer Case (308-07

Transfer Case, Installation).

41. Install the steering gear heat shield.

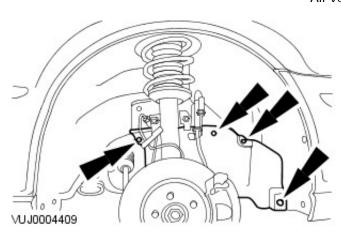


42. Install the steering gear heat shield bracket.



All vehicles

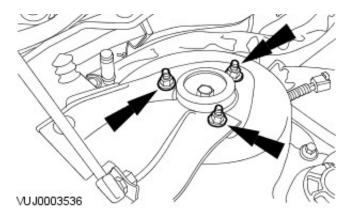
43. Install the fender splash shield access panel.

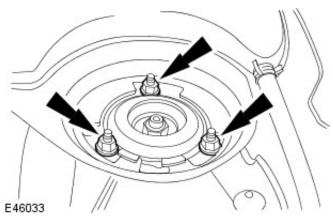


44. Install the front subframe.

For additional information, refer to: Front Subframe - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

- **45.** Tighten the right-hand shock absorber and spring assembly securing nuts.
 - Tighten to 25 Nm.





- **46.** Tighten the left-hand shock absorber and spring assembly securing nuts.
 - Tighten to 25 Nm.

47. Install the air cleaner.

For additional information, refer to: <u>Air Cleaner</u> (303-12A Intake Air Distribution and Filtering - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Removal and Installation).

48. Install the battery tray.

For additional information, refer to: <u>Battery</u> (414-01 Battery, Mounting and Cables, Removal and Installation).

49. Fill the manual transaxle to the correct oil level. For additional information, refer to: Transaxle Draining and Filling - Vehicles With: 5-Speed Manual Transmission - MT75 (308-03 Manual Transmission/Transaxle, General Procedures).

Manual Transmission/Transaxle External Controls -

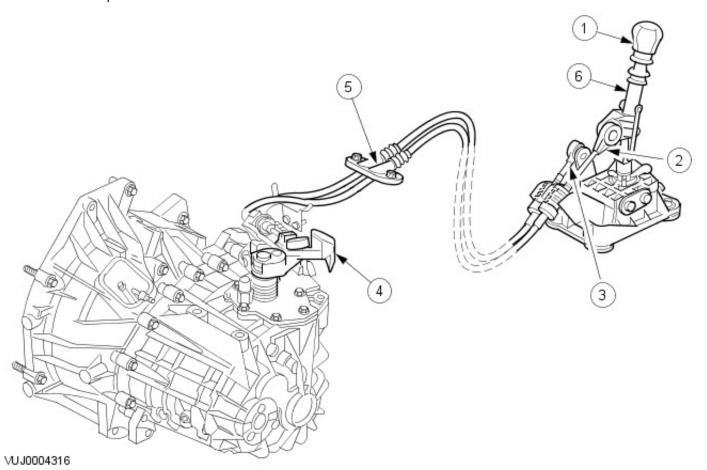
Torque Specifications

Description	Nm	lb-ft	lb-in
Selector cable grommet	-	-	60 lb-in
Gearshift lever mount retaining nuts	-	-	80 lb-in

Manual Transmission/Transaxle External Controls - External Controls

Description and Operation

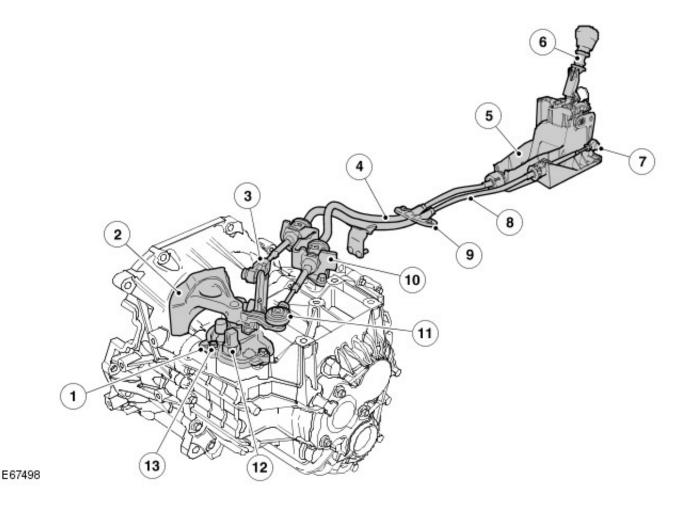
Vehicles with 5-speed manual transmission



Item	Part Number	Description	
1	_	Gearshift lever knob	
2	_	Shift cable	
3	Selector cable		
4	 Selector lever on the transmission 		
5	_	Shift and selector cable grommet	
6	_	Gearshift lever	

The shift is white and the selector cable is black. In order to detach the cables from there abutment brackets on the transmission and at the gear lever, twist the locking tab of each abutment clockwise. As the shift and selector cable have a common grommet where they pass through the floor, they can only be changed as a pair.

Vehicles with 6-speed manual transmission



Item	Description	Item	Description
1	Internal shift mechanism	8	Selector cable
2	Counterbalance	9	Body seal
3	Selector cable adjustment mechanism	10	Shift cable mounting
4	Shift cable	11	Shift cable mounting point on the gearshift lever
5	Gear lever housing	12	Reverse gear switch
6	Shift lever	13	Transmission vent
7	Selector cable mounting point on the gearshift lever		

The transaxle uses a cable-shift mechanism designed to provide a smooth and positive gearshift action, while also isolating the lever from any powertrain vibration. Cable adjustment is provided at the transaxle end of the cables at the abutment brackets. Damper weights incorporated behind the cable adjusters suppress cable vibration.

There are no adjustment capabilities within the gear selector mechanism.

The cables are color coded and attached at both ends with ball connections incorporating a button release.

Reverse gear is selected by pulling-up the ring below the gear knob and then moving the lever to the reverse position.

Manual Transmission/Transaxle External Controls - External Controls

Diagnosis and Testing

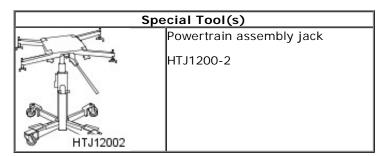
- 1. **1.** Verify the customer concern by operating the system.
- 2. **2.** Visually inspect for obvious signs of mechanical damage.

Mechanical

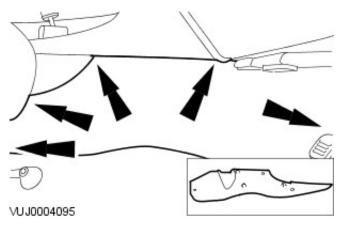
- Visibly damaged or worn
- Loose or missing screws or nuts
- 3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
- 4. **4.** If the concern is not visually evident, verify the symptom and refer to the REFER to: Manual Transmission and Clutch (308-00 Manual Transmission/Transaxle and Clutch General Information, Diagnosis and Testing).

Manual Transmission/Transaxle External Controls - Gearshift CablesVehicles With: 5-Speed Manual Transmission - MT75

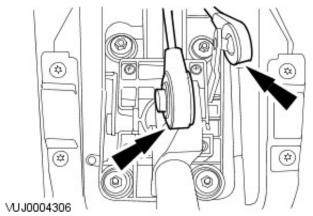
Removal and Installation



Removal

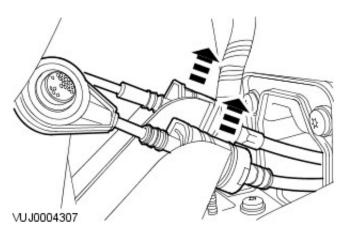


1. Remove the center console right-hand side panel.



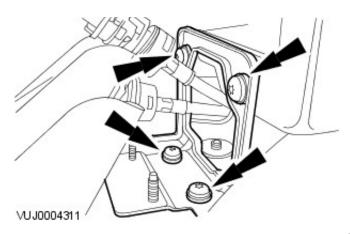
2. NOTE: Press the button to release the cable fitting before disconnecting the cable.

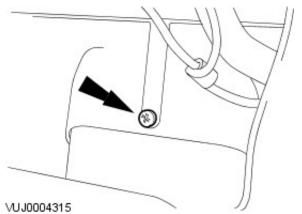
Disconnect the gearshift selector cables.



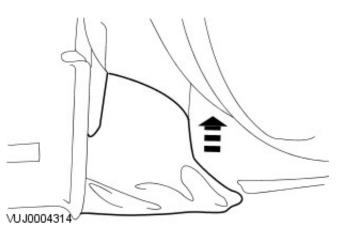
3. Disconnect the gearshift selector cables.

4. Remove the instrument panel center mount bracket.

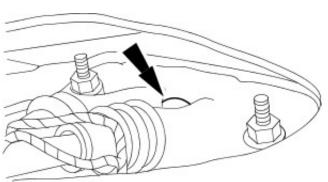




5. Remove the center air duct retaining screw.



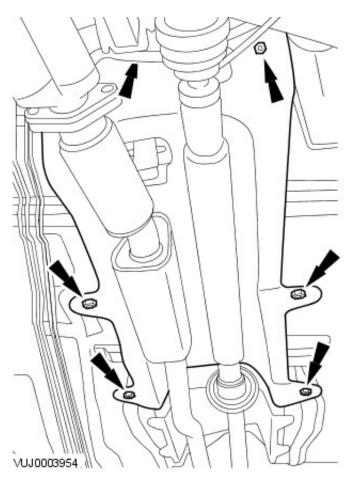
6. Reposition the center air duct upwards.

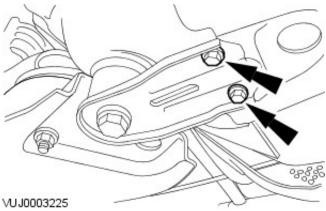


7. Detach the gearshift selector cable grommet.

VUJ0004313

- **8.** Raise and support the vehicle. For additional information, refer to Section 100-02 Jacking and Lifting.
- 9. Detach the exhaust heat shield.

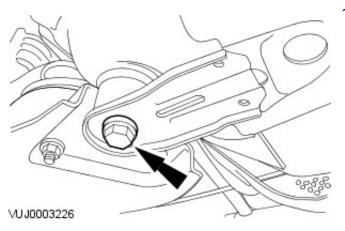




10. CAUTION: Using the powertrain assembly jack, support the rear of the subframe.

• NOTE: Left-hand shown, right-hand similar.

Remove the subframe reinforcement plate retaining bolts.

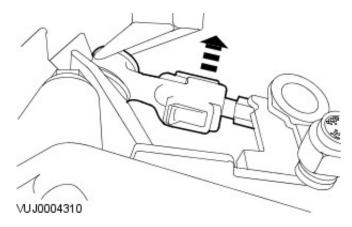


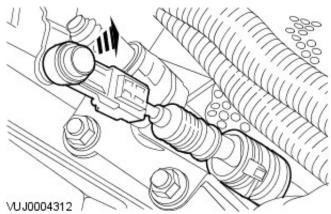
11. NOTE: Left-hand shown, right-hand similar.

Loosen the subframe rear mount retaining bolt.

12. NOTE: Press the button to release the cable fitting before disconnecting the cable.

Detach the gearshift selector cables.



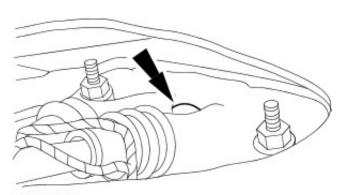


13. NOTE: Press the button to release the cable fitting before disconnecting the cable.

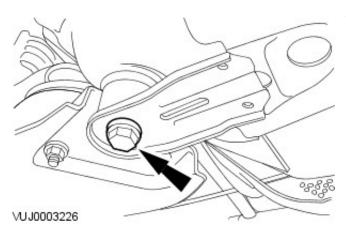
Remove the gearshift selector cable.

Installation

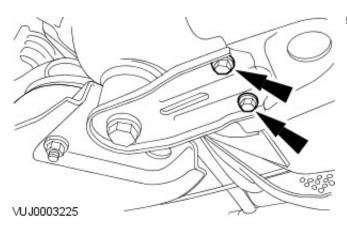
- 1. To install, reverse the removal procedure.
- 2. Tighten to 60 lb/in.



VUJ0004313



- **3.** Check and adjust the gearshift cables. For additional information, refer toSection 308-00 Manual Transmission/Transaxle and Clutch General Information.
- **4.** Tighten the subframe rear mount retaining bolt.
 - Tighten to 142 Nm.



- **5.** Lighten the front subframe reinforcement plate retaining bolts.
 - Tighten to 35 Nm.

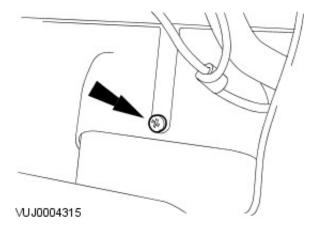
6. Carry out front subframe alignment procedure. For additional information, refer toSection 502-00 Uni-Body, Subframe and Mounting System.

Manual Transmission/Transaxle External Controls - Gearshift CablesVehicles With: 6-Speed Manual Transaxle - MMT6

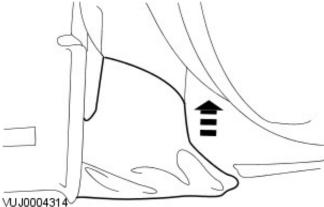
Removal and Installation

Removal

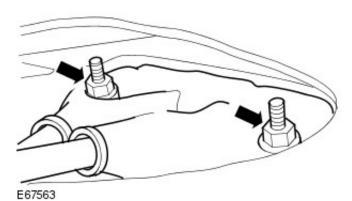
- 1. Remove the gearshift lever.
 For additional information, refer to: Gearshift Lever Vehicles With: 6-Speed Manual Transaxle MMT6 (308-06
 Manual Transmission/Transaxle External Controls, Removal and Installation).
- 2. Remove the center air duct retaining screw.



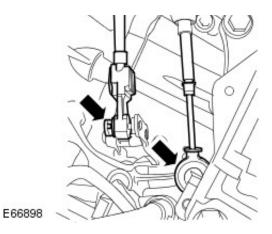
3. Reposition the center air duct upwards.

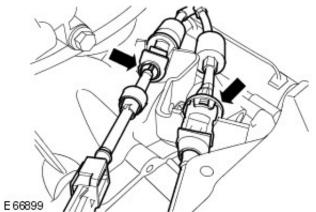


4. Detach the gearshift cable grommet.

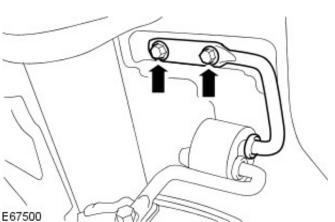


5. Detach the gearshift cables from the transmission selector mechanism.



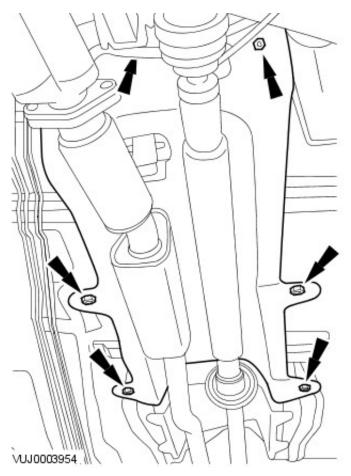


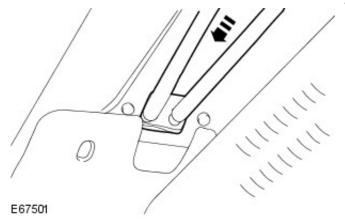
6. Detach the gearshift cables from the transmission retaining bracket.



- **7.** Raise and support the vehicle. For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- **8.** Reposition the exhaust mounting for access to the exhaust heat shield.
 - Remove the retaining bolts.

9. Reposition the exhaust heat shield for access to the gearshift cables.



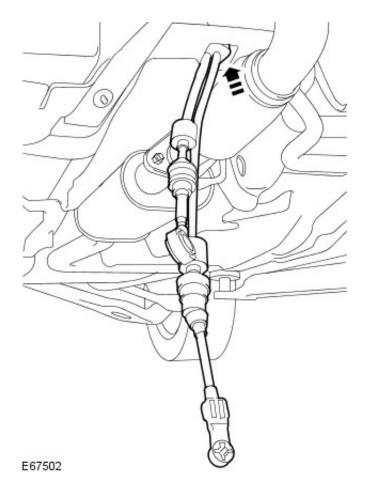


10. Reposition the gearshift cables from the subframe.

11. CAUTION: Make sure the gearshift cables are fed through the vehicle floor pan individually. Failure to follow this instruction may result in damage to the vehicle.

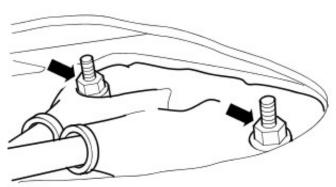
• NOTE: Remove the gearshift cables from inside the vehicle.

Remove the gearshift cables.



Installation

- **1.** To install, reverse the removal procedure.
 - Tighten to 10 Nm.



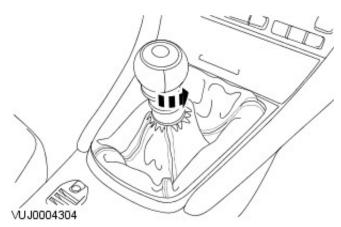
E67563

Manual Transmission/Transaxle External Controls - Gearshift LeverVehicles With: 5-Speed Manual Transmission - MT75

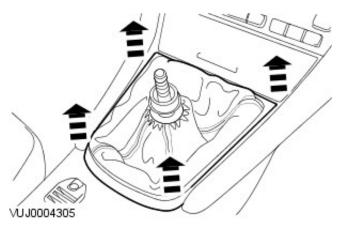
Removal and Installation

Removal

1. Remove the gearshift lever knob.

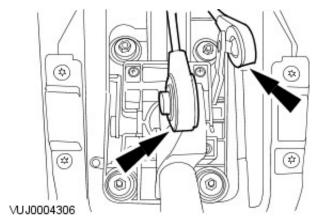


2. Detach the gearshift lever surround.

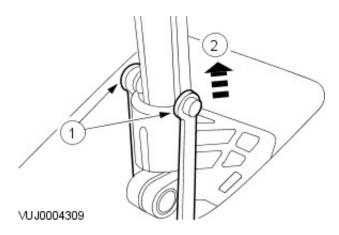


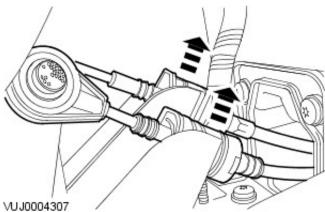
 ${\bf 3.}$ NOTE: Press the button to release the cable fitting before disconnecting the cable.

Disconnect the gearshift selector cables.

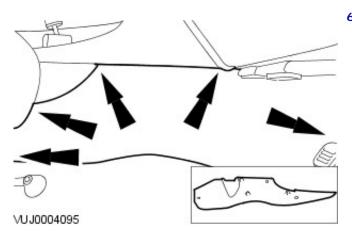


- 4. Remove the gearshift lever surround.
 - 1. Detach the reverse gear selector rods.
 - 2. Remove the gearshift lever surround.



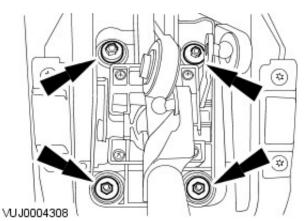


5. Disconnect the gearshift selector cables.



6. NOTE: Right-hand shown, left hand similar.

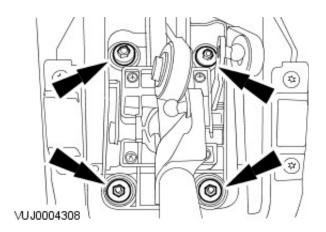
Remove the center console right-hand side trim panel.



- 7. Remove the gearshift lever.
 - 1. Remove the gearshift lever mounting retaining nuts.
 - 2. Remove the gearshift lever.

Installation

1. Tighten to 60 lb-ft.

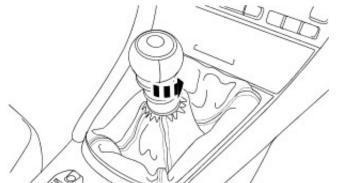


Manual Transmission/Transaxle External Controls - Gearshift LeverVehicles With: 6-Speed Manual Transaxle - MMT6

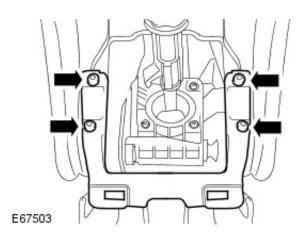
Removal and Installation

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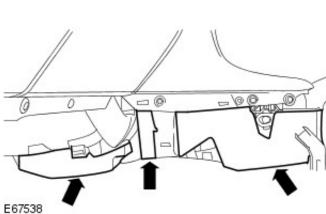
Removal



- 1. Remove the gearshift lever knob.
 - Remove the gearshift lever spring.



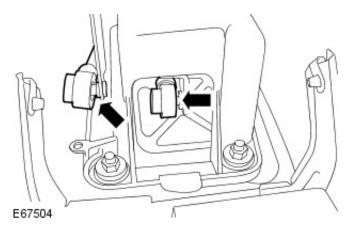
- 2. Remove the restraints control module (RCM).
 For additional information, refer to: Restraints Control
 Module (RCM) (501-20B Supplemental Restraint System,
 Removal and Installation).
- **3.** Remove the floor console mounting bracket.

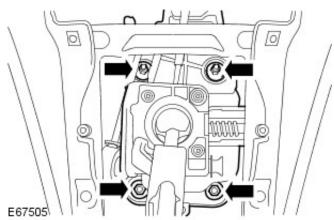


4. NOTE: Left -hand shown, right-hand similar.

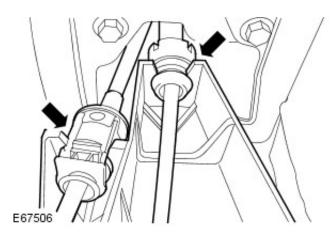
Remove the floor console sound absorbing foam.

5. Disconnect the gearshift selector cables.





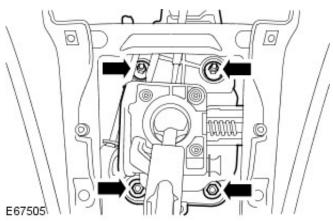
- **6.** Detach the gearshift lever assembly to allow access to the gearshift cables.
 - Remove the retaining nuts.



- **7.** Disconnect the gearshift cables.
 - Remove the gearshift lever assembly.

Installation

1. Tighten to 10 Nm.



Transfer Case -

Capacities

Description	Liters
Transfer case lubricant, drain and refill	0.50

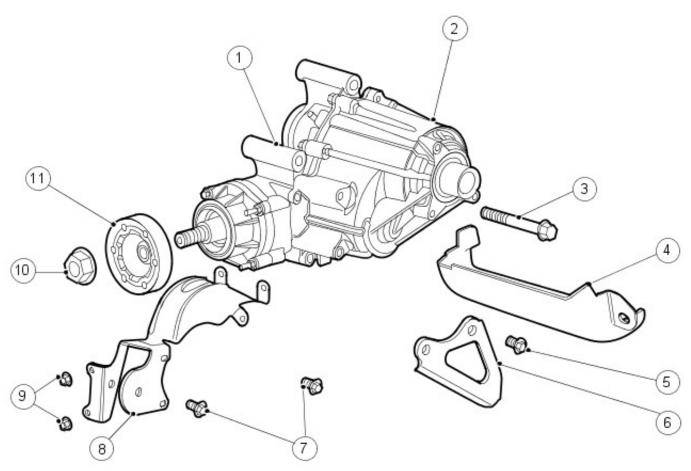
Torque specifications

Description	Nm	Lb - ft	Lb - in
M8 pinion housing studs	35	26	-
M8 pinion housing bolts	35	26	-
Engine anti-roll restrictor mounting bracket top retaining bolts	55	41	-
Engine anti-roll restrictor mounting bracket side retaining bolts	35	26	-
Engine anti-roll restrictor mounting bracket bottom retaining nuts	35	26	-
Engine anti-roll restrictor mount retaining bolt	55	41	-
Transfer case support bracket top retaining bolts	25	18	-
Transfer case support bracket bottom retaining bolt	47	35	-
Transfer case retaining bolts*	80	59	-
Transfer case fill plug	20	15	-
Exhaust front pipe retaining clamp	55	41	-
Catalytic converter to catalytic converter mount bracket retaining bolts	25	18	-
Shock absorber and spring assembly securing nuts	25	18	-

^{*}On vehicles prior to VIN J25640, if you are re-using fixings, tighten to 90 Nm.

Transfer Case - Transfer Case

Description and Operation



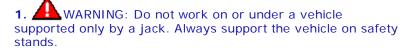
E30054

Item	Part Number	Description	
1	_	Transfer case	
2	_	Transfer case fill plug	
3	_	Transfer case retaining bolt	
4	_	Transfer case air cooling duct	
5	_	Transfer case Y bracket retaining bolt	
6	_	Transfer case Y bracket	
7	_	Engine anti-roll restrictor mounting bracket retaining bolts	
8	_	Engine anti-roll restrictor mounting bracket	
9	_	Engine anti-roll restrictor mounting bracket retaining nuts	
10	_	Companion flange retaining nut	
11	_	Companion flange	

The transfer case system consists of a power transfer unit, rear driveshaft, coupling device and rear axle. The power transfer unit is a gearbox that attaches to the transaxle. The right hand halfshaft engages to the transfer case link shaft which engages to the differential side gears as in a normal 4x2 application. The transfer case provides power to the driveshaft through a helical gear spline coupled to the transaxle differential case, a helical gear drop (idler gear) and hypoid/helical ring gear assembly and pinion set. Repair of the transfer case is limited to seals and gaskets. If any of the geared components, tappered roller bearings, case cover or internal shafts fail, a new transfer case must be installed. The transfer case is sealed from the transaxle and has its own sump. The transfer case uses SAE 75W140 synthetic gear lubricant. The fill plug is located on the top of the transfer case, under the engine anti roll restrictor mounting bracket.

Transfer Case - Transfer Case Draining and Filling General Procedures

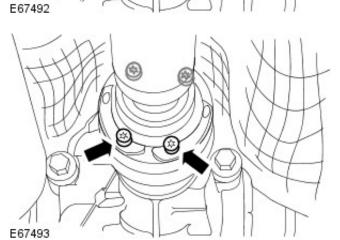
Special Tool(s)		
205-053	Flange holding tool 205-053	
E54574	<u> </u>	
204-268A	Flange remover/installer 204-068A	
E107035		
	Flange remover/installer boss 204-266	
204-266		
204-295	Flange remover/installer 204-295	
E107034		
308-375	Seal extractor 308-375	
E55428		
	Slide hammer	
	100-012	
100012		
	Slide hammer adapter 100-012-01	
100-012-01		



Raise and support the vehicle.

2. NOTE: Mark the position of the driveshaft in relation to the drive pinion flange.

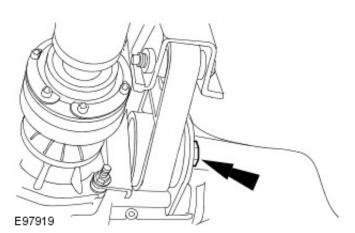
Remove two opposing driveshaft universal joint retaining bolts.



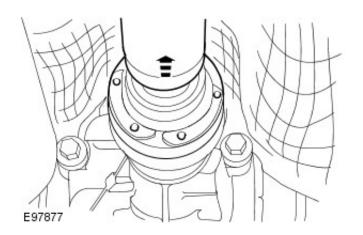
3. Loosen the remaining driveshaft universal joint retaining

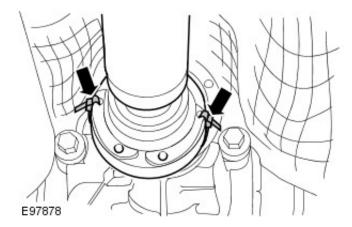


• Remove the engine roll restrictor retaining bolt.

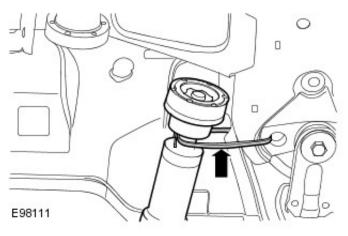


5. Detach the driveshaft from drive pinion flange.



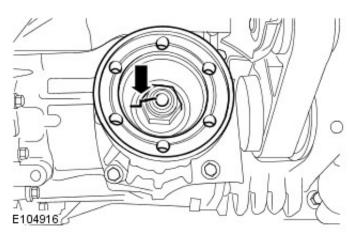


6. Using suitable tie straps, secure the outer casing of the driveshaft universal joint.



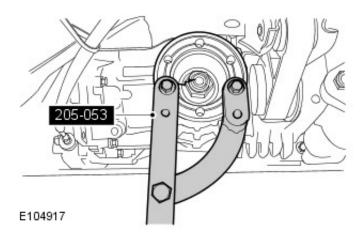
7. CAUTION: Make sure that the driveshaft does not hang on the center universal joint. Failure to follow this instruction may result in damage to the driveshaft.

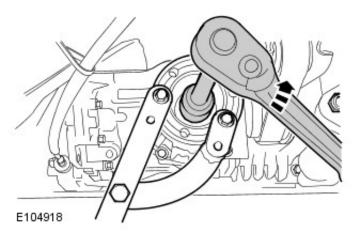
Using suitable tie straps, secure the driveshaft to the subframe.



8. Mark the position of the retaining nut in relation to the companion flange and the companion flange in relation to the output shaft.

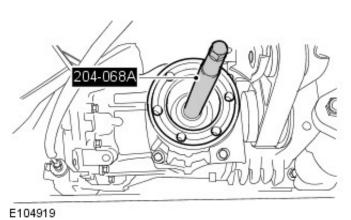
9. Install the special tool to the companion flange.



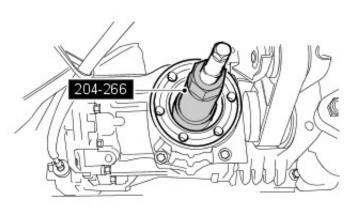


- **10.** NOTE: Make a note of the complete number of turns required to remove the companion flange retaining nut.
- NOTE: Make a note of the number of degrees past the last complete rotation required to remove the companion flange retaining nut.

Remove the companion flange retaining nut.



11. Install the special tool to the output shaft.

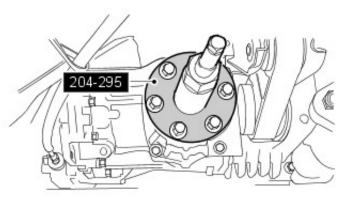


12. Install special tool 204-266 to special tool 204-068A.

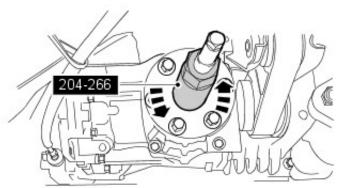
E104920

13. Install the special tool to the companion flange.

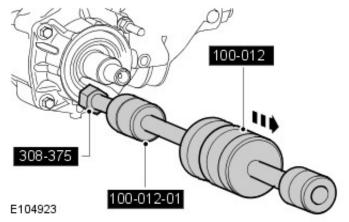




E104921



E104922



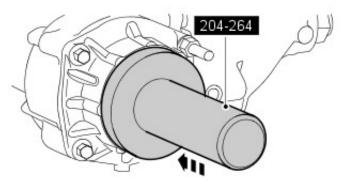
- **14.** Remove the companion flange.
 - Rotate the special tool counter-clockwise.

15. Using the special tools remove the pinion oil seal.

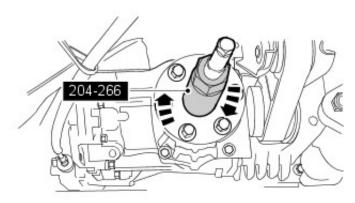
16. NOTE: Make sure the vehicle is completely level when draining the transfer case.

Allow the oil to fully drain into a suitable container.

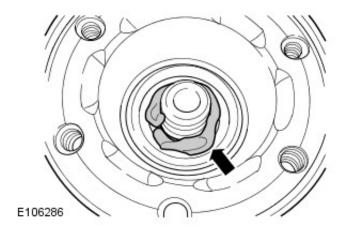
17. Using the special tool 204-264 fully seat the new oil seal.



E104924

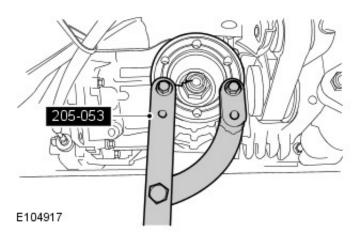


E104926

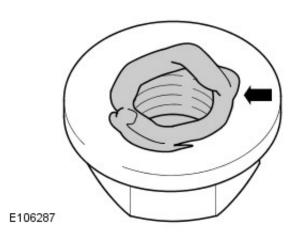


- **18.** Install the companion flange to the output shaft.
 - Lubricate the companion flange splines with SAE 75W140 lubricant.
 - Install the companion flange making sure that the flange and output shaft marks are aligned.
 - Install special tool 204-295 to the companion flange.
 - Install special tool 204-266.
 - Using the special tools install the companion flange to the output shaft by 10mm.
- **19.** Remove the special tools.
- **20.** Using a suitable solvent/cleaner, remove all traces of oil from the transfer case rear output flange and exposed threads of the output shaft.
 - **21.** Apply sealant (C2S 12099) to the area of transfer case rear output flange where securing nut seats.

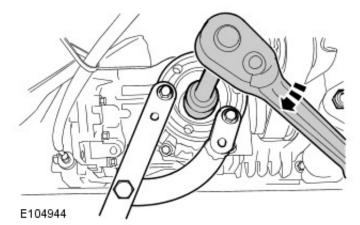
22. Install the special tool to the companion flange.

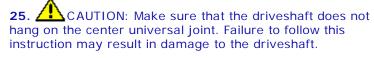


23. Apply sealant (C2S 12099) to the mating face of the transfer case rear output flange securing nut.

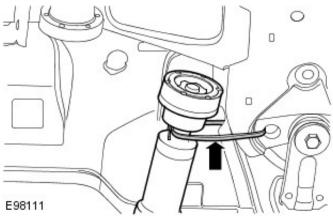


- 24. Install the companion flange securing nut.
 - Start the nut at the noted number of degrees before the start of the first full rotation.
 - Tighten to the noted full number of rotations.
 - Make sure that the original marks between the companion flange, securing nut and output shaft are aligned.

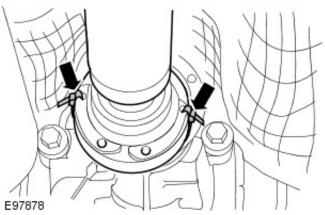




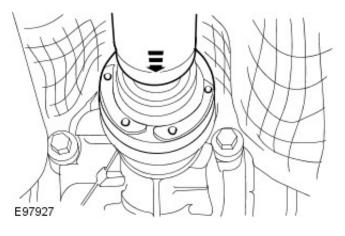
Cut and remove the tie straps securing the outer casing of the driveshaft universal joint.



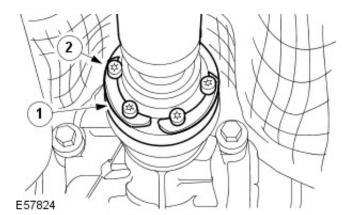




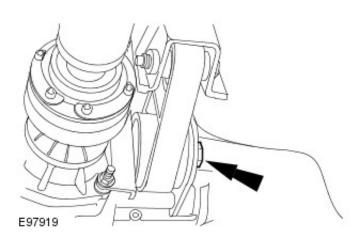
27. Connect the driveshaft to the transfer case.

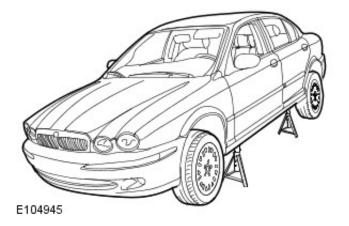


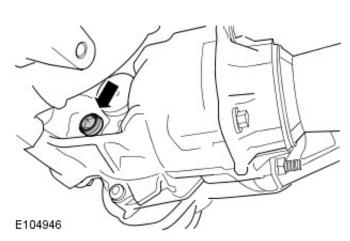
- **28.** Attach the driveshaft universal joint.
 - 1. Attach the driveshaft universal joint.
 - 2. Install new driveshaft retaining bolts.
 - Tighten to 44 Nm.



- 29. Attach the engine roll restrictor.
 - Tighten to 80 Nm.







30. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

 \bullet NOTE: The lower lip of the sill must be 540mm from the floor.

Raise and support the left hand side of the vehicle.

- Remove the vehicle from the lift.
- Raise the vehicle using two jacks.
- **31.** Fill the transfer case with 400ml of oil.
 - Tighten the filler plug to 20Nm.

Transfer Case - Halfshaft Seal RH In-vehicle Repair

Removal

1. Remove the right-hand halfshaft seal. For additional information, refer to $\underline{\text{Transfer Case}}$ in this section.

Transfer Case - Transfer Case Rear Output Shaft Seal In-vehicle Repair

Special Tool(s)		
(40000000000000000000000000000000000000	Flange holding tool	
205-053	205-053	
E54574		
204-268A	Flange remover/installer 204-068A	
E107035		
	Flange remover/installer boss 204-266	
204-266		
204-295 E107034	Flange remover/installer 204-295	
2339	Seal extractor	
308-375	308-375	
E55428		
	Slide hammer 100-012	
100012		
	Slide hammer adapter 100-012-01	
100-012-01		

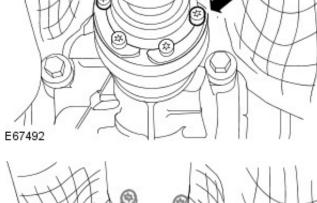
Removal

1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

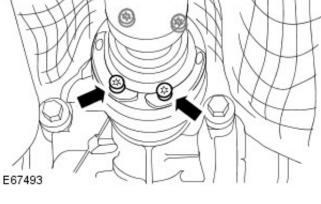
Raise and support the vehicle.

2. NOTE: Mark the position of the driveshaft in relation to the drive pinion flange.

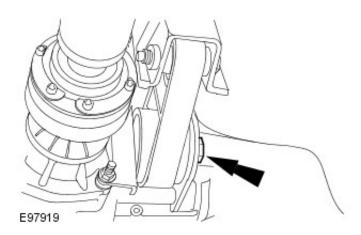
Remove two opposing driveshaft universal joint retaining holts



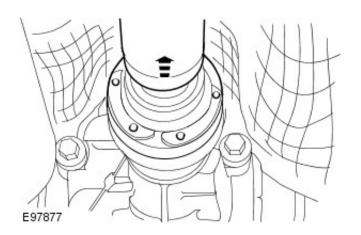
3. Loosen the remaining driveshaft universal joint retaining bolts

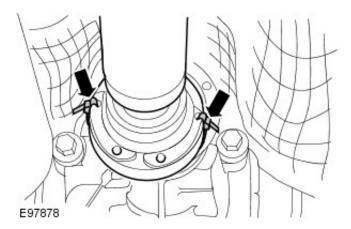


- 4. Detach the engine roll restrictor.
 - Remove the engine roll restrictor retaining bolt.

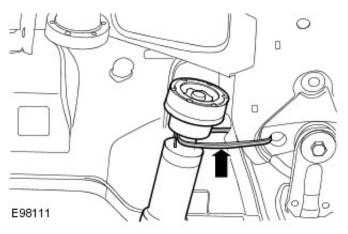


5. Detach the driveshaft from drive pinion flange.



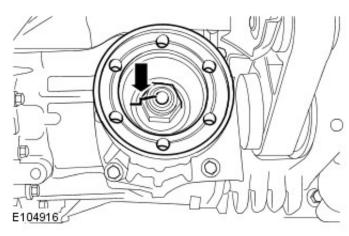


6. Using suitable tie straps, secure the outer casing of the driveshaft universal joint.



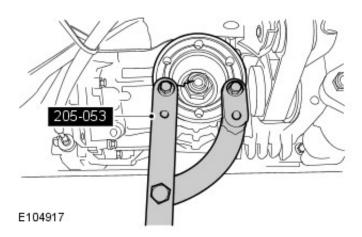
7. CAUTION: Make sure that the driveshaft does not hang on the center universal joint. Failure to follow this instruction may result in damage to the driveshaft.

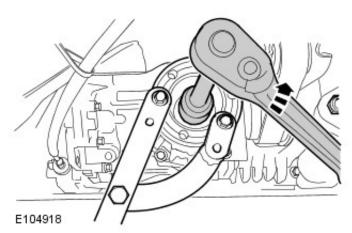
Using suitable tie straps, secure the driveshaft to the subframe.



8. Mark the position of the retaining nut in relation to the companion flange and the companion flange in relation to the output shaft.

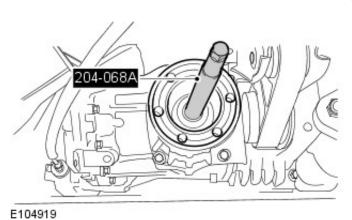
9. Install the special tool to the companion flange.



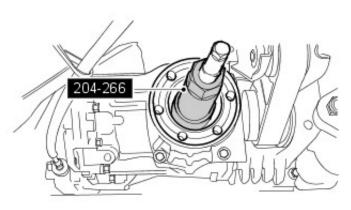


- **10.** NOTE: Make a note of the complete number of turns required to remove the companion flange retaining nut.
- NOTE: Make a note of the number of degrees past the last complete rotation required to remove the companion flange retaining nut.

Remove the companion flange retaining nut.



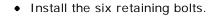
11. Install the special tool to the output shaft.

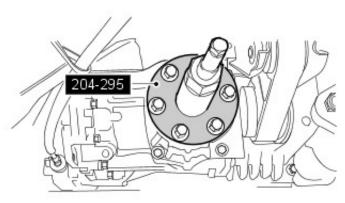


12. Install special tool 204-266 to special tool 204-268A.

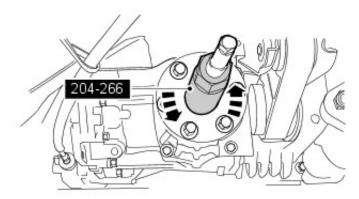
E104920

13. Install the special tool to the companion flange.



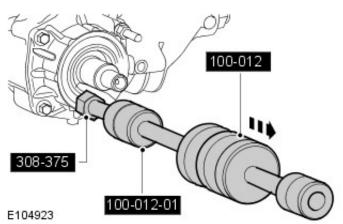


E104921



- **14.** Remove the companion flange.
 - Rotate the special tool anti-clockwise.





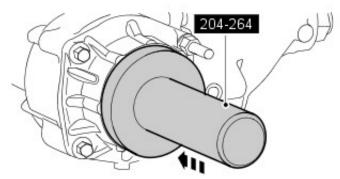
15. Using the special tools remove the pinion oil seal.

16. NOTE: Make sure the vehicle is completely level when draining the transfer case.

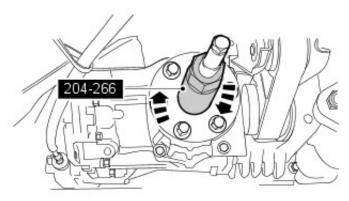
Allow the oil to fully drain into a suitable container.

Installation

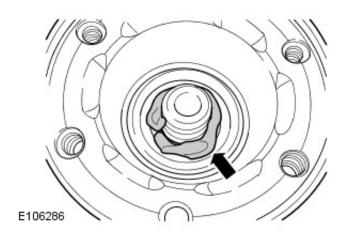
1. Using the special tool 204-268 fully seat the new oil seal.



E104924

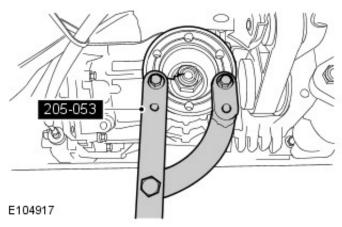


E104926

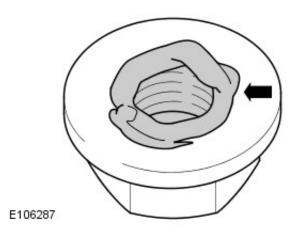


- 2. Install the companion flange to the output shaft.
 - Lubricate the companion flange splines with SAE 75W140 lubricant.
 - Install the companion flange making sure that the flange and output shaft marks are aligned.
 - Install special tool 204-295 to the companion flange.
 - Install special tool 204-266.
 - Using the special tools install the companion flange to the output shaft by 10mm.
- 3. Remove the special tools.
- **4.** Using a suitable solvent/cleaner, remove all traces of oil from the transfer case rear output flange and exposed threads of the output shaft.
 - **5.** Apply sealant (C2S 12099) to the area of transfer case rear output flange where securing nut seats.

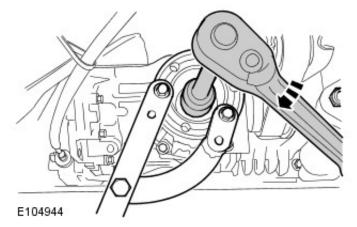
6. Install the special tool to the companion flange.



7. Apply sealant (C2S 12099) to the mating face of the transfer case rear output flange securing nut.

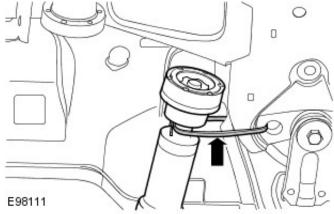


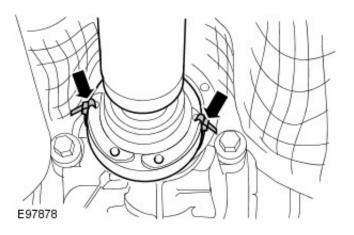
- 8. Install the companion flange securing nut.
 - Start the nut at the noted number of degrees before the start of the first full rotation.
 - Tighten to the noted full number of rotations.
 - Make sure that the original marks between the companion flange, securing nut and output shaft are aligned.



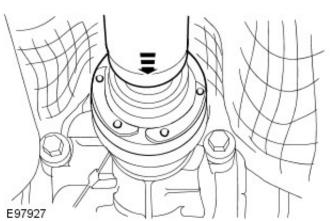


Cut and remove the tie straps securing the outer casing of the driveshaft universal joint.

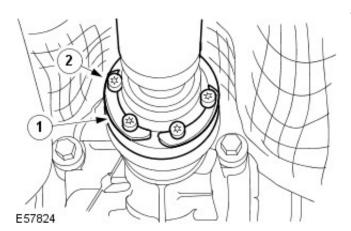




10. Cut and remove the tie straps securing the outer casing of the driveshaft universal joint.

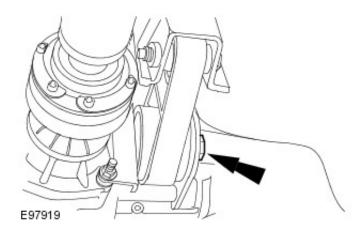


11. Connect the driveshaft to the transfer case.

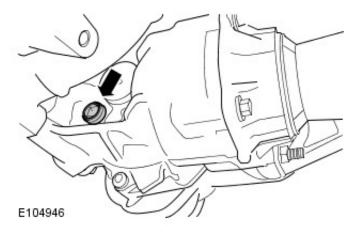


- **12.** Attach the driveshaft universal joint.
 - 1. Attach the driveshaft universal joint.
 - 2. Install new driveshaft retaining bolts.
 - Tighten to 44 Nm.

- **13.** Attach the engine roll restrictor.
 - Tighten to 80 Nm.







supported only by a jack. Always support the vehicle on safety stands.

 \bullet NOTE: The lower lip of the sill must be 540mm from the floor.

Raise and support the left hand side of the vehicle.

- Remove the vehicle from the lift.
- Raise the vehicle using two jacks.
- 15. Fill the transfer case with 400ml of oil.
 - Tighten the filler plug to 20Nm.

Transfer Case - Transfer Case

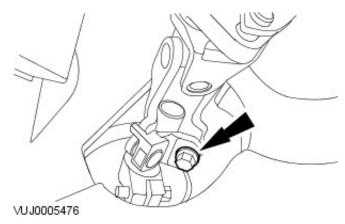
Removal

Special Tool(s)			
	Slide hammer adapter		
	100-012-03		
Dilling			
100-012-03			
	Slide hammer		
8	100-012		
100010			
100012	100 012 02		
	100-012-02		
	Slide hammer shaft		
2			
100-012-02			
	Right-hand halfshaft splitter		
n 1)	307-442		
MVI	307-442		
Tol UG			
307-442			
/3	Right-hand halfshaft splitter handle		
//	307-443		
//			
6/			
A			
307-443			
	Link shaft limiter bracket		
0	307-446		
607 111			
307-44€	Link aboth all cool cools		
Carlo	Link shaft oil seal remover		
CONTRACTOR OF THE PARTY OF THE	308-208		
401			
J. J.			
308-208			
	Torque adaptor		
	303-1069		
10.5 10.00 10.00			
E46430			

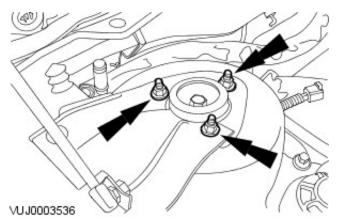
Removal

All vehicles

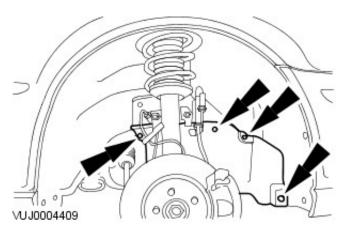
- **1.** Position the front wheels in a straight ahead position and centralize the steering wheel.
 - Lock in position and remove the ignition key.
- 2. Detach the steering column.
 - Remove and discard the steering column lower retaining bolt.



Loosen the shock absorber and spring assembly securing nuts.

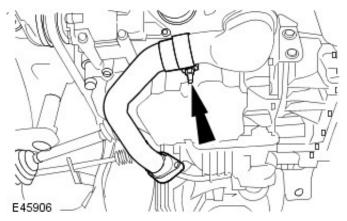


4. Remove the right-hand front wheel and tire. For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).



5. Remove the fender splash shield access panel.

6. Remove the front pipe.



7. Remove the muffler inlet pipe.

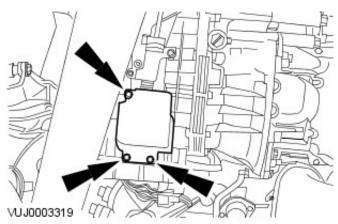
For additional information, refer to: Muffler Inlet Pipe - 2.5L

NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (309-00

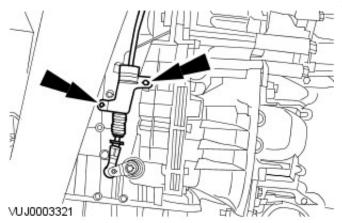
Exhaust System, Removal and Installation).

Vehicles with automatic transmission

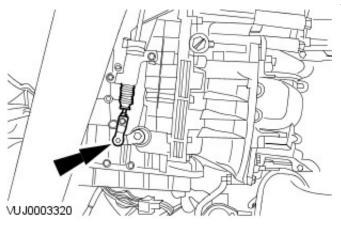
8. Remove the selector lever cable shield.



9. Detach the selector lever cable bracket.



10. Disconnect the selector lever cable.



11. Drain the transmission fluid.
For additional information, refer to: <u>Transmission Fluid Drain and Refill</u> (307-01B Automatic Transmission/Transaxle - Vehicles With: 6-Speed Automatic Transaxle - AWF21, General Procedures).

Vehicles with manual transmission

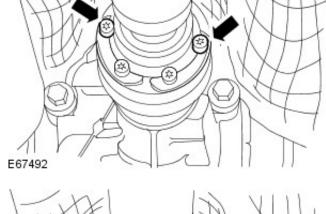
12. Drain the transmission fluid. For additional information, refer to: (308-03 Manual Transmission/Transaxle)

<u>Transaxle Draining and Filling - Vehicles With: 5-Speed Manual Transmission - MT75</u> (General Procedures), <u>Transaxle Draining and Filling - Vehicles With: 5-Speed Manual Transmission - MT75</u> (General Procedures).

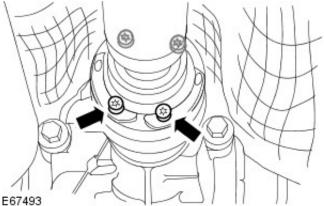
All vehicles

 $\textbf{13.} \ \mathsf{NOTE:} \ \mathsf{Mark} \ \mathsf{the} \ \mathsf{position} \ \mathsf{of} \ \mathsf{the} \ \mathsf{driveshaft} \ \mathsf{in} \ \mathsf{relation} \ \mathsf{to} \ \mathsf{the} \\ \mathsf{drive} \ \mathsf{pinion} \ \mathsf{flange}.$

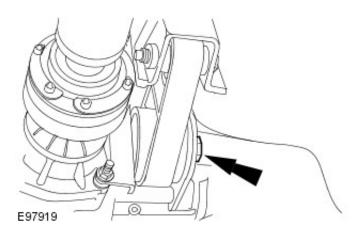
Remove two opposing driveshaft universal joint retaining bolts.



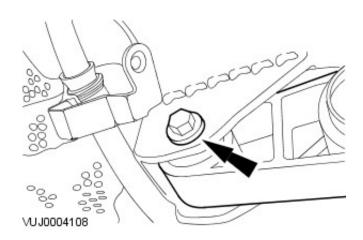
14. Loosen the remaining driveshaft universal joint retaining bolts.



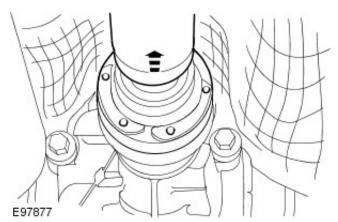
- 15. Detach the engine roll restrictor.
 - Remove the engine roll restrictor retaining bolt.



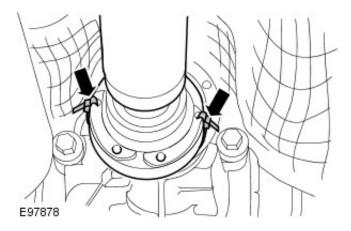
16. Remove the engine roll restrictor.



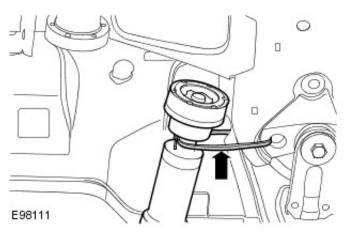
• Remove the engine roll restrictor retaining bolt.



17. Detach the driveshaft from drive pinion flange.



18. Using suitable tie straps, secure the outer casing of the driveshaft universal joint.



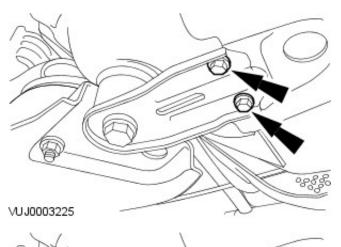
19. CAUTION: Make sure that the driveshaft does not hang on the center universal joint. Failure to follow this instruction may result in damage to the driveshaft.

Using suitable tie straps, secure the driveshaft to the subframe

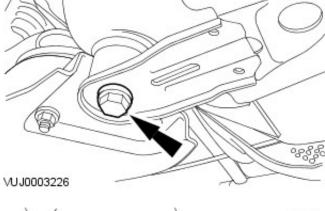
20. NOTE: Left-hand shown, right-hand similar.

Remove the front subframe reinforcement plate retaining

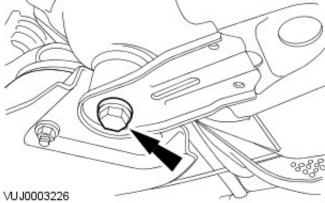




21. Remove the right-hand front subframe rear mount retaining bolt.



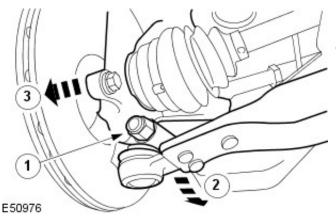
22. Loosen the left-hand front subframe rear mount retaining bolt.



23. CAUTION: Make sure the constant velocity (CV) joint boot is protected. Failure to follow this instruction may result in damage to the CV joint boot.

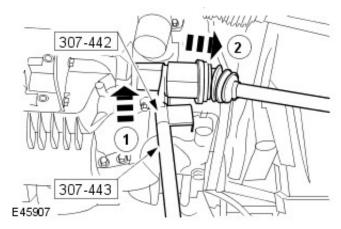
Detach the lower arm from the wheel knuckle.

- Remove the lower arm ball joint retaining nut and bolt.
- 2. Reposition the lower arm.
- 3. Reposition the wheel knuckle.



24. CAUTIONS:

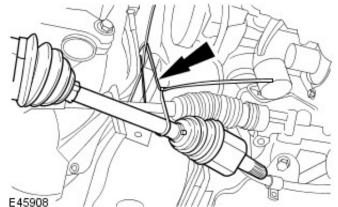
To prevent damage to the transfer box internal seal, make sure that the link shaft is not retracted further than 200 mm (7.87 inches) from the transfer case.



Make sure the halfshaft CV joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

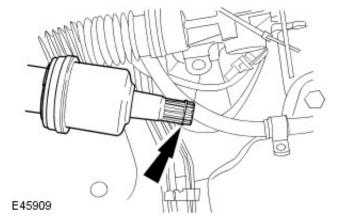
Using the special tools, detach the halfshaft.

- 1. Align the special tools to the halfshaft.
- 2. Detach the halfshaft.
- Remove and discard the halfshaft seal.

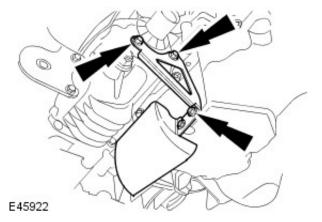


25. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Support the halfshaft.

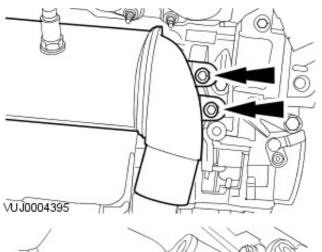


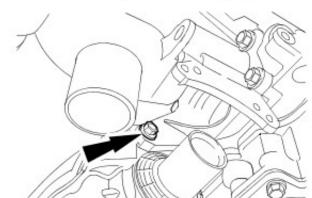
26. Remove and discard the halfshaft snap ring.



27. Remove the transfer case support bracket.

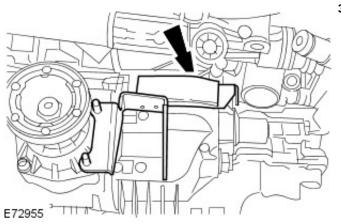
28. Remove the catalytic converter mount bracket retaining bolts.



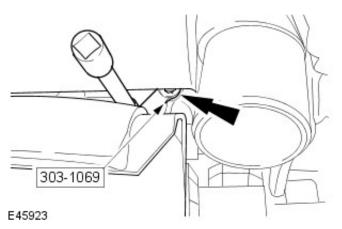


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29. Remove the catalytic converter mount bracket to transfer case retaining bolt.

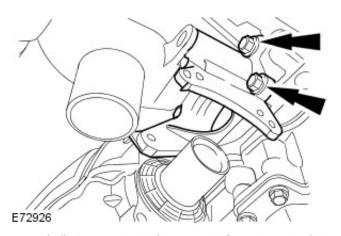


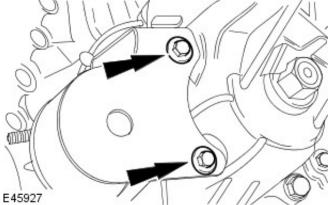
30. Remove the catalytic converter mount bracket retaining bolt.



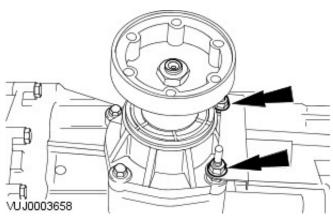
31. Using the special tool, loosen the catalytic converter mount bracket, top left-hand retaining bolt.

32. Remove the catalytic converter mount bracket.

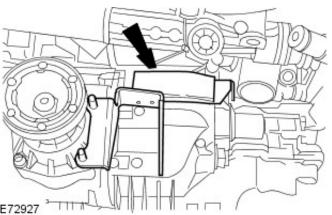




33. Remove the engine anti-roll restrictor bracket retaining bolts.



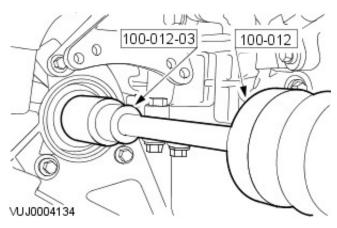
34. Remove the engine anti-roll restrictor bracket retaining nuts.

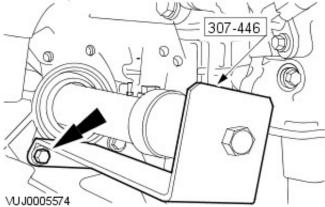


35. Remove the engine anti-roll restrictor bracket.

36. CAUTION: To prevent damage to the transfer box internal seal, make sure that the link shaft is not retracted further than 200 mm (7.87 inches) from the transfer case.

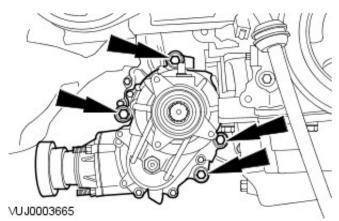
Using the special tools, detach the transfer case link shaft from the transfer case.





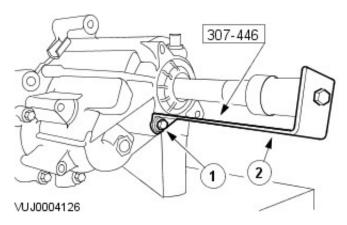
37. CAUTION: To prevent damage to the transfer box internal seal, make sure that the link shaft is not retracted further than 200 mm (7.87 inches) from the transfer case.

Using the special tool, retract the transfer case link shaft.



38. CAUTION: Make sure there is no loss of fluid from the transfer case. Failure to follow this instruction may result in damage to the transfer case.

With the aid of an assistant remove the transfer case.



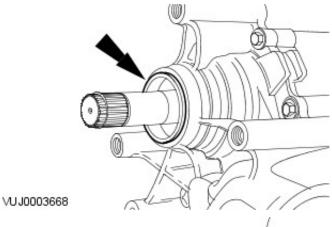
39. AUTION: Make sure there is no loss of fluid from the transfer case. Failure to follow this instruction may result in damage to the transfer case.

Remove the special tool.

- 1. Remove the retaining bolt.
- 2. Remove the special tool.

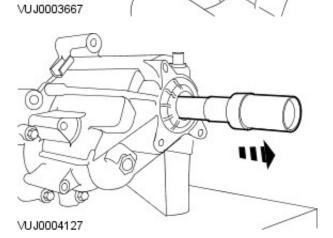
40. CAUTION: Make sure there is no loss of fluid from the transfer case. Failure to follow this instruction may result in damage to the transfer case.

Remove and discard O-ring seal.



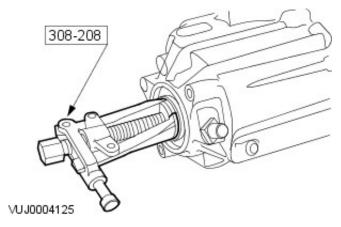
41. CAUTION: Make sure there is no loss of fluid from the transfer case. Failure to follow this instruction may result in damage to the transfer case.

Remove and discard the link shaft snap ring.



42. CAUTION: Make sure there is no loss of fluid from the transfer case. Failure to follow this instruction may result in damage to the transfer case.

Remove the link shaft from the transfer case.



43. CAUTION: Make sure there is no loss of fluid from the transfer case. Failure to follow this instruction may result in damage to the transfer case.

Using the special tool, remove the link shaft seal.

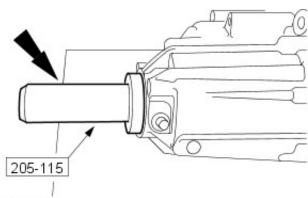
Transfer Case - Transfer Case

Installation

Spe	Special Tool(s)		
	Link shaft limiter bracket		
	307-446		
307-446			
	Torque adapter		
	303-1069		
E46430			
	Link shaft oil seal installer		
	205-115		
205-115			

Installation

All vehicles



- VUJ0004124
- VUJ0004263

- 1. CAUTION: Make sure there is no loss of fluid from the transfer case. Failure to follow this instruction may result in damage to the transfer case.
- NOTE: Using a suitable solvent clean the seal face on the housing before fitting a new seal.

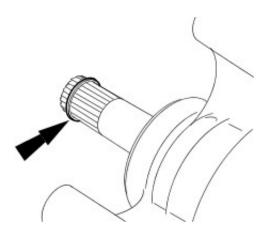
Using the special tool, install the link shaft oil seal.

- If any transfer case fluid is lost during installation carry out drain and refill.
 For additional information, refer to: <u>Transfer Case</u> <u>Draining and Filling</u> (308-07 Transfer Case, General Procedures).
- 2. CAUTION: Make sure there is no loss of fluid from the transfer case. Failure to follow this instruction may result in damage to the transfer case.

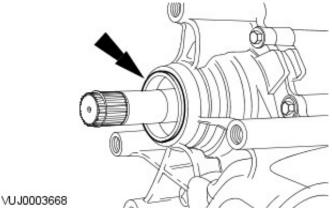
Install the link shaft into the transfer case.

3. CAUTION: Make sure there is no loss of fluid from the transfer case. Failure to follow this instruction may result in damage to the transfer case.

Install a new link shaft snap ring.

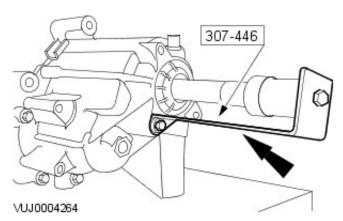


VUJ0003667



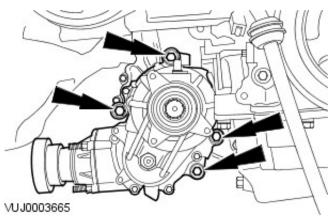
4. CAUTION: Make sure there is no loss of fluid from the transfer case. Failure to follow this instruction may result in damage to the transfer case.

Install a new O-ring seal.



5. CAUTION: Make sure there is no loss of fluid from the transfer case. Failure to follow this instruction may result in damage to the transfer case.

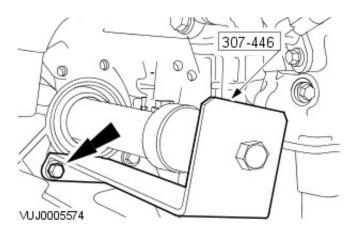
Install the special tool.

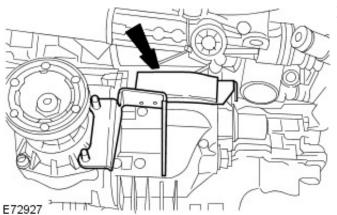


6. CAUTION: Make sure there is no loss of fluid from the transfer case. Failure to follow this instruction may result in damage to the transfer case.

With the aid of an assistant install the transfer case.

- Tighten to 80 Nm.
- If any transfer case fluid is lost during installation carry out drain and refill.
 For additional information, refer to: <u>Transfer Case</u> <u>Draining and Filling</u> (308-07 Transfer Case, General Procedures).
- NOTE: On vehicles prior to VIN J25640, if you are re-using transfer case fixings, tighten to 90 Nm.
 - **7.** Remove the special tool.
 - Engage the link shaft into the transfer case.

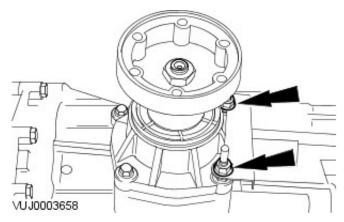




8. NOTE: Do not tighten the engine anti-roll restrictor bracket top retaining bolt at this stage.

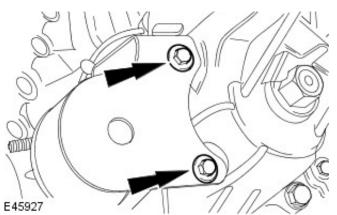
Install the engine anti-roll restrictor bracket.

• Install the engine anti-roll restrictor bracket top retaining bolt.



9. NOTE: Do not tighten the engine anti-roll restrictor bracket retaining nuts at this stage.

Install the engine anti-roll restrictor bracket retaining nuts.

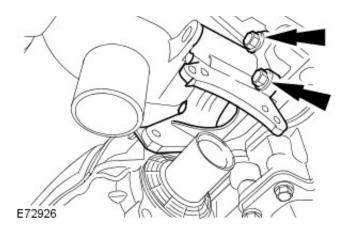


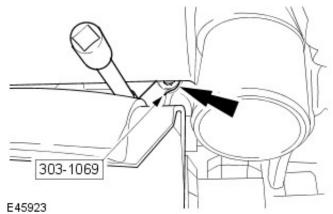
10. NOTE: Do not tighten the engine anti-roll restrictor bracket retaining bolts at this stage.

Install the engine anti-roll restrictor bracket side retaining bolts.

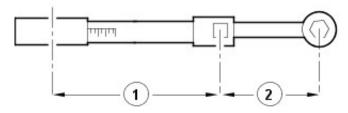
11. NOTE: Do not tighten the catalytic converter mount bracket retaining bolts at this stage.

Install the catalytic converter mount bracket.

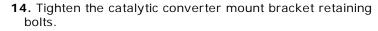




- **12.** Using the special tool, tighten the catalytic converter mount bracket, top left-hand retaining bolt.
 - Use the calculation in step 13 to produce the correct torque to apply to the retaining bolt.

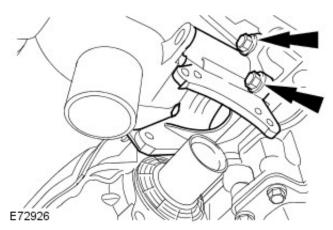


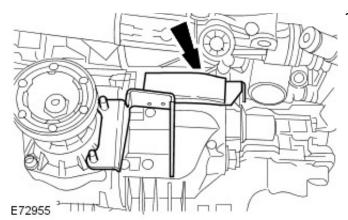
- **13.** Using the special tool and a torque wrench, tighten the catalytic converter mount bracket, top left-hand retaining bolt.
 - To make sure the catalytic converter mount bracket, top left-hand retaining bolt is torqued to the correct specification the following calculation steps must be used.
 - 1. Step 1. Multiply 55 Nm by the effective length of the torque wrench (1).
 - 2. Step 2. Add the effective length of the special tool(2) to the effective length of the torque wrench (1).
 - 3. Step 3. Divide the total of step 1 by the total of step 2
 - 4. Step 4. Set the torque wrench to the figure arrived at in step 3.
 - Tighten the catalytic converter mount bracket, top lefthand retaining bolt to the torque given by the calculation.



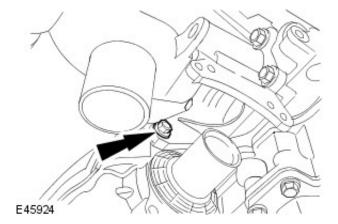
• Tighten to 55 Nm.



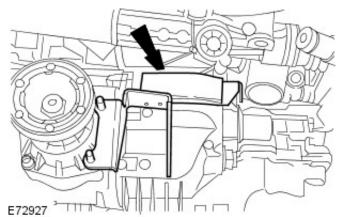




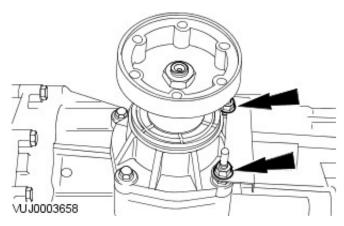
- **15.** Lighten the catalytic converter mount bracket retaining bolt.
 - Tighten to 55 Nm.



- **16.** Install the catalytic converter mount bracket to transfer case retaining bolt.
 - Tighten to 25 Nm.

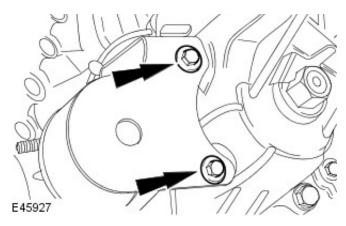


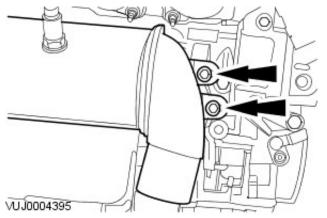
- **17.** Tighten the engine anti-roll restrictor bracket top retaining bolt.
 - Tighten to 55 Nm.



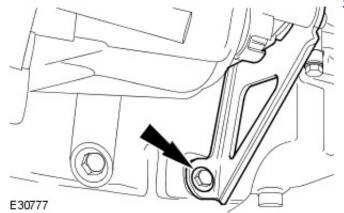
- **18.** Tighten the engine anti-roll restrictor bracket retaining nuts.
 - Tighten to 35 Nm.

- **19.** Tighten the engine anti-roll restrictor bracket side retaining bolts.
 - Tighten to 35 Nm.





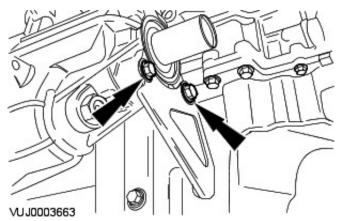
- **20.** Install the catalytic converter to catalytic converter mount bracket retaining bolts.
 - Tighten to 25 Nm.



21. NOTE: Alternator cooling duct shown removed for clarity.

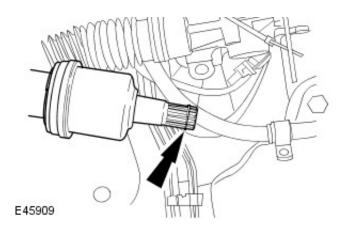
Install transfer case support bracket.

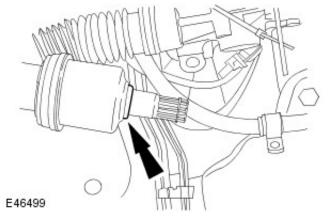
• Tighten to 47 Nm.



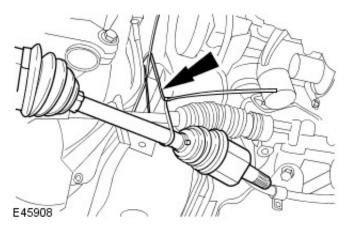
- **22.** Install transfer case support bracket top retaining bolts.
 - Tighten to 25 Nm.

23. Install a new snap ring to the halfshaft.



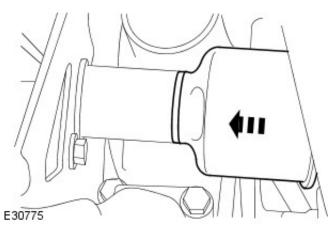


24. Install a new halfshaft seal.



25. CAUTION: Make sure the halfshaft constant velocity (CV) joints do not over articulate. Failure to follow this instruction may result in damage to the CV joints.

Remove the halfshaft support strap.



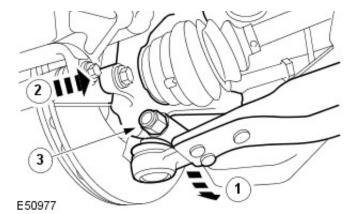
26. CAUTION: Make sure the CV joint splines are located fully. Do not use excessive force when engaging the CV joint into the link shaft.

Install the halfshaft.

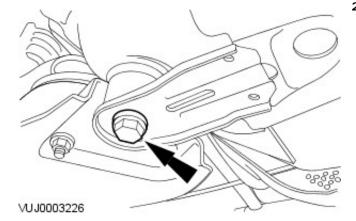
27. NOTE: Install a new retaining nut.

Attach the wheel knuckle.

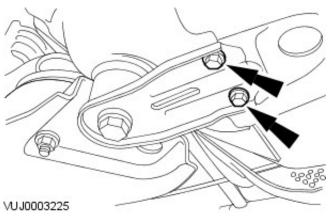
- 1. Reposition the lower arm.
- 2 Attach the wheel knuckle



- Z. ALIACII LIIE WIIEEI KIIUCKIE.
- 3. Install the lower arm ball joint retaining nut and bolt.
- Tighten to 83 Nm.

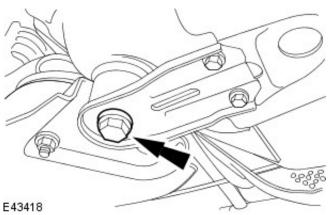


28. Loosley install the right-hand front subframe rear mount retaining bolt.



29. NOTE: Left-hand shown, right-hand similar.

Loosely install the front subframe reinforcement plate retaining bolts.



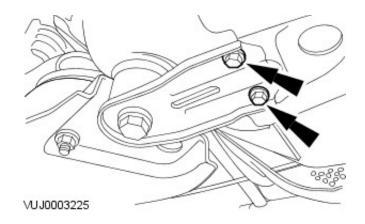
30. NOTE: Left-hand shown, right-hand similar.

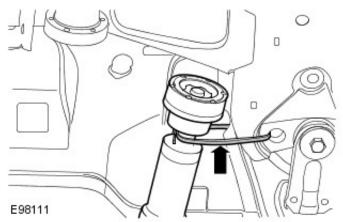
Tighten to 142 Nm.

31. NOTE: Left-hand shown, right-hand similar.

Tighten the front subframe reinforcement bolts.

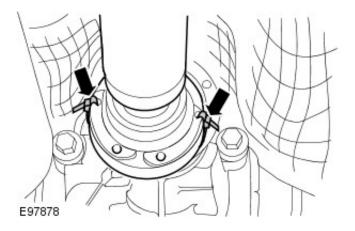
- M8 to 35 Nm.
- M10 to 70 Nm.



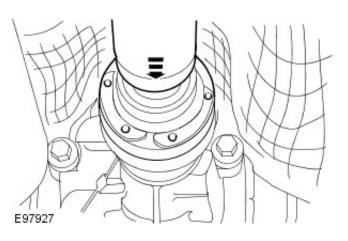


32. CAUTION: Make sure that the driveshaft does not hang on the center universal joint. Failure to follow this instruction may result in damage to the driveshaft.

Cut and remove the tie straps securing the outer casing of the driveshaft universal joint.



33. Cut and remove the tie straps securing the outer casing of the driveshaft universal joint.



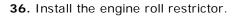
34. Connect the driveshaft to the transfer case.

- **35.** Attach the driveshaft universal joint.
 - 1. Attach the driveshaft universal joint.
 - 2 Install new driveshaft retaining holts

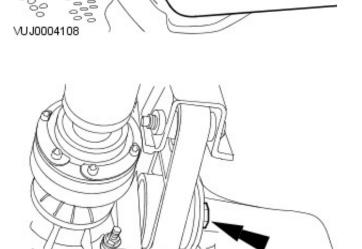


1 E57824

• Tighten to 44 Nm.

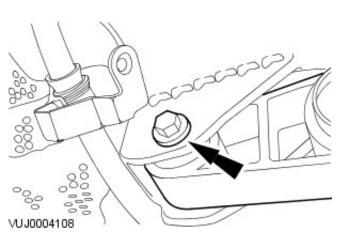


• Install the engine roll restrictor retaining bolt.



37. Attach the engine roll restrictor.

• Tighten to 80 Nm



E97919

38. Tighten to 80 Nm.

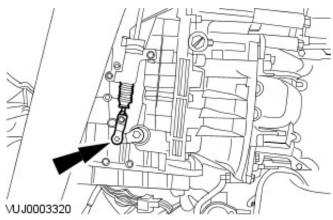
Vehicles with manual transmission

Transmission/Transaxle)

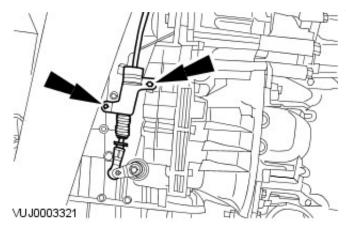
<u>Transaxle Draining and Filling - Vehicles With: 5-Speed Manual Transmission - MT75</u> (General Procedures), <u>Transaxle Draining and Filling - Vehicles With: 5-Speed Manual Transmission - MT75</u> (General Procedures).

Vehicles with automatic transmission

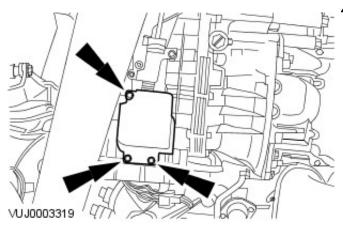
40. Connect the selector lever cable.



- **41**. Attach the selector lever cable bracket.
 - Tighten to 10 Nm.

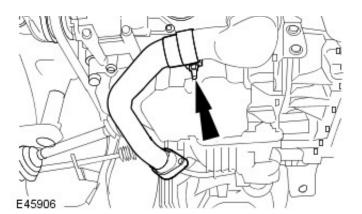


- **42.** Fill the automatic transmission to the correct oil level. For additional information, refer to: <u>Transmission Fluid Drain and Refill</u> (307-01A Automatic Transmission/Transaxle Vehicles With: 5-Speed Automatic Transaxle JATCO, General Procedures).
- 43. Install the selector lever cable shield.
 - Tighten to 10 Nm.

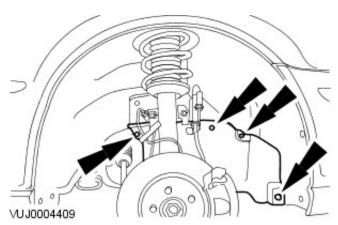


All vehicles

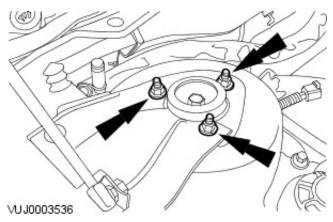
- **44.** Install the muffler inlet pipe.
 For additional information, refer to: Muffler Inlet Pipe 2.5L NA V6 AJV6/2.0L NA V6 AJV6/3.0L NA V6 AJ27 (309-00 Exhaust System, Removal and Installation).
- 45. Install the front pipe.



• Tighten to 55 Nm.



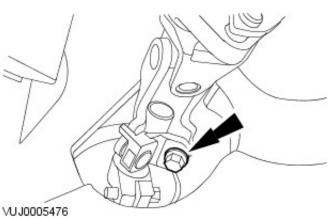
46. Install the fender splash shield access panel.



47. Install the right-hand front wheel and tire. For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

48. Tighten the shock absorber and spring assembly securing nuts

• Tighten to 25 Nm.



49. NOTE: Install a new steering column lower retaining bolt.

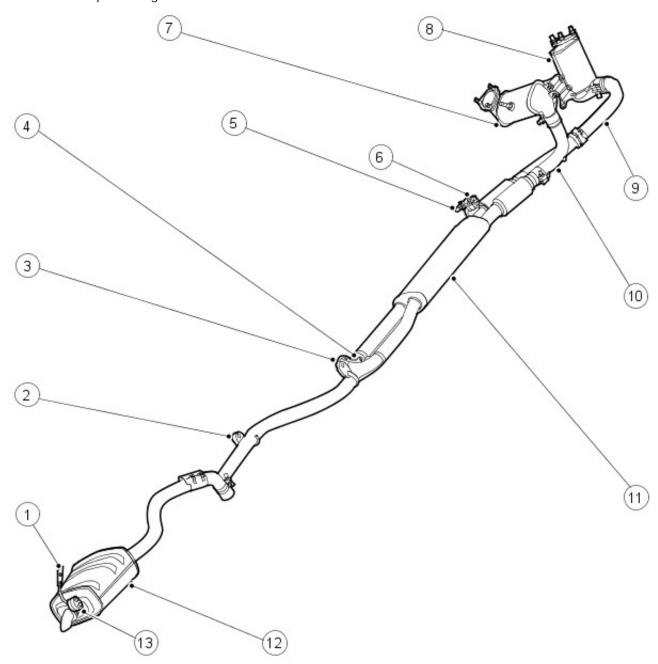
Attach the steering column.

Torque Specifications

Description	Nm	Lb-Ft	Lb-In
Catalytic converter retaining studs	9	-	80
Catalytic converter to exhaust manifold retaining nuts	Α	-	-
Catalytic converter - R/H; to transfer case mounting bracket retaining bolts	25	18	-
Catalytic converter - L/H; to support bracket retaining bolts	25	18	-
Exhaust clamp pinch nut and bolt	55	41	-
Front muffler to muffler inlet pipe retaining nuts	55	41	-
Muffler inlet pipe to front pipe retaining nut and bolt	55	41	-
Exhaust hanger to front muffler retaining bolt.		18	-
Heated oxygen sensor (HO2S)		30	-
Catalyst monitor sensor	40	30	-
Exhaust hanger to body retaining bolts	25	18	
Exhaust heat shield retaining bolts		-	89
Catalytic converter heat shield retaining bolts		-	89
Air cleaner bracket retaining nuts		-	53
A = refer to the procedure for correct torque sequence	-	-	-

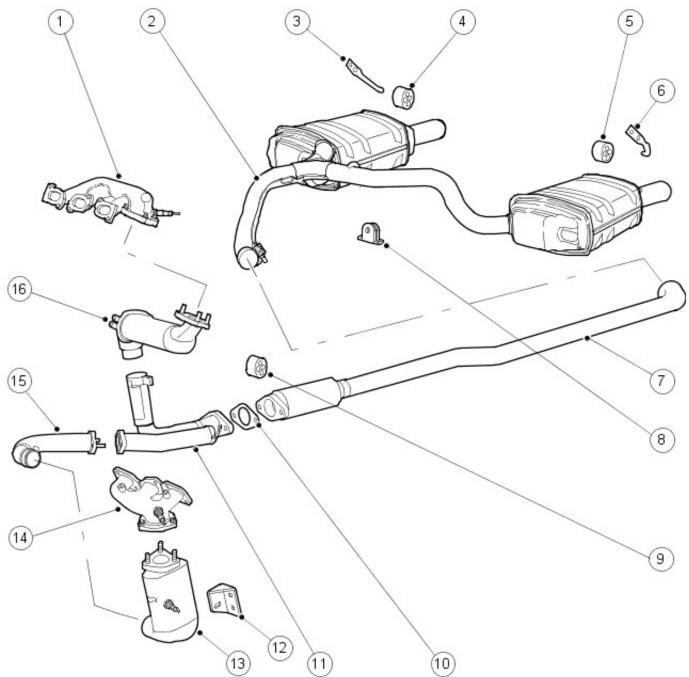
Exhaust System - Exhaust System Description and Operation

Vehicles with 2.0L petrol engine



VUJ0005785

Item	Part Number	Description
1	-	Exhaust hanger
2	-	Exhaust hanger isolator
3	-	Exhaust hanger isolator
4	-	Exhaust hanger
5	-	Exhaust hanger
6	-	Exhaust hanger isolator
7	-	Catalytic converter - R/H
8	-	Catalytic converter - L/H
9	-	Front pipe
10	-	Muffler inlet pipe
11	-	Front muffler
12	-	Muffler and tailpipe
	ĺ	

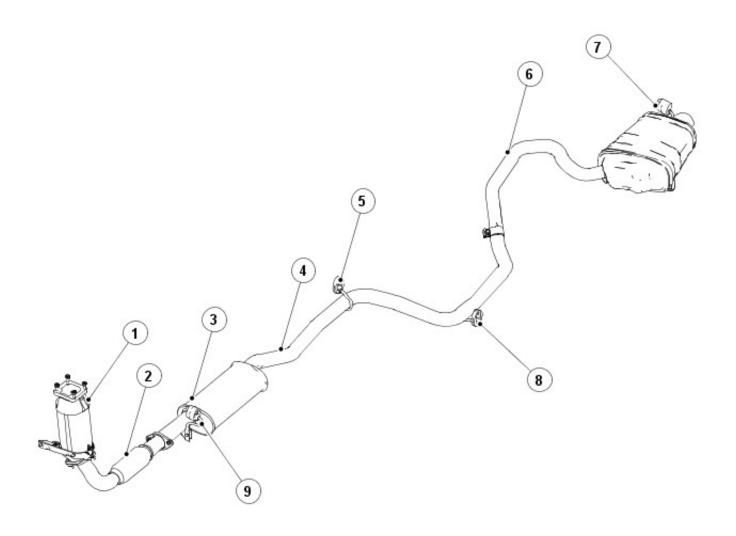


VUJ0003737

Item	Part Number	Description	
1	<u>—</u>	Exhaust manifold - R/H	
2	_	Muffler and tailpipe assembly	
3	_	Exhaust hanger	
4	_	Exhaust hanger isolator	
5	_	Exhaust hanger isolator	
6	_	Exhaust hanger	
7	_	Front muffler	
8	_	Exhaust hanger isolator	
9	_	Exhaust hanger isolator	
10	_	Front muffler to muffler inlet pipe gasket	
11	_	Muffler inlet pipe	
12		Catalytic converter - L/H, support bracket	
13		Catalytic converter - L/H	

I	14	_	Exhaust manifold - L/H	
	15	_	Front pipe	
ſ	16	_	Catalytic converter - R/H	

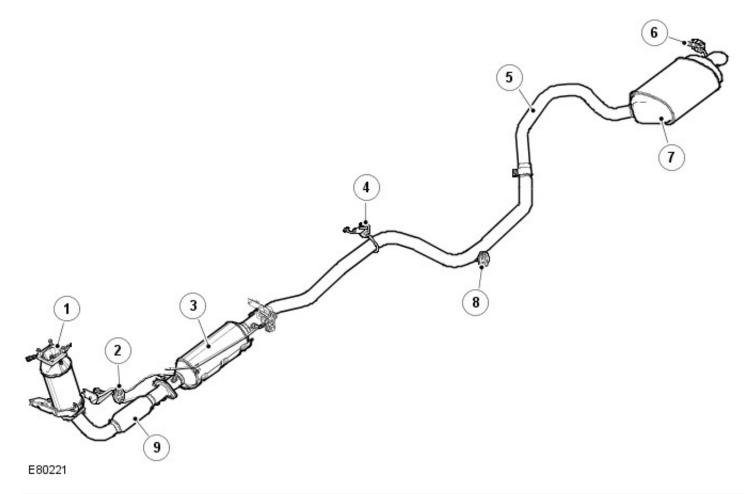
Vehicles with Diesel Engine



E43778

Item	Part Number	Description
1	_	Catalytic converter
2	_	Exhaust flexible pipe
3	_	Exhaust hanger isolator
4	_	Front muffler
5	_	Exhaust hanger isolator
6	_	Muffler and tailpipe
7	_	Exhaust hanger isolator
8	_	Exhaust hanger isolator
9	_	Exhaust hanger

Vehicles with Diesel Particulate Filter (DPF)



Item	Part Number	Description
1	_	Catalytic converter
2	_	Exhaust hanger
3	_	DPF
4	_	Exhaust hanger isolator
5	_	Rear pipe
6	_	Exhaust hanger isolator
7	_	Muffler
8	_	Exhaust hanger isolator
9	_	Exhaust flexible pipe

All petrol vehicles are fitted with a stainless steel exhaust system consisting of:

- catalytic converter(s)
- front pipe
- muffler inlet pipe
- front muffler assembly
- muffler and tailpipe assembly

The exhaust system is designed to meet the rising standards of vehicle emissions, complying with LEV (USA) and stage three (Europe) emission legislation; effective from January 2001.

The exhaust system is supported at the front by the two catalytic converters which are retained directly to the exhaust manifolds by studs and nuts. The remainder of the exhaust system is supported by four rubber hanger isolators. On 2.0L and diesel vehicles there are three attached to the front muffler assembly and one attached to the rear muffler. On 2.5L and 3.0L vehicles there is one attached to the front muffler and three attached to the rear muffler and tail pipe assembly.

A flexible coupling, which is part of the front muffler, is fitted to isolate the exhaust system from engine movement and vibration.

For 2.5L and 3.0L vehicles the rear exhaust muffler and tail pipe assembly is manufactured in one section which consists of a 'Y' pipe joined to the two rear muffler and tail pipes. A service fix is provided for replacement of the rear mufflers and tail pipes. For 2.0L and diesel vehicles there is a single rear muffler assembly which is attached to the left-hand side of the vehicle.

Three Way Catalytic Converters

The catalytic converters each contain two bricks coated with palladium/rhodium. These elements are utilized to control the emissions of hydrocarbons (HC), carbon monoxide (CO) and oxides of nitrogen (NOx) from the engine.

Oxidation Catalytic Converter

The catalytic converter contains a brick coated with platinum. This element is utilized to control the emissions of hydrocarbons (HC), carbon monoxide (CO) and particles of matter from the engine.

Diesel Particulate Filter

The Diesel Particulate Filter (DPF) system reduces diesel particulate emissions to negligible levels (0.005 g/km) to meet current local European City clear air requirements.

The particulate emissions are the black fumes emitted from the diesel engine under certain load conditions. The emissions are a complex mixture of solid and liquid components with the majority of the particulates being carbon micro-spheres on which hydrocarbons from the engine's fuel and lubricant condense.

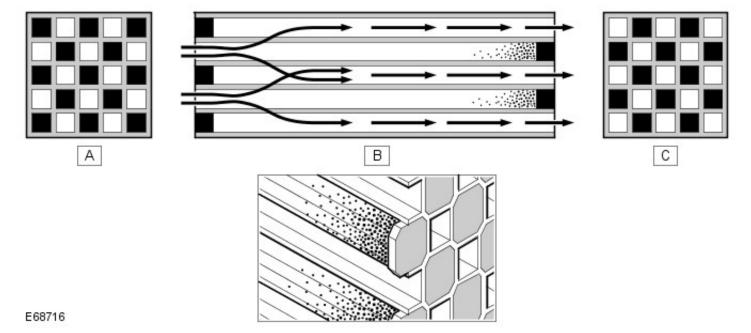
The DPF filter system consists of the following components:

- DPF
- DPF control software incorporated into the engine control module (ECM)
- Differential pressure sensor

The DPF reduces the pollution generated by diesel vehicles by filtering soot particles out of the exhaust gases.

The DPF is located in the exhaust system, downstream of the catalytic converter. A major feature of the DPF is its ability for regeneration. Regeneration is the burning of particulates trapped by the filter to prevent obstruction to the free flow of exhaust gasses. The regeneration process takes place at calculated intervals and is not noticeable by the driver of the vehicle.

Regeneration is most important, since an overfilled filter can damage the engine through excessive exhaust back-pressure and can its self be damaged or destroyed. The material trapped in the filter is in the most part carbon particles with some absorbed hydrocarbons.



Item	Part Number	Description	
Α	-	Front face showing alternate closed cells	
В	-	Side view showing exhaust gas flow through the filter and particulate build up	
С	-	Rear face showing alternate closed cells	

The DPF uses a filter technology based on a filter with a catalytic coating. The DPF is made from silicon carbide housed in a steel container and has excellent thermal shock resistance and thermal conductivity properties. The DPF is designed for the engine's operating requirements to maintain the optimum back-pressure requirements.

The porous surface of the filter consists of hundreds of small parallel channels positioned in the longitudinal direction of the exhaust system. Adjacent channels in the filter are alternately plugged at the end. This design forces the exhaust gasses to flow through the porous filter walls, which act as the filter medium. Particulate matter, which are

too big to pass through the porous surface are collected and stored in the channels.

The collected particulate matter, if not removed, can create an obstruction to exhaust gas flow. The particles are removed by a regeneration process, which incinerates the particles.

Two processes are used to regenerate the DPF, passive and active.

Passive Regeneration

Passive regeneration requires no special engine management intervention and occurs during normal engine operation. The passive regeneration involves a slow conversion of the particulate matter deposited in the DPF into carbon dioxide. This process is active when the DPF temperature reaches 250°C (482°F) and is a continuous process when the vehicle is being driven at higher engine loads and speeds.

During passive regeneration, only a portion of the particulate matter is converted into carbon dioxide. This is due to the chemical reaction process, which is only effective within the normal operating temperature range of 250°C to 500°C (482°F to 932°F).

Above this temperature range the conversion efficiency of the particulates into carbon dioxide increases as the DPF temperature is raised. These temperatures can only be achieved using the active regeneration process.

Active Regeneration

Active regeneration starts when the particulate loading of the DPF reaches a threshold as monitored or determined by the DPF control software. The threshold calculation is based on driving style, distance traveled and back-pressure signals from the differential pressure sensor.

Active regeneration generally occurs every 370 to 1250 miles (600 to 2000km) although this is dependant on how the vehicle is driven. For example, if the vehicle is driven at low loads in urban traffic regularly, active regeneration will occur more often. This is due to the rapid build-up of particulates in the DPF than if the vehicle is driven at high speeds when passive regeneration will have occurred.

The DPF software incorporates an additional trigger, which is used as backup for active regeneration. If active regeneration has not been initiated by a back-pressure signal from the differential pressure sensor, regeneration is requested based on estimated cumulative particulate emissions since the last active regeneration event.

Active regeneration of the DPF is commenced when the temperature of the DPF is increased to the combustion temperature of the particles. The DPF temperature is raised by increasing the exhaust gas temperature. This is achieved by:

- · Retarding the main injection timing
- Reducing intake boost pressure levels
- Activation of the inlet throttle
- Introducing post-injection of fuel after the pilot and main fuel injections have occurred.

Control of the post-injection is determined by the DPF software monitoring the signals from the two DPF temperature sensors to establish the temperature of the DPF. Depending on the DPF temperature, the DPF software requests the ECM to perform either 1 or 2 post-injections of fuel:

- The first post-injection of fuel burns inside the cylinder, which increases the temperature of the exhaust gas
- The second post-injection of fuel is injected late in the power stroke cycle. The fuel partly combusts in the cylinder, but some un-burnt fuel also passes into the exhaust where it creates an exothermic event within the catalytic converter, further increasing the temperature of the DPF

The active regeneration process takes approximately 20 minutes to complete. The first phase increases the DPF temperature to 200°C (392°F). The second phase further increases the DPF temperature to 600°C (1112°F), which is the optimum temperature for particle combustion. This temperature is then maintained for 15-20 minutes to ensure complete incineration of the particles within the DPF. The incineration process converts the carbon particles to carbon dioxide and water.

The active regeneration temperature of the DPF is closely monitored by the DPF software to maintain a target temperature of 600°C (1112°F) at the DPF inlet. The temperature control ensures that the temperatures do not exceed the operational limits of the turbocharger and the catalytic converter. The turbocharger inlet temperature must not exceed 760°C (1400°F) and the catalytic converter brick temperature must not exceed 800°C (1472°F) and the exit temperature must remain below 750°C (1382°F).

During the active regeneration process the following ECM controlled events occur:

- The turbocharger is maintained in the fully open position. This minimizes heat transmission from the exhaust gas to the turbocharger and reduces the rate of exhaust gas flow allowing optimum heating of the DPF. If the driver demands an increase in engine torque, the turbocharger will respond by closing the vanes as necessary
- The throttle is closed as this assists in increasing the exhaust gas temperature and reduces the rate of exhaust gas flow which has the effect of reducing the time for the DPF to reach the optimum temperature
- The exhaust gas re-circulation (EGR) valve is closed. The use of EGR decreases the exhaust gas temperature

- and therefore prevents the optimum DPF temperature being achieved
- The glow plugs are occasionally activated to provide additional heat to assist in raising the DPF temperature

If, due to vehicle usage and/or driving style, the active regeneration process cannot take place or is unable to regenerate the DPF, the dealer can force regenerate the DPF. This is achieved by either driving the vehicle until the engine is at its normal operating temperature and then driving for a further 20 minutes at speeds of not less than 30 mph (48 km/h) or by connecting the Jaguar approved diagnostic system to the vehicle, which will perform an automated static regeneration procedure to clean the DPF.

Diesel Particulate Filter Control

The DPF requires constant monitoring to ensure that it is operating at its optimum efficiency and does not become blocked. The ECM contains DPF software, which controls the monitoring and operation of the DPF system and also monitors other vehicle data to determine regeneration periods and service intervals.

The DPF software can be divided into 3 separate control software modules; a DPF supervisor module, a DPF fuel management module and a DPF air management module.

These 3 modules are controlled by a fourth software module known as the DPF co-ordinator module. The co-ordinator module manages the operation of the other modules when an active regeneration is requested. The DPF supervisor module is a sub-system of the DPF co-ordinator module.

DPF Fuel Management Module

The DPF fuel management module controls the following functions:

- Timing and quantity of the 4 split injections per stroke (pilot, main and 2 post injections)
- Injection pressure and the transition between the 3 different calibration levels of injection

The above functions are dependant on the condition of the catalytic converter and the DPF.

The controlled injection determines the required injection level in addition to measuring the activity of the catalytic converter and the DPF. The fuel management calculates the quantity and timing for the 4-split injections, for each of the 3 calibration levels for injection pressure, and also manages the transition between the levels.

The 2 post injections are required to separate the functionality of increasing in-cylinder gas temperatures and the production of hydrocarbons. The first post injection is used to generate the higher in-cylinder gas temperature while simultaneously retaining the same engine torque output produced during normal (non-regeneration) engine operation. The second post injection is used to generate hydrocarbons by allowing un-burnt fuel into the catalytic converter without producing increased engine torque.

DPF Air Management Module

The DPF air management module controls the following functions:

- EGR control
- Turbocharger boost pressure control
- Exhaust Air Fuel Ratio (AFR) control

During active regeneration, the EGR operation is disabled and the closed-loop activation of the turbocharger boost controller is calculated. The air management module controls the air in the intake manifold to a predetermined level of pressure. This control is required to achieve the correct in-cylinder conditions for stable and robust combustion of the post-injected fuel.

The module controls the exhaust AFR by actuating the EGR throttle.

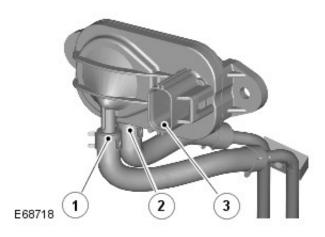
DPF Co-ordinator Module

The DPF co-ordinator module reacts to a regeneration request from the supervisor module by initiating and co-ordinating the following DPF regeneration requests:

- EGR cut-off
- Turbocharger boost pressure control
- Engine load increase
- Control of air pressure in the intake manifold
- Fuel injection control

When the supervisor module issues a regeneration request, the co-ordinator module manages the change over to the regeneration specific settings. The change over occurs during an accelerator pedal release manoeuver from the driver or after a calibrated waiting time.

Pressure Differential Sensor



Item	Part Number	Description
1	-	High pressure connection
2	-	Low pressure connection
3	-	Electrical connector

The differential pressure sensor is located in the engine compartment, on the lower RH side of the bulkhead. The sensor is located on 2 studs and secured with nuts.

The differential pressure sensor is used by the DPF software to monitor the condition of the DPF. Two pipe connections on the sensor are connected by pipes to the inlet and outlet ends of the DPF. The pipes allow the sensor to measure the inlet and outlet pressures of the DPF.

As the amount of particulates trapped by the DPF increases, the pressure at the inlet side of the DPF increases in comparison to the DPF outlet. The DPF software uses this comparison, in conjunction with other data, to calculate the accumulated amount of trapped particulates.

By measuring the pressure difference between the DPF inlet and outlet and the DPF temperature, the DPF software can determine if the DPF is becoming blocked and requires regeneration.

Differential Particulate Filter Temperature Sensors

Two temperature sensors are used in the DPF system. One is located in the catalyst inlet and the second sensor is located in the DPF inlet.

The sensors measure the temperature of exhaust gas exiting the turbocharger and before it passes through the DPF and provides the information needed to calculate the DPF temperature.

The information is used, in conjunction with other data, to estimate the amount of accumulated particulates and to control the DPF temperature.

Instrument Cluster Indications

When the engine is at it's normal operating temperature and the vehicle is driven at moderate speeds, 30 mph (48 km/h), or more, a regeneration of the DPF takes place automatically. This means that the exhaust particles collected in the filter are burned away and the filter is emptied.

For drivers who make regular short journeys at low speeds, it may not be possible to efficiently regenerate the DPF. In this case, the DPF software will detect a blockage of the DPF from signals from the differential pressure sensor and will alert the driver by displaying a warning message 'DPF FULL' in the message center, plus either a RED or AMBER warning lamp.

CAUTION: If the warning message with the RED warning lamp is displayed, a Jaguar dealer/authorized repairer must be contacted as soon as possible before damage to the DPF occurs.

When the message is displayed with an AMBER priority warning lamp, regeneration is required.

CAUTION: If the vehicle continues to be driven with the AMBER warning lamp illuminated without regenerating the DPF, the RED warning lamp will illuminate.

• NOTE: Once triggered, the warning lamp and message will remain on until the ignition is switched to the 'OFF' position. Even though regeneration is still required, the warning lamp and message will only re-appear after 255 seconds of driving and sufficient pressure has built up in the DPF.

For more information, refer to the Owners Handbook.

Diesel Particulate Filter Side Effects

The following section details some side effects caused by the active regeneration process.

Engine Oil Dilution

Engine oil dilution can occur due to small amounts of fuel entering the engine crankcase during the post-injection phases. This has made it necessary to introduce a calculation based on driving style to reduce oil service intervals if necessary. The driver is alerted to the oil service by a message in the instrument cluster.

The DPF software monitors the driving style, the frequency of the active regeneration and duration. Using this information a calculation can be made on the engine oil dilution. When the DPF software calculates the engine oil dilution has reached a predetermined threshold (fuel being 7% of engine oil volume) a service message is displayed in the instrument cluster.

Depending on driving style, some vehicles may require an oil service before the designated interval. If a service message is displayed, the vehicle will be required have a full service and the service interval counter will be reset.

Fuel consumption

During the active regeneration process of the DPF, there will be an increase in fuel consumption. When active regeneration is operating, there will be a 100% increase in fuel consumption.

However, because active regeneration occurs infrequently, the overall effect on fuel consumption is approximately 2%. The additional fuel used during the active regeneration process is accounted for in the instantaneous and average fuel consumption displays in the instrument cluster.

Exhaust System - Exhaust System

Diagnosis and Testing

Overview

For information on the description and operation of the diesel particulate filter (DPF) and catalytic converter systems: REFER to: Exhaust System (309-00 Exhaust System, Description and Operation).

Inspection and verification

- 1. 1. Verify the customer concern.
 - Confirm the illumination of any DPF warning lamps (red or amber) and any message center information.
 - Once the ignition is turned off, the warnings will disappear, but will reappear after 255 seconds of driving, or once sufficient pressure has built up in the DPF.
- 2. **2.** Visually inspect for obvious mechanical or electrical faults.

Visual inspection

Mechanical	Electrical
 Mufflers and pipes Catalytic converter Diesel particulate filter (DPF) Exhaust gas recirculation (EGR) valve Turbocharger 	 Exhaust gas temperature sensors Injectors Differential pressure sensor and circuits Exhaust gas recirculation (EGR) valve and circuits Turbocharger and circuits Glow plugs 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. **4.** Use the approved diagnostic system or a scan tool to retrieve any diagnostic trouble codes (DTCs) before moving onto the symptom chart or DTC index.
 - Make sure that all DTCs are cleared following rectification.

Symptom chart

Condition	Possible source	Action
Engine oil dilution		Note that depending on driving style and use, some vehicles may require engine oil changes at less than usual service intervals. Check the message center and service history. Change the engine oil and reset the counter as necessary.
Excessive fuel consumption/poor performance	exhaust pipe and/or muffler(s) • Blocked catalytic	Inspect the exhaust system for damage. Disconnect the exhaust system from the catalytic converter(s) and check for restricted flow. Remove the catalytic converter(s) and inspect internally for damage. Install new components as necessary. REFER to: Exhaust System (309-00 Exhaust System, Description and Operation). Note that the fuel consumption increases while active regeneration is in operation, but as this happens infrequently there is only a slight increase in overall consumption.
Knocks/rattles from underside	insecure/damagedCatalytic converter(s)	Inspect the exhaust system for damage. Check the security of the system fittings. Tap the sides of the catalytic converter(s) with a soft-faced hammer and listen for movement inside the converter. Install new components as necessary. REFER to: Exhaust System , Description and Operation).
Noise/fumes in vehicle	insecure/damaged	Inspect the exhaust system for damage. Check the security of the system fittings. In a well-ventilated area, close off the tailpipe(s) and check for evidence of leakage. Seal any leaks as necessary. REFER to: Exhaust System , Description and Operation).

DTC index

DTC	Description	Possible cause	Action
P0544	Exhaust gas temperature sensor circuit, right-hand bank, upstream sensor	temperature sensor circuit:	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Exhaust gas temperature sensor circuit low, right-hand bank, upstream sensor		Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Exhaust gas temperature sensor circuit high, right-hand bank, upstream sensor		Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Differential pressure feedback sensor hoses reversed	Diesel Particulate Filter (DPF) delta pressure sensor crossed hose fault	Check the correct connection of the hoses to the pressure sensor. Rectify as necessary. Clear the DTCs, test for normal operation.
	Right-hand bank exhaust gas temperature sensor circuit, sensor 2	sensor circuit: short circuit to ground Exhaust gas temperature sensor circuit: open circuit Exhaust gas temperature sensor circuit: short circuit to power Exhaust gas temperature sensor circuit to	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
	Right-hand bank exhaust gas		Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and

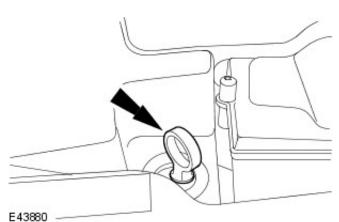
temperature sensor circuit low, sensor 2	sensor circuit: short circuit to ground • Exhaust gas temperature sensor fault	circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
Right-hand bank exhaust gas temperature sensor circuit high, sensor 2	temperature sensor circuit:	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
Right-hand bank exhaust gas temperature sensor circuit range/performance, sensor 1	temperature sensor circuit:	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
Right-hand bank exhaust gas temperature sensor circuit intermittent, sensor 1	temperature sensor circuit:	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
Right-hand bank exhaust gas temperature sensor circuit intermittent, sensor 2	temperature sensor circuit:	Refer to the approved diagnostic system for a guided diagnostic routine. Check the exhaust gas temperature sensor and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs, test for normal operation.
Diesel particulate filter (DPF)restriction - ash accumulation		Install a new DPF as necessary. REFER to: <u>Diesel Particulate Filter (DPF)</u> (309-00 Exhaust System, Removal and Installation). Clear the DTCs, test for normal operation.
Diesel particulate filter (DPF)differential pressure too low		Install a new DPF as necessary. REFER to: <u>Diesel Particulate Filter (DPF)</u> (309-00 Exhaust System, Removal and Installation). Clear the DTCs, test for normal operation.
Diesel particulate filter (DPF)differential pressure too high	overloaded	Carry out the regeneration procedure. Clear the DTCs, test for normal operation.
Exhaust temperature too low for particulate filter regeneration		Carry out the regeneration procedure. Clear the DTCs, test for normal operation.

P2452	Diesel particulate filter (DPF)pressure sensor A circuit		Check the DPF delta pressure sensor and circuits. Refer to the electrical guides. Rectify as necessary.
	Diesel particulate filter (DPF)pressure sensor A circuit range/performance	pressure	Refer to the approved diagnostic system for a guided diagnostic routine. Check the condition and fitment of the DPF delta pressure sensor and hoses. Rectify as necessary.

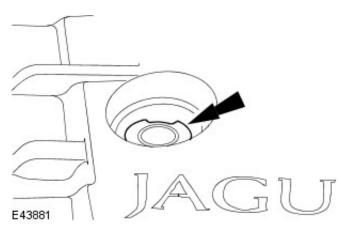
Exhaust System - Catalytic Converter 2.2 L Duratorq-TDCi (110kW/150PS) - Puma/2.0 L Duratorq-TDCi

Removal and Installation

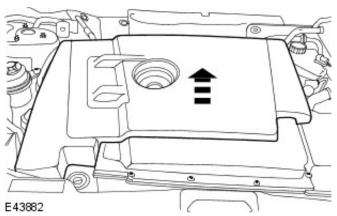
Removal



1. Remove the oil level indicator.



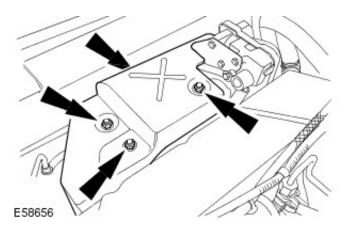
2. Remove the oil filler cap.

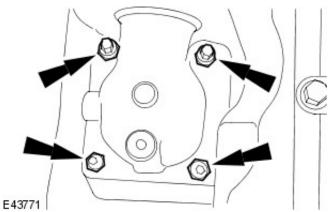


3. NOTE: Install the oil filler cap and oil level indicator to prevent foreign material entering the valve cover.

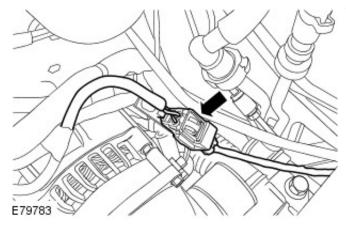
Remove the engine cover.

4. Remove the turbocharger heatshield.

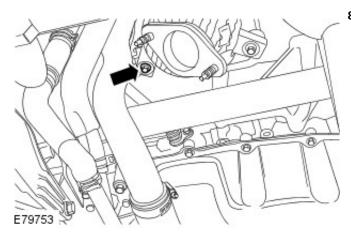




- **5.** Remove the catalytic converter to turbocharger retaining nuts.
 - Remove and discard the retaining nuts.

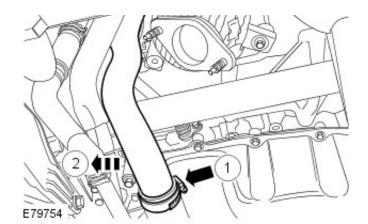


6. Disconnect the catalytic converter temperature sensor electrical connector.

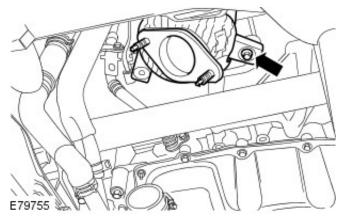


- 7. Remove the exhaust flexible pipe.
 For additional information, refer to: Exhaust Flexible Pipe 2.2L Duratorq-TDCi (110kW/150PS) Puma/2.0L DuratorqTDCi (309-00 Exhaust System, Removal and Installation).
- **8.** Remove the turbocharger outlet pipe retaining bolt.

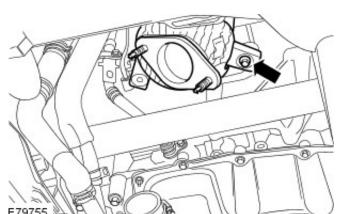
9. Detach the turbocharger outlet pipe.



- 1. Loosen the retaining clip.
- 2. Reposition the pipe.



- **10.** Remove the catalytic converter.
 - Remove the securing bolt.
 - Remove and discard the gasket.

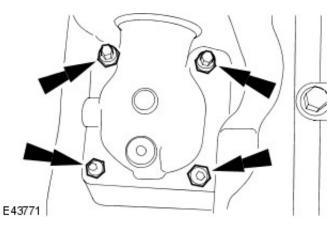


Installation

- 1. CAUTION: Never use jointing compound forward of the catalytic converter.
- NOTE: Coat the catalytic converter studs with anti-seize grease.

Install the catalytic converter.

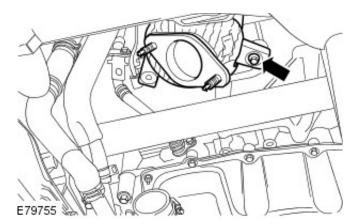
- Loosely install the catalytic converter retaining bolt.
- Install a new gasket.



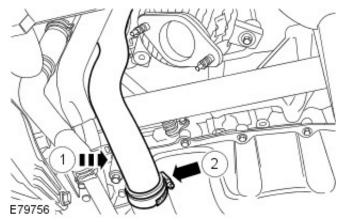
- 2. Lower the vehicle.
- 3. Install the catalytic converter to turbocharger retaining nuts.
 - Tighten to 46 Nm.
 - Install new retaining nuts.

- 4. Raise the vehicle.
- **5**. Tighten the catalytic converter retaining bolt.

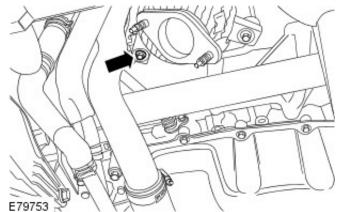




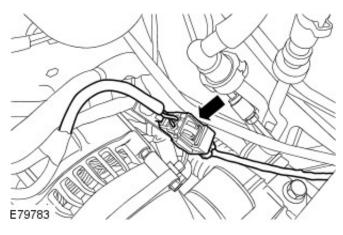
- **6.** Attach the turbocharger outlet pipe.
 - 1. Reposition the pipe.
 - 2. Tighten the retaining clip.
 - Tighten to 4 Nm.



- **7.** Install the turbocharger outlet pipe retaining bolt.
 - Tighten to 46 Nm.

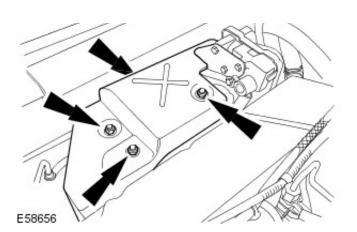


- 8. Install the exhaust flexible pipe.
 For additional information, refer to: Exhaust Flexible Pipe 2.2L Duratorq-TDCi (110kW/150PS) Puma/2.0L DuratorqTDCi (309-00 Exhaust System, Removal and Installation).
- **9.** Connect the catalytic converter temperature sensor electrical connector.

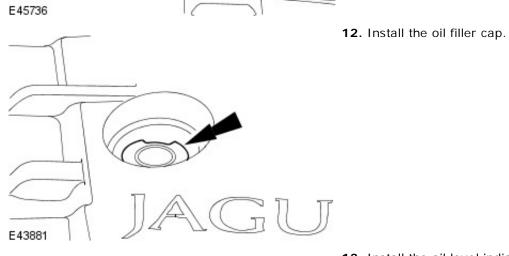


10. Install the turbocharger heatshield.





11. NOTE: Remove the oil filler cap and oil level indicator. Install the engine cover.



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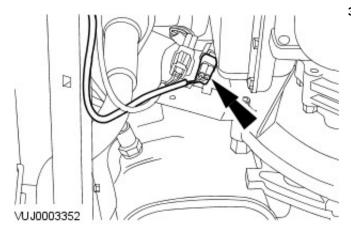
13. Install the oil level indicator.

Exhaust System - Catalytic Converter LH2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27

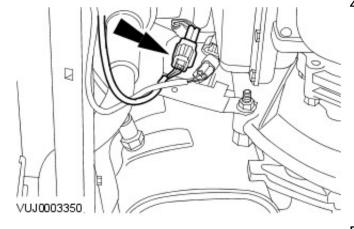
Removal and Installation

Removal

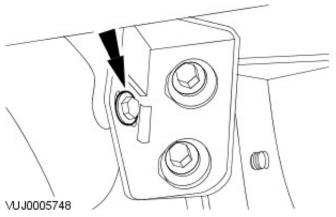
- Disconnect the battery ground cable. For additional information, refer to For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- Remove the cooling fan motor and shroud. For additional information, refer to
 For additional information, refer to: Cooling Fan Motor and Shroud (303-03A Engine Cooling 2.5L NA V6 AJV6/2.0L NA V6 AJV6/3.0L NA V6 AJ27, Removal and Installation).
- **3.** Disconnect the heated oxygen sensor (HO2S) electrical connector.



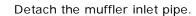
4. Disconnect the catalyst monitor sensor electrical connector.

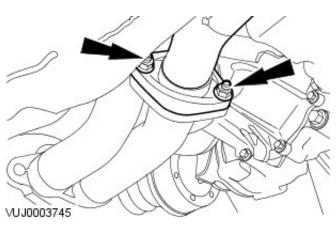


5. Remove the catalyst to support bracket retaining bolt.

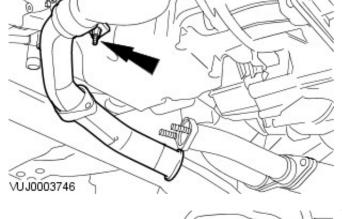


6. NOTE: 2.5L and 3.0L shown, 2.0L similar.

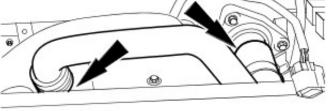




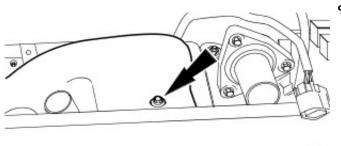
7. Remove the front pipe.



8. Remove the thermostat housing to oil cooler coolant pipe.

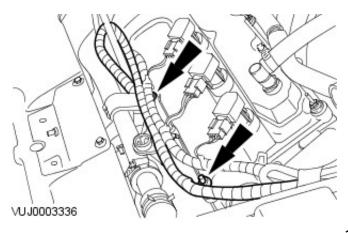


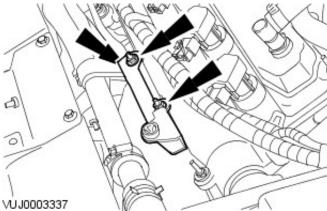
9. Remove the catalytic converter heat shield lower retaining



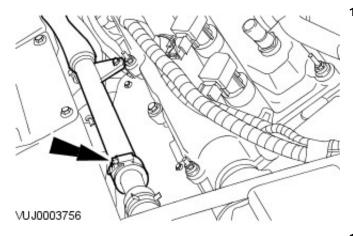
10. Lower the vehicle.

11. Detach and reposition the wiring harnesses.

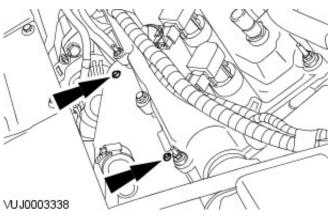




12. Remove the air cleaner retaining bracket.

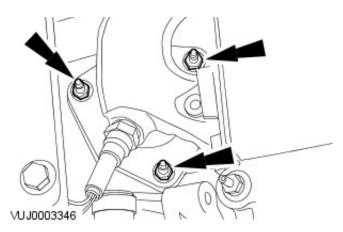


13. Detach and reposition the radiator inlet coolant pipe.

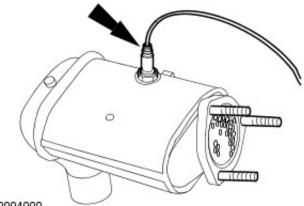


14. Remove the catalytic converter heat shield.

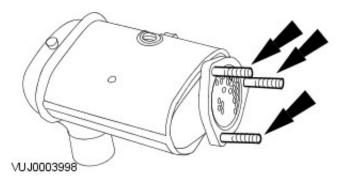
- **15.** Remove the catalytic converter.
 - Discard the retaining nuts.



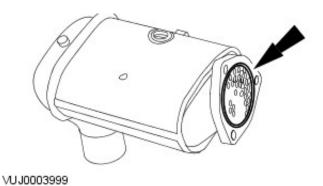
16. Remove the HO2S.



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17. Remove and discard the catalytic converter retaining studs.



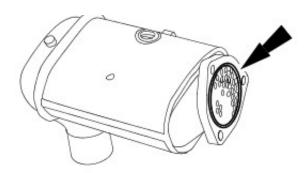
18. Remove and discard the sealing ring.

Installation

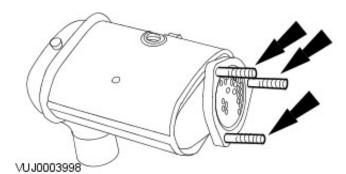
1. CAUTION: Never use jointing compound forward of the catalytic converter.

To install, reverse the removal procedure.

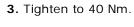
• Install a new sealing ring.

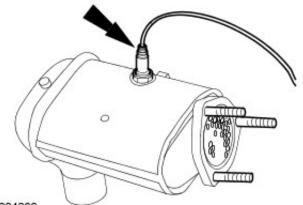


VUJ0003999

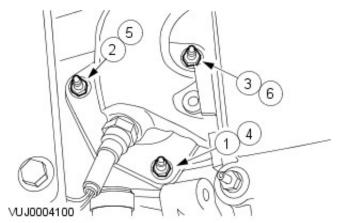


- 2. Install new catalytic converter retaining studs.
 - Tighten to 9 Nm.





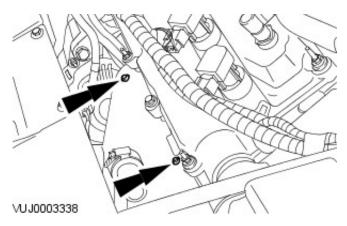
VUJ0004000

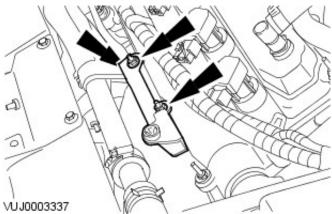


 ${\bf 4.}\ {\sf NOTE:}\ {\sf Make}\ {\sf sure}\ {\sf that}\ {\sf the}\ {\sf retaining}\ {\sf nuts}\ {\sf are}\ {\sf tightened}\ {\sf twice}$ in the sequence shown.

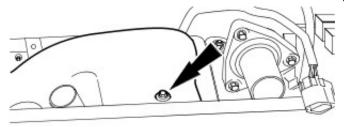
Tighten in the sequence shown to 25 Nm.

5. Tighten to 10 Nm.

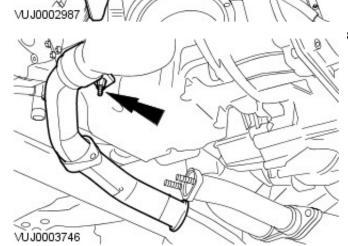




6. Tighten to 6 Nm.



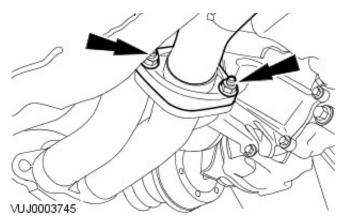
7. Tighten to 10 Nm.

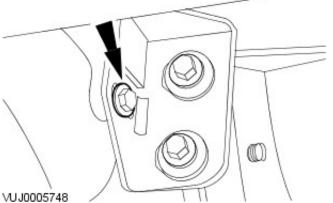


8. Tighten to 55 Nm.

9. NOTE: 2.5L and 3.0L shown, 2.0L similar.

Tighten to 55 Nm.





10. Tighten to 25 Nm.

11. 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 (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, General Procedures).

Exhaust System - Catalytic Converter RH2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27

Removal and Installation

Removal

 Remove the front subframe. For additional information, refer to

For additional information, refer to: Front Subframe - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

.

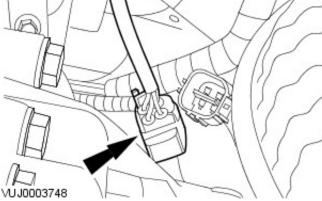
2. NOTE: 2.5L and 3.0L shown, 2.0L similar.

Disconnect the catalyst monitor sensor electrical connector.



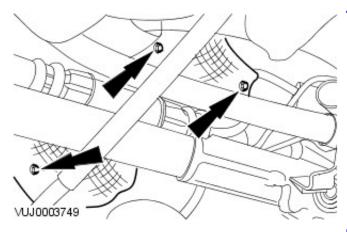
3. NOTE: 2.5L and 3.0L shown, 2.0L similar.

Disconnect the heated oxygen sensor (HO2S) electrical connector.



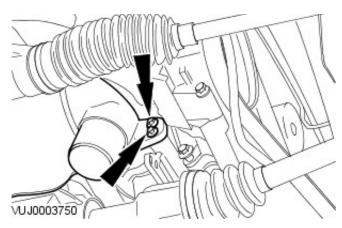
4. NOTE: 2.5L and 3.0L shown, 2.0L similar.

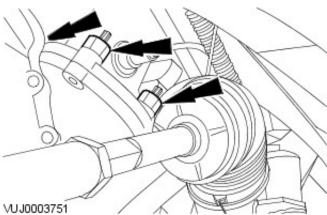
Remove the exhaust heat shield.



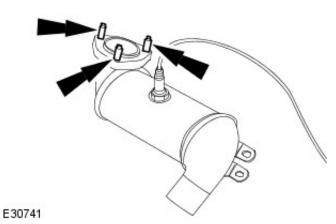
5. NOTE: 2.5L and 3.0L shown, 2.0L similar.

Remove the catalytic converter retaining bolts.

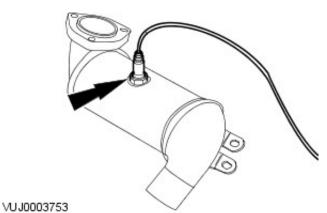




6. NOTE: 2.5L and 3.0L shown, 2.0L similar. Remove and discard the retaining nuts.

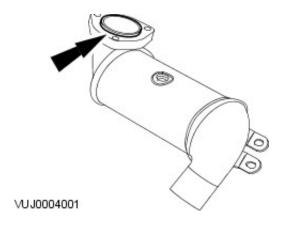


7. Remove and discard the retaining studs.



8. Remove the HO2S.

9. Remove and discard the sealing ring.

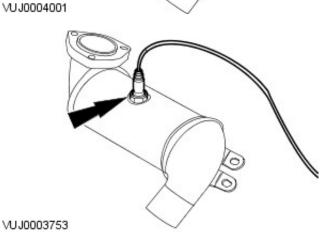


Installation

1. CAUTION: Never use jointing compound forward of the catalytic converter.

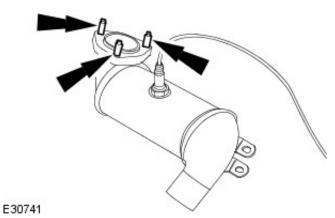
To install, reverse the removal procedure.

• Install a new sealing ring.



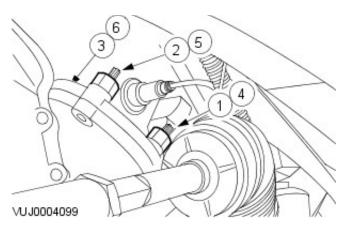
2. Tighten to 40 Nm.

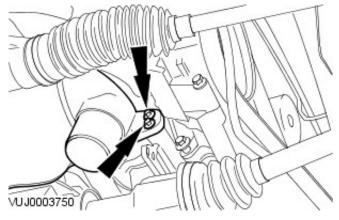
- 3. Install new retaining studs.
 - Tighten to 9 Nm.



- 4. NOTE: 2.5L and 3.0L shown, 2.0L similar.
- NOTE: Make sure that the retaining nuts are tightened twice in the sequence shown.

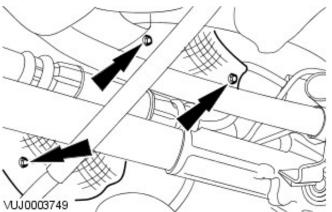
Tighten in the sequence shown to 25 Nm.





5. NOTE: 2.5L and 3.0L shown, 2.0L similar.

Tighten to 25 Nm.



6. NOTE: 2.5L and 3.0L shown, 2.0L similar.

Tighten to 10 Nm.

7. NOTE: For NAS vehicles only.

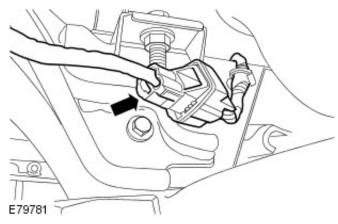
If required, carry out a long drive cycle.
For additional information, refer to: Powertrain Control
Module (PCM) Long Drive Cycle Self-Test (303-14A
Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 AJV6/3.0L NA V6 - AJ27, General Procedures).

Exhaust System - Diesel Particulate Filter (DPF)

Removal and Installation

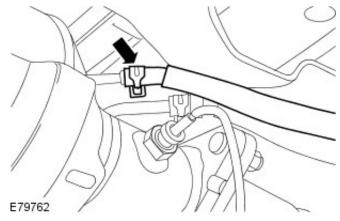
Removal

- Raise and support the vehicle.
 For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- 2. Disconnect the diesel particulate filter temperature sensor electrical connector.



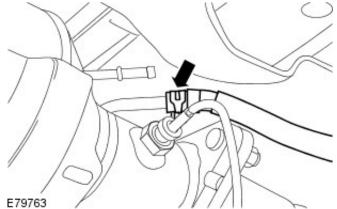
3. NOTE: Note the orientation of the diesel particulate filter high-pressure and low-pressure hoses and make sure they are installed in the same position.

Detach the diesel particulate filter low-pressure hose.

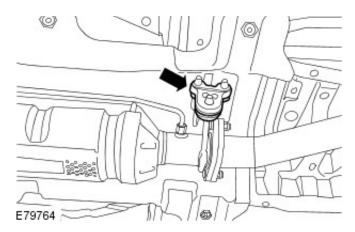


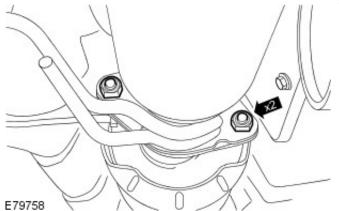
4. NOTE: Note the orientation of the diesel particulate filter high-pressure and low-pressure hoses and make sure they are installed in the same position.

Detach the diesel particulate filter high-pressure hose.

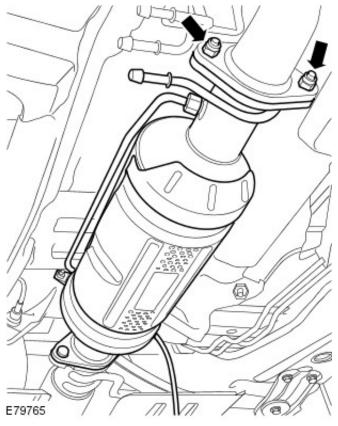


5. Detach the diesel particulate filter support isolator.





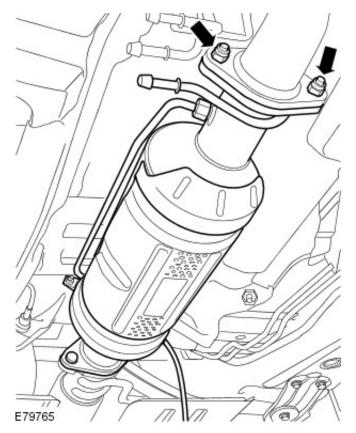
- **6.** Remove the diesel particulate filter to flexible pipe retaining nuts.
 - Remove and discard the gasket and nuts.

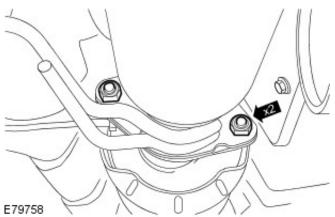


- 7. Remove the diesel particulate filter.
 - Remove and discard the gasket and nuts.

Installation

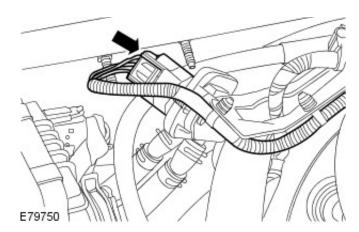
- **1.** To install, reverse the removal procedure.
 - Tighten to 46 Nm.
 - Install a new gasket and nuts.

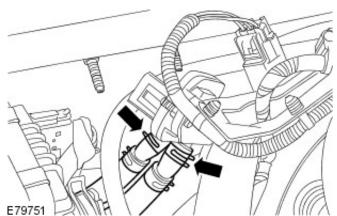




2. Tighten to 46 Nm.

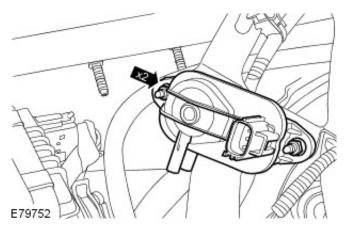
• Install a new gasket and nuts.





6. NOTE: Note the orientation of the DPF differential pressure high-pressure and low-pressure hoses and make sure they are installed in the same position.

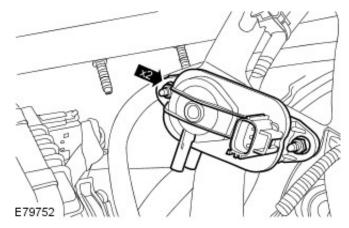
Disconnect the DPF differential pressure sensor highpressure and low-pressure hoses.



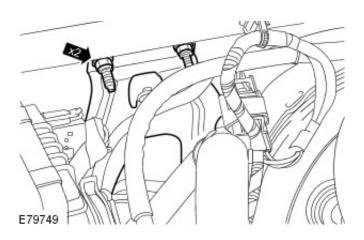
- 7. Remove the DPF differential pressure sensor.
 - Remove the retaining nuts.



- **1.** To install, reverse the removal procedure.
 - Tighten to 5 Nm.



2. Tighten to 4 Nm.

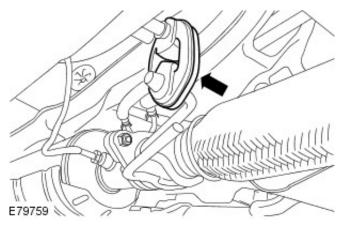


Exhaust System - Exhaust Flexible Pipe2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi

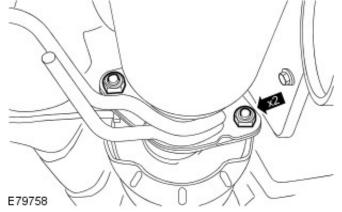
Removal and Installation

Removal

- Remove the air deflector.
 For additional information, refer to: <u>Air Deflector 2.2L Duratorq-TDCi (110kW/150PS) Puma/2.0L Duratorq-TDCi (501-02 Front End Body Panels, Removal and Installation).</u>
- 2. Detach the exhaust flexible pipe support isolator.



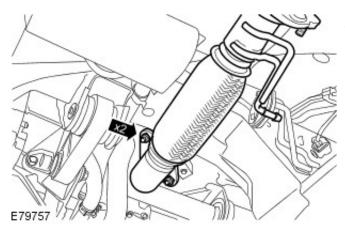
- **3.** Remove the exhaust flexible pipe retaining nuts.
 - Remove and discard the gasket and nuts.



4. CAUTION: Over bending of the exhaust flexible pipe may result in damage to the component.

Remove the exhaust flexible pipe.

• Remove and discard the gasket and nuts.

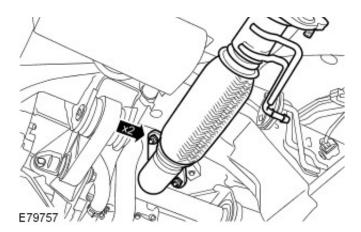


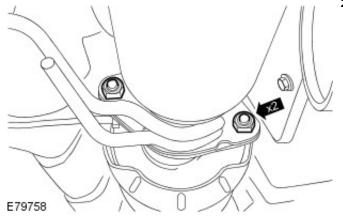
Installation

1. CAUTION: Over bending of the exhaust flexible pipe may result in damage to the component.

To install, reverse the removal procedure.

- Install a new exhaust flexible pipe gasket and nuts.
- Tighten to 46 Nm.





2. Tighten to 46 Nm.

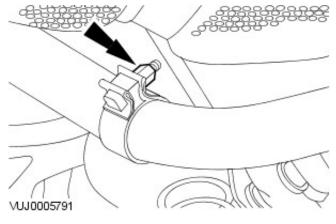
• Install a new exhaust flexible pipe gasket and nuts.

Exhaust System - Front Muffler2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi

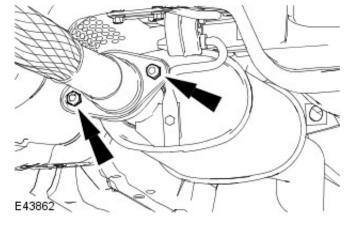
Removal and Installation

Removal

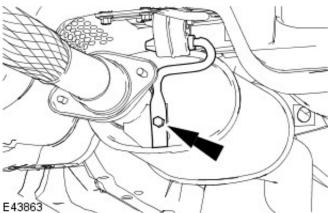
- Raise and support the vehicle.
 For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- 2. Loosen the rear muffler exhaust clamp nut.



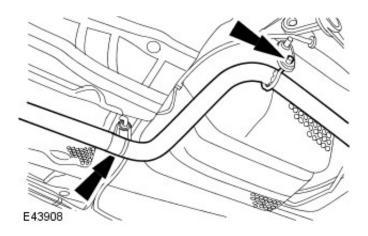
3. Remove the front muffler retaining nuts.



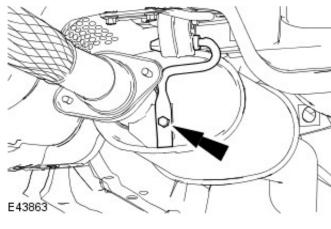
4. Detach the front muffler exhaust hanger isolator bracket.



- **5.** Remove the front muffler.
 - Detach the front muffler hanger isolators.
 - Discard the gasket.



Installation

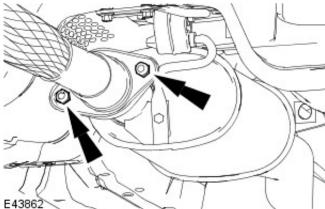


1. CAUTION: The exhaust hanger isolators are constructed of a special material. Use only the correct specification exhaust hanger isolators.

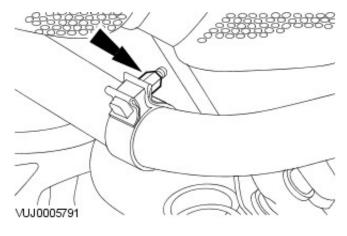
- NOTE: Check the exhaust hanger isolators for damage or fatigue. Install new exhaust hanger isolators if required.
- NOTE: Make sure the front muffler does not foul the underside of the vehicle.
- NOTE: Install a new gasket.

To install, reverse the removal procedure.

- Tighten to 25 Nm.
- 2. Tighten to 46 Nm.



3. Tighten to 55 Nm.



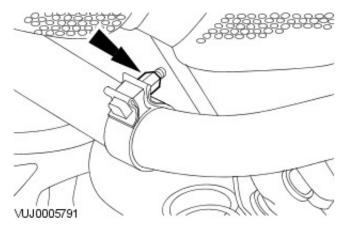
Exhaust System - Front Muffler 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27

Removal and Installation

Removal

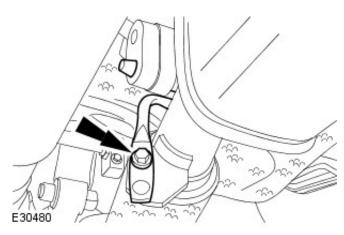
All vehicles

- Raise and support the vehicle.
 For additional information, refer to Section 100-01 Identification Codes.
- 2. Loosen the rear muffler exhaust clamp nut.



Vehicles with 2.5L or 3.0L engine

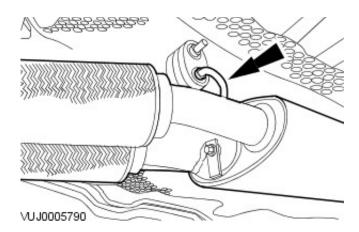
3. Detach the front muffler exhaust hanger isolator bracket.

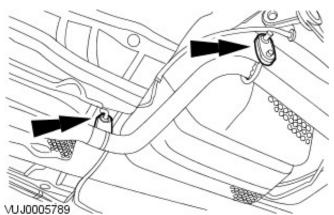


- VUJ0003743
- **4.** Remove the front muffler.
 - Remove and discard the gasket.

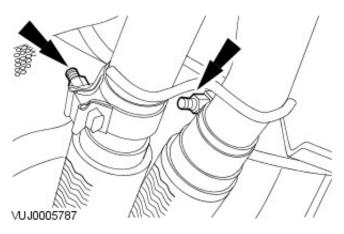
Vehicles with 2.0L engine

5. Detach the front muffler exhaust hanger isolator.





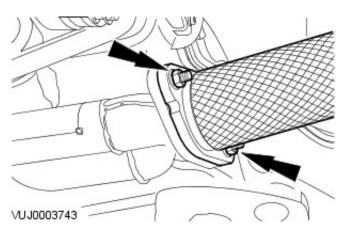
6. Detach the front muffler hanger isolators.



- **7.** Remove the front muffler.
 - Loosen the front muffler clamp retaining nuts.

Installation

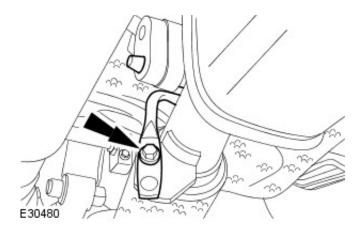
Vehicles with 2.5L or 3.0L engine



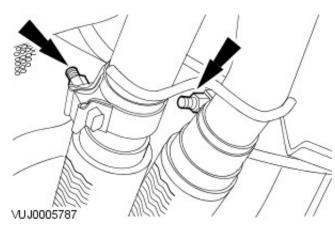
- 1. CAUTION: The exhaust hanger isolators are constructed of a special material. Use only the correct specification exhaust hanger isolators.
- NOTE: Check the exhaust hanger isolators for damage or fatigue. Install new exhaust hanger isolators if required.
- NOTE: Make sure the front muffler does not foul the underside of the vehicle.
- NOTE: Install a new gasket.

To install, reverse the removal procedure.

- Tighten to 55 Nm.
- 2. Tighten bolt to 25 Nm.



Vehicles with 2.0L engine



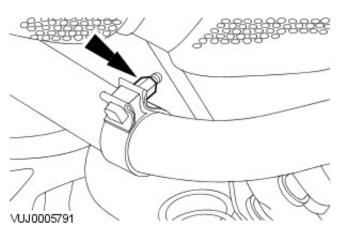
- 3. CAUTION: The exhaust hanger isolators are constructed of a special material. Use only the correct specification exhaust hanger isolators.
- NOTE: Check the exhaust hanger isolators for damage or fatigue. Install new exhaust hanger isolators if required.
- NOTE: Make sure the front muffler does not foul the underside of the vehicle.

To install, reverse the removal procedure.

• Tighten to 55 Nm.

All vehicles

4. Tighten to 55 Nm.



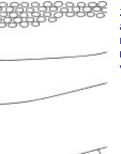
Exhaust System - Muffler and Tailpipe2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, 2.0L

Removal and Installation

VUJ0005791

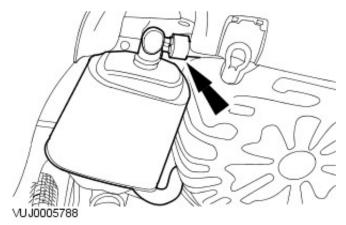
Removal

Raise and support the vehicle.
 For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).



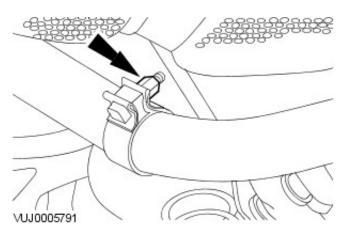
2. CAUTION: Before removing the rear muffler assembly, make a note of the location between the rear muffler and the rear muffler inlet pipe. Failure to install the rear muffler in the correct position could cause an acoustic vibration inside the vehicle.

Loosen the muffler and tailpipe clamp retaining nut.



- 3. Remove the rear muffler assembly.
 - Detach the muffler and tailpipe support isolator.





- 1. CAUTION: The exhaust hanger isolators are constructed of a special material. Use only the correct specification exhaust hanger isolators. Failure to follow this instruction may result in damage to the component.
- NOTE: Check the exhaust hanger isolators for damage or fatigue. Install new exhaust hanger isolators if required.
- NOTE: Install the muffler and tailpipe in the same position that was noted in the removal procedure. If installing a new rear muffler make sure that there is no torsional stress in the exhaust system, and that the exhaust system is free of the underbody of the vehicle.

To install, reverse the removal procedure.

• Tighten to 55 Nm.

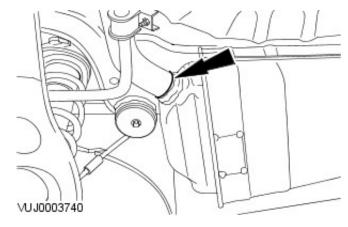
Exhaust System - Muffler and Tailpipe 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Removal and Installation

Removal

- Raise and support the vehicle.
 For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- 2. NOTE: Right-hand shown, left-hand similar.

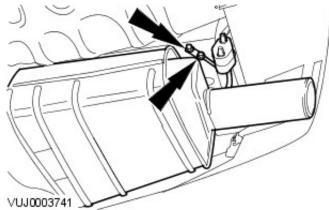
Cut the rear muffler 'Y' pipe in front of the welded joint.



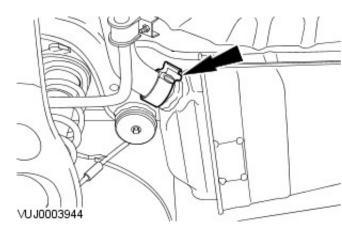
3. NOTE: Right-hand shown, left-hand similar.

Remove the muffler and tailpipe.

• Remove the exhaust hanger and isolator.



Installation

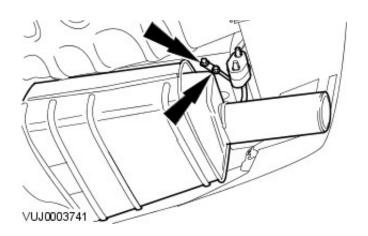


- 1. CAUTION: The exhaust hanger isolators are constructed of a special material. Use only the correct specification exhaust hanger isolators. Failure to follow this instruction may result in damage to the component.
- NOTE: Check the exhaust hanger isolators for damage or fatigue. Install new exhaust hanger isolators if required.
- NOTE: Make sure the rear muffler 'Y' pipe does not have any burns
- NOTE: Make sure the muffler and tailpipe is central to the bumper aperture.
- NOTE: Right-hand shown, left-hand similar.

Install the muffler and tailpipe.

- Tighten to 55 Nm.
- 2. NOTE: Right-hand shown, left-hand similar.

Tighten to 25 Nm.



Exhaust System - Muffler Inlet Pipe2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27

Removal and Installation

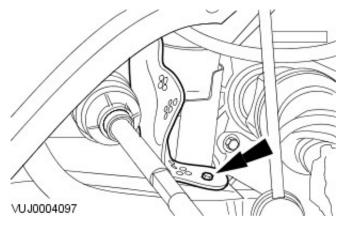
Removal

All vehicles

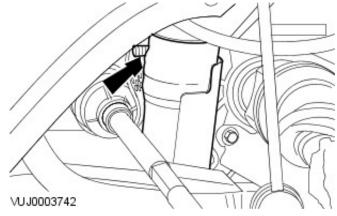
1. Remove the front wheel and tire. For additional information, refer to Section <u>204-04 Wheels and Tires</u>.

Vehicles with 2.5L or 3.0L engine

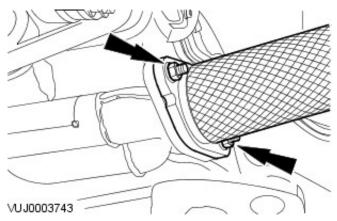
2. Detach and reposition the heat shield.



3. Loosen the muffler inlet pipe exhaust clamp nut.

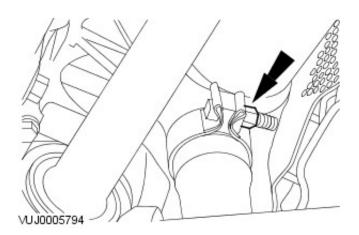


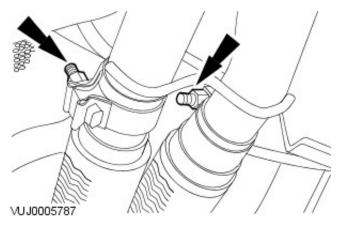
- 4. Detach the front muffler.
 - Remove and discard the gasket.



Vehicles with 2.0L engine

5. Loosen the muffler inlet pipe exhaust clamp nut.

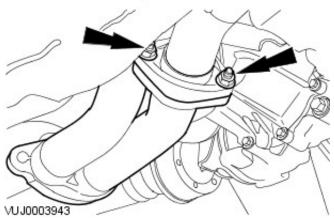




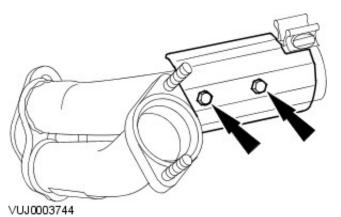
- 6. Detach the muffler.
 - Slacken the muffler retaining clamp nuts.



NOTE: 2.5L and 3.0L shown, 2.0L similar.Remove the muffler inlet pipe.

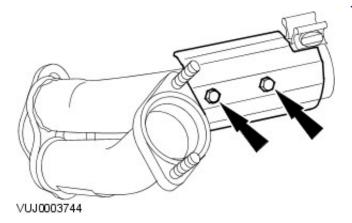


8. NOTE: 2.5L and 3.0L shown, 2.0L similar. Remove the exhaust heat shield.



Installation

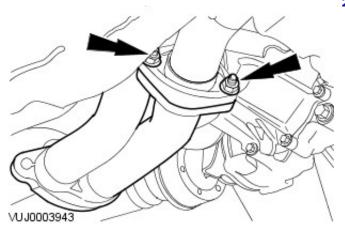
All vehicles



1. NOTE: 2.5L and 3.0L shown, 2.0L similar.

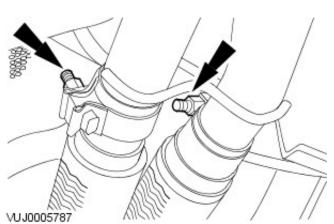
To install, reverse the removal procedure.

• Tighten to 10 Nm.



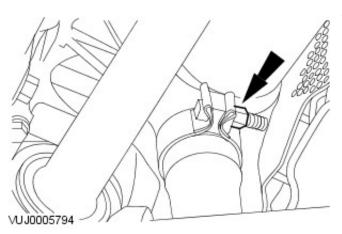
2. NOTE: 2.5L and 3.0L shown, 2.0L similar.

Tighten to 55 Nm.

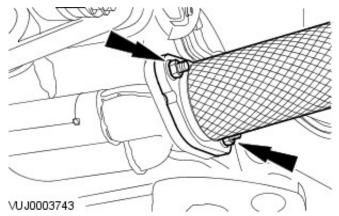


Vehicles with 2.0L engine

3. Tighten to 55 Nm.

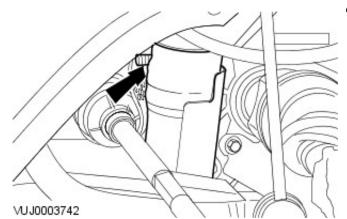


4. Tighten to 55 Nm.

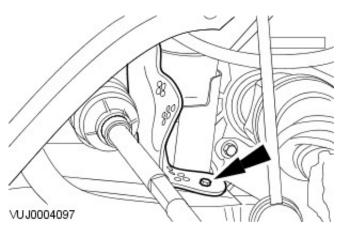


5. NOTE: Install a new gasket.

Tighten to 55 Nm.



6. Tighten to 55 Nm.



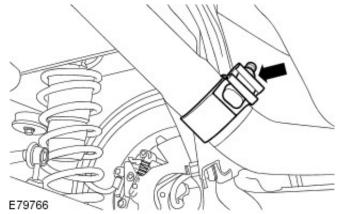
7. Tighten to 10 Nm.

Exhaust System - Muffler Inlet PipeVehicles With: Diesel Particulate Filter (DPF)

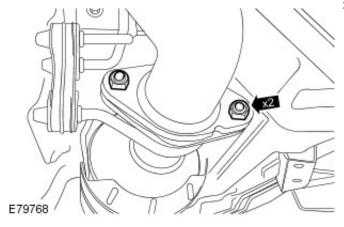
Removal and Installation

Removal

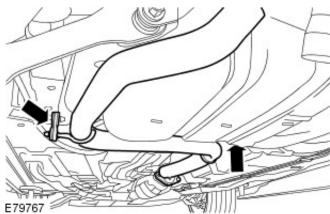
- Raise and support the vehicle.
 For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- 2. Loosen the rear muffler exhaust clamp nut.



3. Remove the muffler inlet pipe to diesel particulate filter retaining nuts.



- 4. Remove the muffler inlet pipe.
 - Detach the muffler inlet pipe support isolators.
 - Remove and discard the gasket.

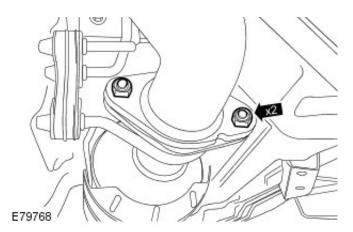


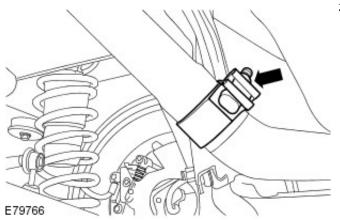
Installation

1. NOTE: Check the exhaust support isolators for damage or fatigue. Install new exhaust support isolators if required.

To install, reverse the removal procedure.

- Tighten to 46 Nm.
- Install a new gasket.





2. Tighten to 55 Nm.

Fuel System - General Information -

General Specifications

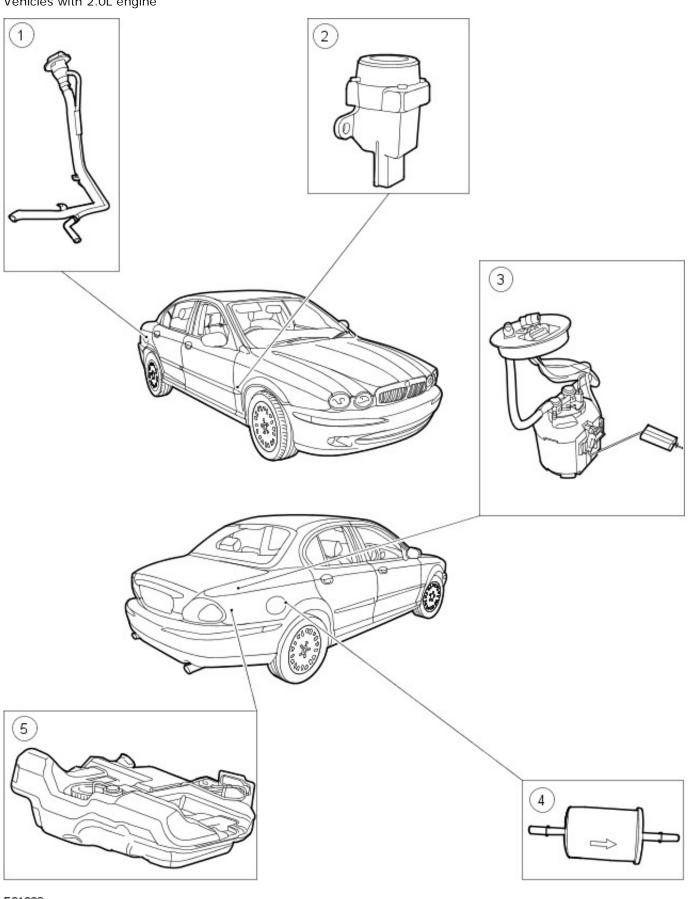
Item	Specification
Fuel tank capacity	61.5 ltrs

Torque Specifications

Description	Nm	lb-ft	lb-in
Fuel tank sender unit lock rings	170	52	-

Fuel System - General Information - Fuel System Description and Operation

Vehicles with 2.0L engine



E31338

Item	Part Number	Description
1	_	Fuel tank filler pipe
2	_	Inertia fuel shutoff (IFS) switch
3	_	Fuel pump
4	_	Fuel filter
5	_	Fuel tank

The mechanical returnless fuel system utilized has the following advantages:

- Reduces the build up of fuel pressure on starting the engine
- Holds the pressure in the fuel lines to aid engine hot starts
- Smooths out pulsations and reduces fuel pump noise

The fuel tank is constructed of high density polythylene and is located underneath the vehicle below the rear passenger seat. The tank is retained by two support straps fixed to the vehicle's underbody, with the underside of the tank being protected by a fitted heatshield.

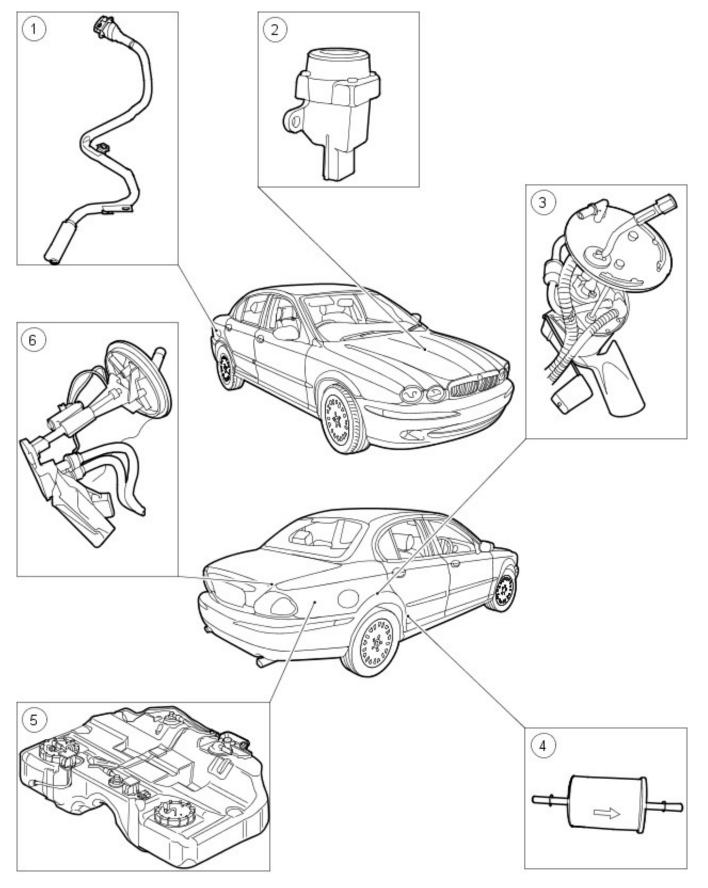
The electric turbine fuel pump, which operates in a fuel reservoir, has an integral top plate for the external pipe work and electrical connectors. The pump is secured to the fuel tank by a screw-on plastic closure ring.

Two roll over valves are connected by a hose which allows air to circulate in the tank which prevents the build up of high pressure vapor areas which may be created during fuel tank filling on gradients or when the vehicle is in motion.

CAUTION: The use of supplementary oil or fuel additives is not approved unless specified by Jaguar Cars in the form of a service communication or directive.

Fuel is pumped from the tank to the fuel rail at a constant pressure of 4.5 bar, regardless of the amount of fuel being injected into the engine. Fuel pressure is constantly maintained by the fuel pump's integral mechanical pressure regulator which returns excess fuel to the fuel tank via a T-piece positioned directly after the fuel filter.

Vehicles with 2.5L or 3.0L engine



VUJ0003469

Item	Part Number	Description
1	_	Fuel tank filler pipe
2	<u> </u>	Inertia fuel shutoff (IFS) switch
3	_	Fuel pump module

4	_	Fuel filter
5	_	Fuel tank
6	_	Fuel transfer pump (jet pump) module

The electronic returnless fuel system utilized has the following advantages:

- · reduced fuel tank vapor.
- requires less electrical power.
- does not require a fuel return line.

The intelligence of this system is contained within the engine control module (ECM).

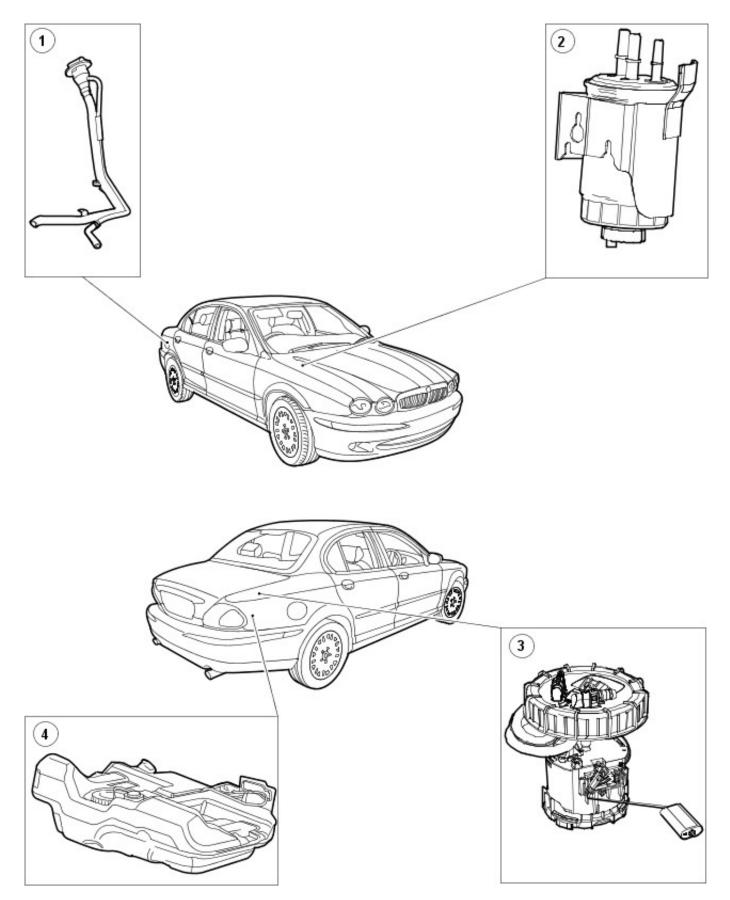
The ECM determines the required fuel flow and communicates this information to the fuel pump controller. The fuel pump controller has the fuel pump driver functions fully integrated into the microprocessor. The ECM calculates the frequency and determines the current required by the fuel pump to maintain the correct fuel pressure at the fuel injectors.

The fuel tank is of a saddle design which incorporates two sender units. The right-hand side houses the fuel pump module. The left-hand side houses the transfer pump (jet pump) module.

CAUTION: The use of supplementary oil or fuel additives is not approved unless specified by Jaguar Cars in the form of a service communication or directive.

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 cut-off switch will cut power to the fuel pump module in the event of an accident.

Vehicles with diesel engine



E49004

Item	Part Number	Description
1	-	Fuel tank filler pipe
2	-	Fuel filter
3	-	Sender unit

The fuel tank is constructed of high density polythylene and is located underneath the vehicle below the rear passenger seat. The tank is retained by two support straps fixed to the vehicle's underbody, with the underside of the tank being protected by a fitted heatshield.

The fuel sender unit uses a resistor tile and float rod system to supply information to the instrument cluster of the fuel level. The fuel system has a run dry strategy which leaves four litres of unusable fuel in the tank. If fuel runout occurs no system priming/bleeding is required.

AUTION: The use of supplementary oil or fuel additives is not approved unless specified by Jaquar Cars in the form of a service communication or directive.

The fuel filter is located at the top of the bulkhead on the right-hand side of the vehicle. The fuel filter incorporates a fuel pre heat function, which utilizes a ball valve operated by a bimetallic strip. When the temperature is less than 15° C (59° F), the ball valve allows the warm fuel in the fuel return system to pass back through the fuel filter to the fuel pump to improve cold running. Once the temperature exceeds 31° C (88° F) a bimetallic strip closes the ball valve in the fuel filter and all of the fuel in the fuel return system is directed back to the fuel tank.

FUEL TANK AND LINES

Introduction

The vehicle has a new fuel system designed to meet USA Federal LEV 2 emissions requirements. Parts affected are:

- Under floor fuel lines.
- Fuel tank assembly.
- Fuel filler pipe.
- Carbon canister.
- Fuel filler cap.

Service Port

In order to further reduce emissions, the fuel rail 'schraeder' valve is deleted. Should a service port be needed, a new service special tool will be available to fit between the fuel rail and the fuel feed line connection.



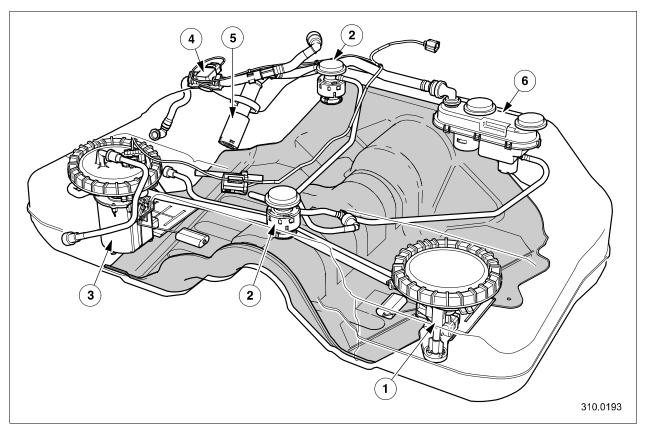
Fuel pressure check tool

To fit this connector into place it will be necessary to depressurize the system first by removing the pump fuse and starting the engine until the engine stops running.

Fuel Tank

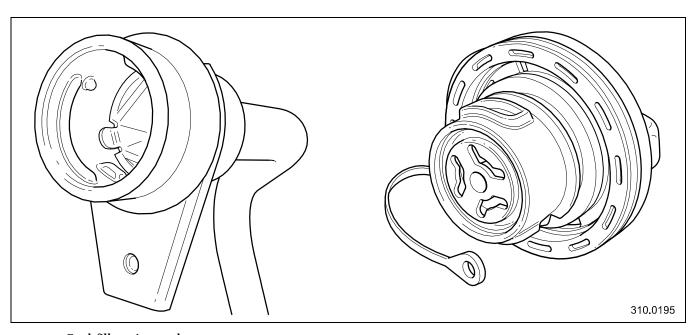
Differences from the previous tank:

- Fuel delivery shut off valve and roll over valves are mounted internally.
- Change to the fuel delivery module and Jet pump module.
- The fuel delivery module and jet pump module internal cross over lines have had their connections reversed.
- The pressure transducer is replaced by one from another supplier. It was mounted on the tank but is now mounted in the vapor line.
- The inlet check valve is changed.



Fuel tank

- 1. Sender and fuel transfer module
- 2. Roll over valve
- 3. Sender and pump assembly
- 4. Pressure transducer
- 5. Inlet check valve
- 6. Fuel delivery shut off valve



Fuel filler pipe and cap

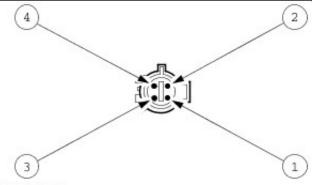
Fuel System - General Information - Fuel System

Diagnosis and Testing

- 1. **1.** Verify the customer concern.
- 2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.
- 3. **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. **4.** If the concern is not visually evident, refer to the Symptom Chart.

Symptom Chart

Symptom	Possible Sources	Action
P1233, P1235, —Fuel Pump	* Damaged harness.	* GO to
Primary Circuit Failure	* Connector loose or corroded.	Pinpoint Test
	* Connector pin(s) bent or tracking between connections.	<u>A.</u>
	* Damaged GROUND.	
	* 'Popped' inertia switch.	
B1201, P0460, —Fuel Sender	* Worn or damaged sensor tracks.	* GO to
Circuit Failure	* Damaged Harness.	Pinpoint Test
	* Connector loose or corroded.	<u>B.</u>
	* Connector pin(s) bent or tracking between connections.	
	* Fuel level sensor to instrument cluster circuits intermittent short	
	or open circuit or high resistance.	
	* Fuel level sensor failure.	
	 * Instrument cluster fault (incorrect fuel level data). 	

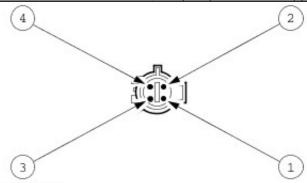


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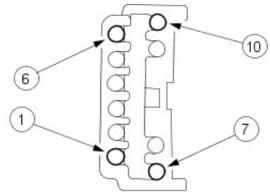
Fuel Pump Harness Connector

Pin Number	Circuit Function	Circuit Color
1	Fuel level sensor signal supply	Yellow/white
2	Fuel pump voltage supply	Pink/black
3	Fuel level sensor GROUND supply	Pink/orange
4	Fuel pump GROUND supply	Black



Transfer Pump Fuel Level Sensor Harness Connector

Tansi of Full product Edver Sensor Harness confliction		
Pin Number	Circuit Function	Circuit Color
1	Fuel level sensor signal supply	Yellow/white
3	Fuel level sensor GROUND supply	Pink/orange



VUJ0003688

Fuel Pump Controller Harness Connector

Pin Number	Circuit Function	Circuit Color
1	engine control module (ECM) control input	Brown
2	Ground	Black
3	Fuel pump ground	Yellow
4	Throttle screen	Black/green
5	Fuel pump screen	White
7	ECM monitor output	White
9	Battery positive	Brown/green
10	Fuel pump positive	Red

PINPOINT T	EST A : P1233, P1235—FUEL PUMP PRIMARY CIRCUIT FAILURE
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
A1: CHECK TH	HE POSITIVE SUPPLY TO THE FUEL PUMP
	1 Switch the ignition to the OFF position.
	2 Disconnect the fuel pump electrical connector FT002.
	3 Switch the ignition to the RUN position.
	4 Measure the pulse width modulation voltage between the fuel pump electrical connector FT002 pin 2, (KB) and GROUND.
	Is there a 1 second, 12 volts voltage signal after the ignition is switched on?
	Yes
	GO to A2.
	No GO to A5.
A2: CHECK TH	HE GROUND SUPPLY TO THE FUEL PUMP
AL. GIILGIK II	1 Switch the ignition to the OFF position.
	2 Measure the resistance between the fuel pump electrical connector FT002 pin 4, (B) and GROUND.
	Is the resistance less than 0.5 Ohm?
	Yes
	INSTALL a new fuel pump. CLEAR DTC. TEST the system for normal operation.
	No
	GO to A7.
A3: CHECK TH	HE POSITIVE SUPPLY TO THE FUEL PUMP CONTROLLER
	1 Switch the ignition to the RUN position.
	2 Measure the voltage at the fuel pump controller CA105 pin 9.
	Is the voltage less than 10.5 Volts?
	Yes GO to A4.
	No.
	GO to A10.
A4: CHECK TH	HE FUEL PUMP CONTROLLER VOLTAGE SUPPLY FUSE
	1 Measure the voltage at the fuel pump controller supply fuse.
	Is the voltage less than 10.5 Volts?
	Yes
	GO to A12.
	No
	REPAIR the circuit between the central electrical junction box (CEJB) and the fuel pump controller. CLEAR DTC. TEST the system for normal operation.
A5: CHECK TH	HE VOLTAGE OUTPUT AT THE FUEL PUMP CONTROLLER

	1 Switch the ignition to the OFF position.	
	2 Disconnect the fuel pump controller electrical connector CA105.	
	3 Switch the ignition to the RUN position.	
	4 Measure the pulse width modulation voltage between the fuel pump controller electrical conn CA105 pin 10 and GROUND.	ector
	Is there a 1 second 12 volts voltage signal after the ignition is switched on? Yes	
	GO to A6 No	
	GO to A3	
A6: CHECK T	HE CONTINUITY BETWEEN THE FUEL PUMP CONTROLLER AND THE FUEL PUMP	
AO. OFFECK T	1 Measure the resistance between the fuel pump controller connector CA105 pin 10, (R) and fu	اما
	pump electrical connector FT002 pin 2, (KB).	
	Is the resistance less than 0.5 Ohm? Yes	
	INSTALL a new fuel pump controller. CLEAR DTC. TEST the system for normal operation.	
	REPAIR the circuit between the fuel pump controller CA105 pin 10, (R) and the fuel pump ele	ectrical
47 01150147	connector FT002 pin 2, (KB). CLEAR DTC. TEST the system for normal operation.	
A /: CHECK I	HE GROUND SUPPLY AT THE FUEL PUMP CONTROLLER	
——	1 Switch the ignition to the OFF position.	V) a:='
	2 Measure the resistance between the fuel pump controller electrical connector CA105 pin 3, (GROUND.	r) and
	Is the resistance less than 0.5 Ohm?	
	Yes CO to AR	
	GO to A8 No	
	GO to A9	
A8: CHECK T	HE CONTINUITY BETWEEN THE FUEL PUMP AND THE FUEL PUMP CONTROLLER	
	1 Measure the resistance between the fuel pump connector FT002 pin 4, (B) and the fuel pump)
	controller connector CA105 pin 3 (Y).	
	Is the resistance less than 0.5 Ohms?	
	Yes	
	GO to A9.	
	No	
	REPAIR the circuit between the fuel pump FT002 pin 4, (B) and the fuel pump controller CA1	05 pin
A O OLIFOX 7	3, (Y). CLEAR DTC. TEST the system for normal operation.	
A9: CHECK I	HE GROUND SUPPLY TO THE FUEL PUMP CONTROLLER	
	1 Switch the ignition to the OFF position.	
	2 Measure the resistance between the fuel pump controller CA105 pin 2, and GROUND.	
	Is the resistance less than 0.5 Ohm?	
	Yes REPAIR the circuit between the fuel pump controller CA105 pin 2, (B) and GROUND. CLEAR I TEST the system for normal operation.	OTC.
	NO INSTALL a new fuel numb centraller CLEAR DTC. TEST the system for permal energian	
A 10: CLIECY	INSTALL a new fuel pump controller. CLEAR DTC. TEST the system for normal operation.	
A TO: CHECK	THE SWITCHABLE SUPPLY TO THE FUEL PUMP CONTROLLER 1. Switch the ignition to the OFF position	
——	1 Switch the ignition to the OFF position.	
——	2 Disconnect the fuel pump controller electrical connector CA105.	
	Switch the ignition to the RUN position.	
	4 Measure the pulse width modulation frequency between the fuel pump controller electrical	
	connector CA105 pin 1, (N) and GROUND.	
	Is the frequency 250 Hz, 1-50% duty? Yes	
	INSTALL a new fuel pump controller. CLEAR DTC. TEST the system for normal operation.	
1	No	
	GO to A11.	
A11: CHECK	THE CONTINUITY BETWEEN THE FUEL PUMP CONTROLLER AND THE ECM	
	1 Switch the ignition to the OFF position.	
	2 Disconnect the ECM electrical connector EN016.	
	3 Measure the resistance between the fuel pump controller electrical connector CA105 pin 1, (I	N) and
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	,
	the ECM electrical connector EN106 pin 27, (N).	
	Is the resistance less than 0.5 Ohm?	
	Is the resistance less than 0.5 Ohm? Yes	
	Is the resistance less than 0.5 Ohm?	

		REPAIR the circuit between the fuel pump controller electrical connector CA105 pin 1, (N) and the
		ECM electrical connector EN106 pin 27, (N). CLEAR DTC. TEST the system for normal operation.
A12: CHECK	THE	POSITIVE SUPPLY TO THE IGNITION RELAY
	1	Switch the ignition to the OFF position.
	2	Disconnect the central electrical junction box (CEJB) electrical connector IP003.
	3	Switch the ignition to the RUN position.
	4	Measure the voltage between the CEJB electrical connector IP003 pin 1, (GU) and GROUND.
	Is t	the voltage less than 10.5 Volts?
	Yes	· · · · · · · · · · · · · · · · · · ·
	1	GO to A13.
	No	
	<u> </u>	INSTALL a new ignition relay R18. CLEAR DTC. TEST the system for normal operation.
A13: CHECK		POSITIVE SUPPLY TO THE INERTIA SWITCH
	1	Switch the ignition to the OFF position.
	2	Disconnect the inertia switch electrical connector IP132.
	3	Switch the ignition to the RUN position.
	4	Measure the voltage between the inertia switch electrical connector IP132 pin 3, (GO) and GROUND.
	ls t	the voltage less than 10.5 Volts?
	Yes	
	1	GO to A14.
	No	
		<u>GO to A15</u> .
A14: CHECK	THE	INERTIA SWITCH VOLTAGE SUPPLY AT THE IGNITION SWITCH
	1	Switch the ignition to the OFF position.
	2	Remove the ignition switch electrical connector IP018.
	3	Switch the ignition to the RUN position.
	4	Measure the voltage between the ignition switch electrical connector IP018 pin 1 and GROUND.
	ls t	the voltage less than 10.5 Volts?
	Yes	
	l	INSTALL a new ignition switch. CLEAR DTC. TEST the system for normal operation.
	No	
	1	REPAIR the circuit between the ignition switch and the inertia switch. CLEAR DTC. TEST system for
A 1 E . CHECK	뉴	normal operation. CONTINUITY BETWEEN THE CEJB AND THE INERTIA SWITCH
A 15: CHECK		
	1	Switch the ignition switch to the OFF position.
	2	Measure the resistance between the CEJB electrical connector IP003 pin 1, (GU) and the inertia
	10.4	switch electrical connector IP132 pin 1, (GU).
	Yes	the resistance less than 0.5 Ohm?
		INSTALL a new inertia switch. CLEAR DTC. TEST the system for normal operation.
	No	REPAIR the circuit between the CEJB electrical connector IP003 pin 1, (GU) and the inertia switch electrical connector IP132 pin 1, (GU). CLEAR DTC. TEST the system for normal operation.
		occurred connector if 102 pin 1, (00). CLEAR DTC. TEST the system for normal operation.
PINPOINT T	ES.	T B : B1201, P0460—FUEL SENDER CIRCUIT FAILURE
TEST		DETAILS (DESILTS (ACTIONS

PINPOINI	PINPOINT TEST B: B1201, P0460—FUEL SENDER CIRCUIT FAILURE	
TEST	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
B1: CHECK TH	HE VOLTAGE SUPPLY TO THE FUEL TANK ELECTRICAL CONNECTOR	
	1 Switch the ignition to the OFF position.	
	2 Disconnect the fuel tank electrical connector CA005.	
	3 Switch the ignition to the RUN position.	
	4 Measure the voltage at the fuel tank electrical connector between:	
	 CA005 pin 1, (WU) and GROUND CA005 pin 2, (WB) and GROUND 	
	Is the voltage greater than 10.5 Volts? Yes	
	GO to B2. No GO to B3.	
B2: CHECK THE GROUND SUPPLY TO THE FUEL TANK ELECTRICAL CONNECTOR		
	1 Switch the ignition to the OFF position.	
	2 Measure the resistance at the fuel tank electrical connector between CA005 pin 3, (B) and	

1 1	GROUND.
	Is the resistance less than 0.5 Ohms?
	Yes
	GO to B4.
	No
	GO to B5.
B3: CHECK TH	IE VOLTAGE SUPPLY FROM THE INSTRUMENT CLUSTER
	1 Switch the ignition to the OFF position.
	2 Disconnect the instrument cluster electrical connector IP010.
	3 Switch the ignition switch to the RUN position.
	4 Measure the voltage at the instrument cluster connector between:
	IP010 pin 8 and GROUND
	IP010 pin 7 and GROUND
	Is the voltage greater than 10.5 Volts? Yes
	REPAIR the relevant circuit. CLEAR DTC. TEST the system for normal operation.
	No
	INSTALL a new instrument cluster. CLEAR DTC. TEST the system for normal operation.
B4: CHECK TH	IE RESISTANCE AT THE FUEL LEVEL SENSORS
	1 Remove the fuel tank. For additional information, refer to Section 310-01 Fuel Tank and Lines.
	2 Disconnect the fuel sensor electrical connectors:
	• FT002
	• FT003
	11000
	3 Measure the resistance between the sensor electrical connectors:
	• FT002 pin 1 and FT002 pin 3
	• FT003 pin 1 and FT003 pin 3
	Is the resistance between 16 and 160 Ohms? Yes
	REPAIR the relevant circuit. CLEAR DTC. TEST the system for normal operation.
	No
	INSTALL the relevant new fuel level sensor. CLEAR DTC. TEST the system for normal operation.
B5: CHECK TH	IE GROUND SUPPLY FROM THE INSTRUMENT CLUSTER
	1 Disconnect the instrument cluster electrical connector IP010.
	2 Measure the resistance at the instrument cluster between IP010 pin 9 and GROUND.
	Is the resistance less than 0.5 Ohm?
	Yes
	REPAIR the circuit between the instrument cluster IP010 pin 9, (B) and the fuel tank electrical
	connector CA005 pin 3, (B). CLEAR DTC. TEST the system for normal operation.
	No
	INSTALL a new instrument cluster. CLEAR DTC. TEST the system for normal operation.

Fuel System - General Information - Fuel System Pressure Check

General Procedures

• 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. WARNINGS:

Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.

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.

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.

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.

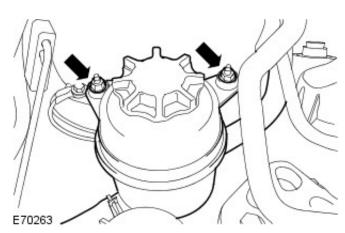
The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.

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.

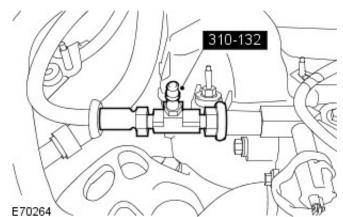
After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.

Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

- 2. Remove the engine cover.
- 3. Detach the power steering fluid reservoir and reposition.



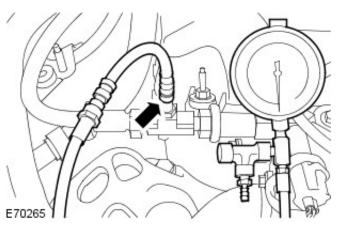
4. Disconnect the fuel rail feed pipe. For additional information, refer to: Spring Lock Couplings



(310-00 Fuel System - General Information, General Procedures).

5. NOTE: Make sure the special tool is fully seated to the fuel pipe connections.

Install the special tool.



6. Install the fuel pressure gauge.

- 7. Connect the battery ground cable.
 For additional information, refer to: <u>Battery Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).
- 8. Carry out the fuel system pressure check. For additional information, refer to: Fuel Charging and Controls 2.0L NA V6 AJV6 (303-04A Fuel Charging and Controls 2.5L NA V6 AJV6/2.0L NA V6 AJV6/3.0L NA V6 AJ27, Diagnosis and Testing).

Fuel System - General Information - Fuel System Pressure Release

General Procedures

Release

1. WARNINGS:

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.

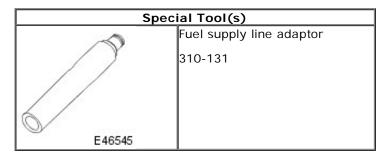
The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be released before attempting any repairs. Failure to follow this instruction may result in personal injury.

Remove the fuel pump fuse.

- 2. Start the engine and allow to idle until the engine stalls.
- Crank the engine for approximately five seconds to make sure the fuel injection supply manifold pressure has been released.
- 4. Install the fuel pump fuse.

Fuel System - General Information - Fuel Tank Draining2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi

General Procedures



1. WARNINGS:

Place the vehicle in a quarantined area and arrange **No Smoking** signs about the vehicle.

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.

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.

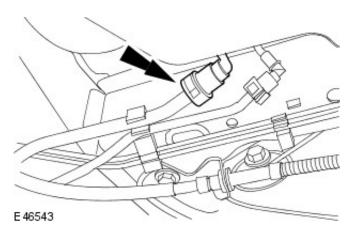
Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

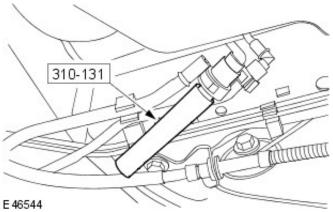
This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

After 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. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

- 2. Raise and support the vehicle.
 For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- 3. Disconnect the supply line.



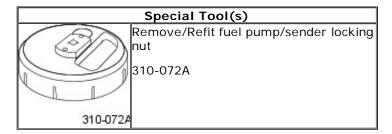


4. Install the special tool to the fuel supply line.

5. Using suitable draining equipment, connect the draining equipment to the special tool and drain the fuel tank. Follow the manufactures operating instructions.

Fuel System - General Information - Fuel Tank Draining2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27

General Procedures



2.0L vehicle

1. WARNINGS:

Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.

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.

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.

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.

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 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. For additional information, refer to Section 414-01 Battery, Mounting and Cables.

- 2. Remove the fuel filler cap.
- **3.** Using suitable draining equipment, drain the fuel tank. Follow the manufactures operating instructions.

2.5L and 3.0L vehicles

1. WARNINGS:

Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.

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.

The fuel tank on the 2.5L and 3.0L vehicles can not be drained in vehicle. Due to the heavy weight, make sure that the fuel tank is securely attached to the lowering equipment when removing.

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.

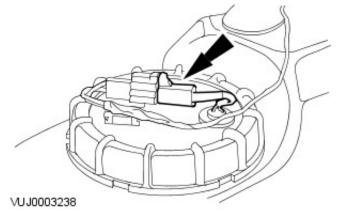
Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

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.

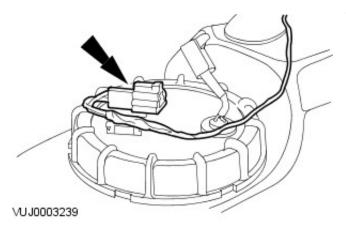
After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.

Disconnect the battery ground cable. For additional information, refer to Section 414-01 Battery, Mounting and Cables.

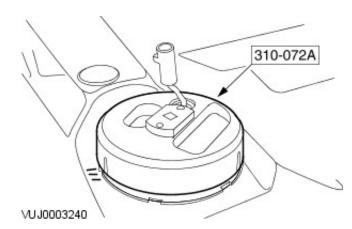
- 2. Remove the fuel tank. For additional information, refer to Section 310-01 Fuel Tank and Lines.
- 3. Disconnect the electrical connector.

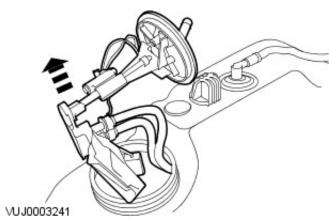


4. Detach the electrical connector.



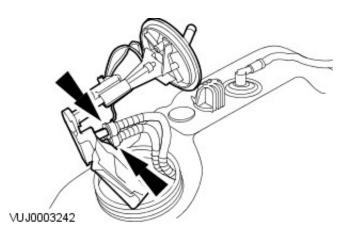
5. Using the special tool, remove the locking ring.



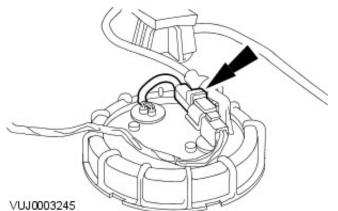


6. CAUTION: Make sure the float or arm are not damaged while removing the fuel transfer pump.

Detach the fuel transfer pump.

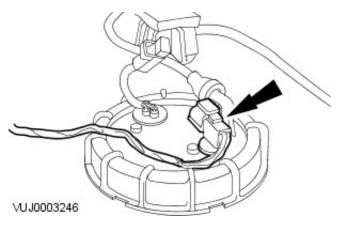


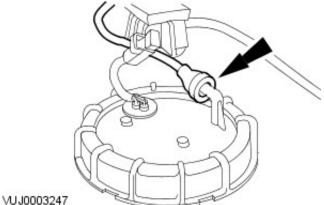
- 7. Remove the fuel transfer pump.
 - Disconnect the cross over pipes
 - Remove and discard the O-ring seal.



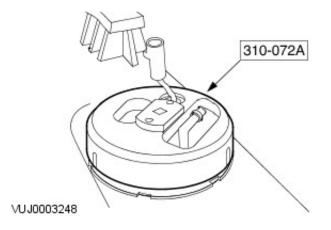
8. Disconnect the electrical connector.

9. Detach the electrical connector.

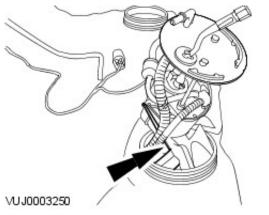




10. Disconnect the fuel supply pipe.



11. Using the special tool, remove the locking ring.

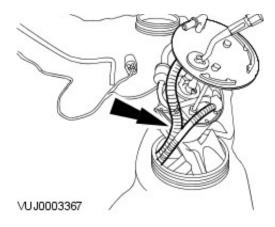


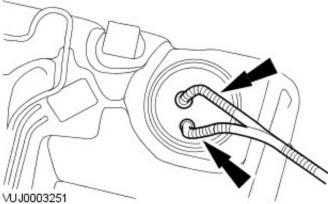
12. CAUTION: Make sure the float or arm are not damaged while removing the fuel pump module.

Guide the fuel pump module through the aperture.

13. CAUTION: Make sure damage to the fuel cross over pipes does not occur.

Guide the cross over pipes through the aperture.





- **14.** Remove the fuel pump module and cross over pipes.
 - Remove and discard the O-ring seal.

15. Using the fuel pump access holes to gain access to the fuel, remove the fuel from the fuel tank using suitable fuel tank draining equipment. Follow the manufactures operating instructions.

Fuel System - General Information - Quick Release Coupling - Push Connect

General Procedures

Disconnect

1. WARNINGS:

Place the vehicle in a quarantined area and arrange "No Smoking/Fuel Vapors" signs about the vehicle.

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.

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.

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.

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.

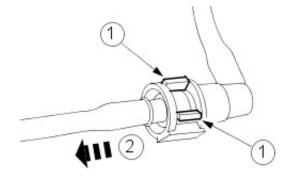
After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.

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.

Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

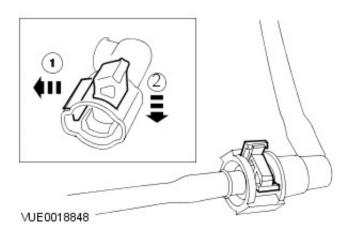
- 2. Relieve the fuel pressure.

 For additional information, refer to: Fuel System Pressure Release.
 - 3. Disconnect the fuel line quick release coupling.
 - Press the fuel line quick release coupling locking tangs.
 - 2. Disconnect the fuel line quick release coupling.

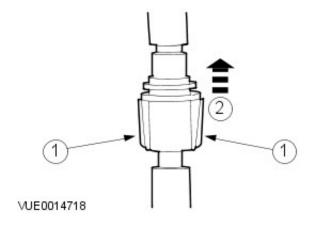


VUE0004022

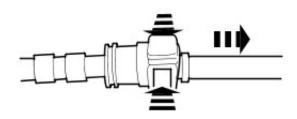
4. Disconnect the fuel line quick release coupling.



- Pull the fuel line quick release coupling locking tang.
- 2. Push the clip through the fuel line quick release coupling to release the fuel line.

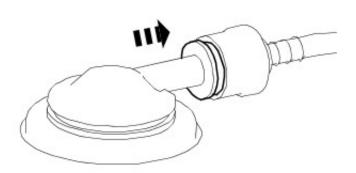


- **5.** Disconnect the fuel line quick release coupling.
 - 1. Press the fuel line quick release coupling locking tangs.
 - 2. Disconnect the fuel line quick release coupling.



- 6. Disconnect the fuel line quick release coupling.
 - Press the fuel line quick release coupling buttons and pull the fuel line to disconnect.

VUE0032292



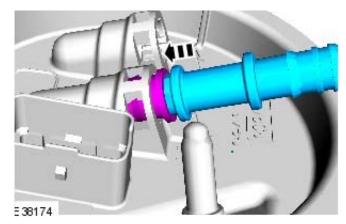
- 7. Release the fuel tank vent line quick release coupling.
 - Press the fuel tank vent line quick release coupling locking release collar.

E38210

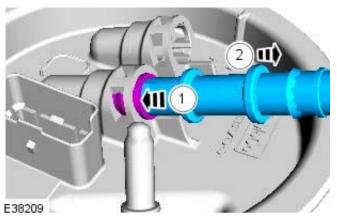
8. Disconnect the fuel tank vent line quick release coupling.



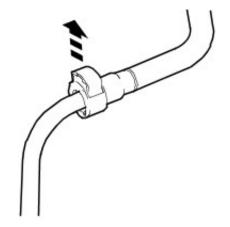
E38211



- 9. Release the fuel line quick release coupling.
 - Press the fuel line quick release coupling locking release collar.



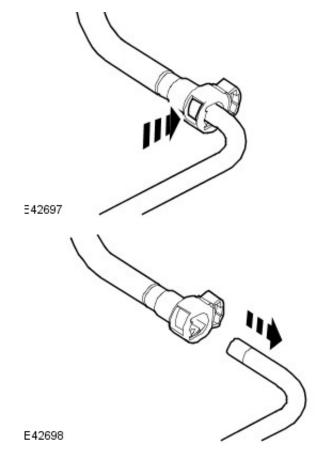
10. Disconnect the fuel line quick release coupling.



11. Using a suitable <u>Flat-bladed screwdriver</u> release the fuel line quick release coupling secondary locking tang.

E42696

- **12.** Operate the fuel line quick release coupling primary locking tang.
 - Push the fuel line quick release coupling primary locking tang into from the fuel line quick release coupling.



13. Disconnect the fuel line from the fuel line quick release coupling.

Connect

• WARNINGS:

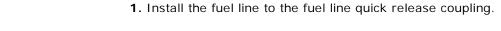
E42701

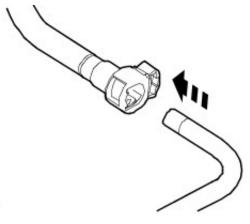
Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

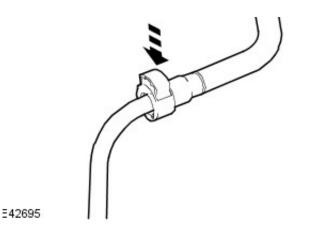
Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

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 carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.







2. CAUTION: Make sure the quick release coupling primary locking tang clicks into place when installing.

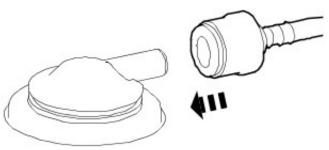
Insert the fuel line quick release coupling secondary locking tang into the fuel line quick release coupling.



3. CAUTION: After installation, to make sure that the fuel line is fully seated, pull on the line.

Install the fuel line quick release coupling.





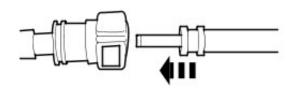
4. CAUTION: After installation, to make sure that the vent line is fully seated, pull on the line.

Install the fuel tank vent line quick release coupling.



5. CAUTION: Make sure the fuel line clicks into place when installing the line. To make sure that the fuel line is fully seated, pull on the line.

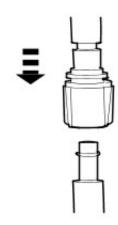
Install the fuel line quick release coupling.



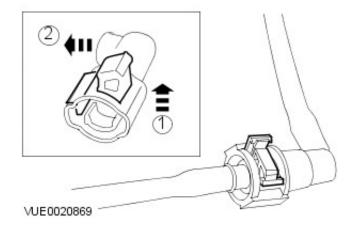
VUE0032293

6. NOTE: Make sure the collar on the fuel line is inserted fully into the fuel line quick release coupling.

Install the fuel line quick release coupling.



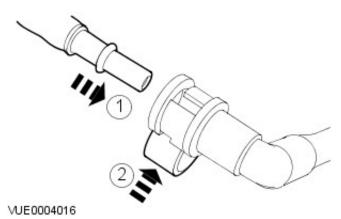
VUE0014720



7. NOTE: Make sure the collar on the fuel line is inserted fully into the fuel line quick release coupling before the locking tang is locked.

Install the fuel line quick release coupling.

- 1. Install the fuel line quick release coupling locking tang.
- 2. Rotate the fuel line quick release coupling locking tang into position.



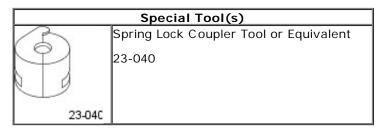
8. NOTE: Make sure the collar on the fuel line is inserted fully into the fuel line quick release coupling before the locking tang is locked.

Install the fuel line quick release coupling.

- 1. Install the fuel line quick release coupling.
- 2. Press the fuel line quick release coupling locking tang into position.

Fuel System - General Information - Spring Lock Couplings

General Procedures



Disconnection

1. WARNINGS:

Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.

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.

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.

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.

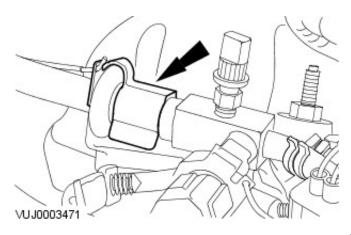
The fuel system remains pressurized for a long time after the ignition is switched off. The fuel pressure must be relieved before attempting any repairs. Failure to follow these instructions may result in personal injury.

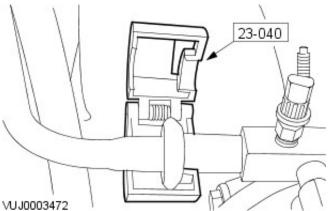
This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

After carrying out repairs, the fuel system must be checked visually for leaks. Failure to follow these instructions may result in personal injury.

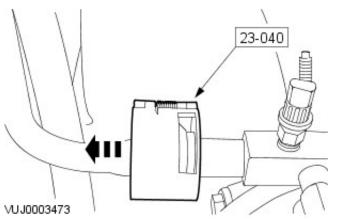
Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

- Relieve the fuel pressure.
 For additional information, refer to: <u>Fuel System Pressure Release</u> (310-00 Fuel System General Information, General Procedures).
- **3.** Remove the safety clip from the spring lock coupling.

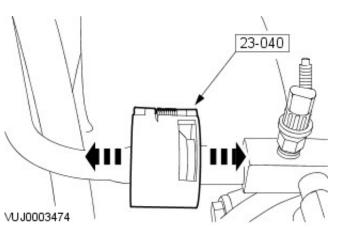




- **4.** Install the spring lock coupling tool.
 - Place suitable absorbent material below the pipe to collect fuel spillage

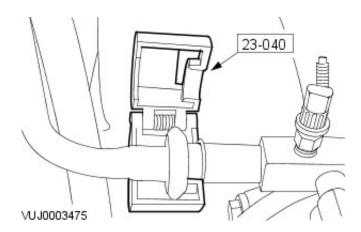


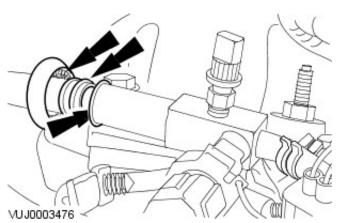
5. Close and push the spring lock coupling tool into the open side of the cage.



6. Separate the fitting.

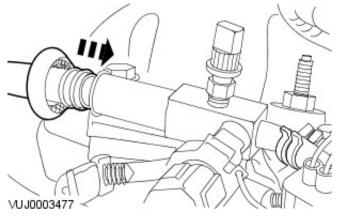
7. Remove the spring lock coupling tool.



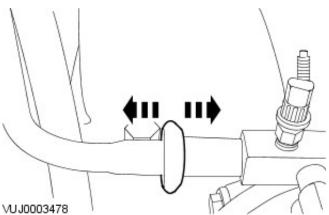


Connection

1. Inspect and clean both coupling ends. Install new O-rings and garter springs if necessary.

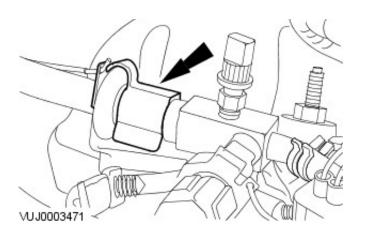


2. Fit the male fitting into the female end and push until the garter spring snaps over the flared end of the male fitting.



3. Make sure the coupling is engaged by pulling on the lines.

- **4.** Install the safety clip.
 - Remove the absorbent material below the pipe

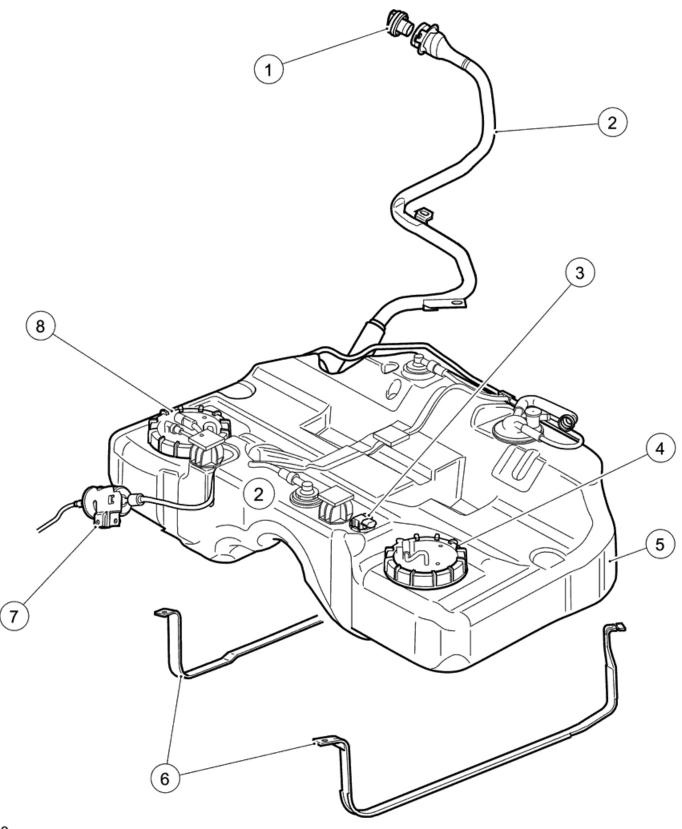


Fuel Tank and Lines -

Torque Specifications

Description	Nm	lb-ft	lb-in
Fuel tank support strap retaining bolts	25	18	-
Fuel pump module locking ring - vehicles with 2.5L or 3.0L engine (non federal market vehicles)	70	52	-
Fuel pump module locking ring - vehicles with 2.5L or 3.0L engine (federal market vehicles)	120	89	-
Fuel pump module locking ring - vehicles with 2.0L or diesel engine	85	63	-
Transfer pump locking ring (non federal market vehicles)	70	52	-
Transfer pump locking ring (federal market vehicles)	120	89	-
Fuel tank filler pipe to fuel tank hose retaining clip	3	-	27
Fuel tank filler pipe retaining nuts	4	-	35
Fuel filter bracket retaining nuts - vehicles with 2.0L, 2.5L or 3.0L engine	4	-	35
Axle assembly rear retaining bolt	110	81	-
Axle assembly front retaining bolts	90	66	-

Fuel Tank and Lines



Item Description

1	Fuel filler cap
2	Fuel tank filler pipe
3	Fuel tank pressure sensor (USA market only)
4	Fuel transfer pump module
5	Fuel tank
6	Fuel tank support straps
7	Fuel filter
8	Fuel pump module

Fuel Tank

The fuel tank is of a plastic construction and is retained to the vehicle by two steel support straps. The fuel tank support straps are mounted onto the underside of the vehicle chassis towards the rear of the fuel tank and bolt to the vehicle towards the front of the fuel tank. Fuel tank ventilation is achieved through two fuel tank roll-over valves into an evaporative emission canister which absorbs fuel tank vapor. The fuel tank roll-over valves are integral to the fuel tank and will prevent fuel loss from the fuel tank if the vehicle becomes inverted. A fuel level valve is also incorporated into the fuel tank to prevent fuel overfilling, this allows the fuel tank to maintain adequate space for expansion of the fuel. For further information, refer to <<303-13>>. USA market vehicles only are fitted with leak check diagnostics which detect leaks in the fuel vapor system using signals from a vapor pressure sensor mounted on the fuel tank.

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 in front of the fuel tank, on the right-hand side of the floor plan.

Fuel Tank Filler Pipe

The fuel tank filler pipe is of a steel construction and is retained to the vehicle by means of three retaining nuts, one retaining the filler neck to the body and two nuts retaining the filler pipe to the vehicle chassis. The fuel tank filler pipe is fitted with a screw turn 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. The shutoff switch is located behind the right-hand cowl side trim panel.

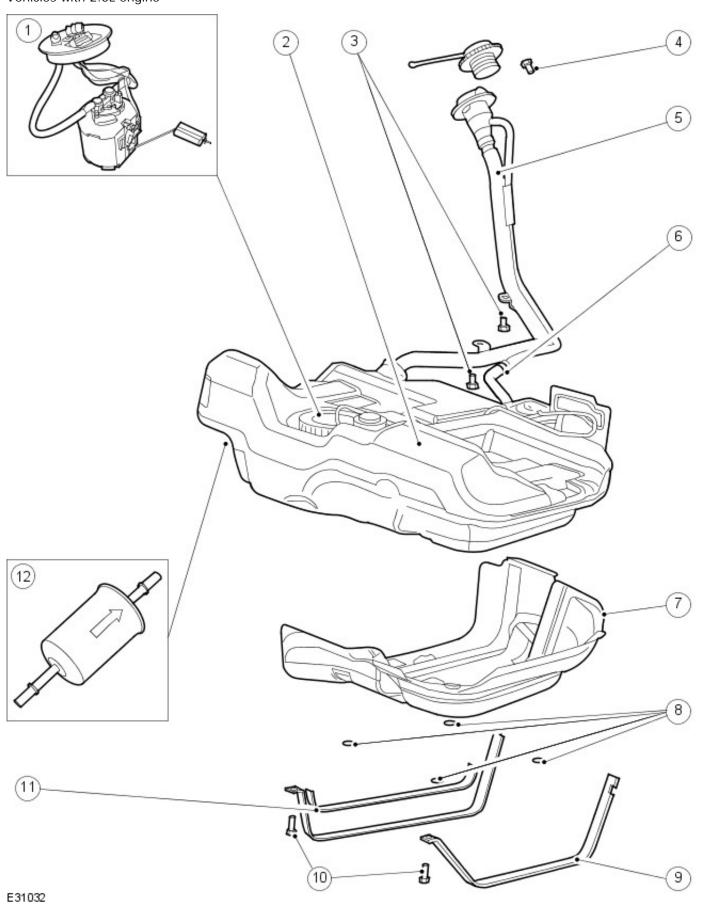
Fuel pumps

The fuel pump is an electric turbine pump which is located inside the fuel tank. The fuel pump module features an integral fuel tank sender unit and is fixed to the fuel tank by means of a locking ring.

As the fuel tank is of a saddle design, a fuel pump module and a transfer pump module are incorporated. The fuel pump module, located in the right-hand saddle, transfers high pressure fuel (low flow) to the left-hand side of the fuel tank. The transfer pump module, located in the left-hand saddle, then transfers low pressure fuel (high flow) into the right-hand fuel pump.

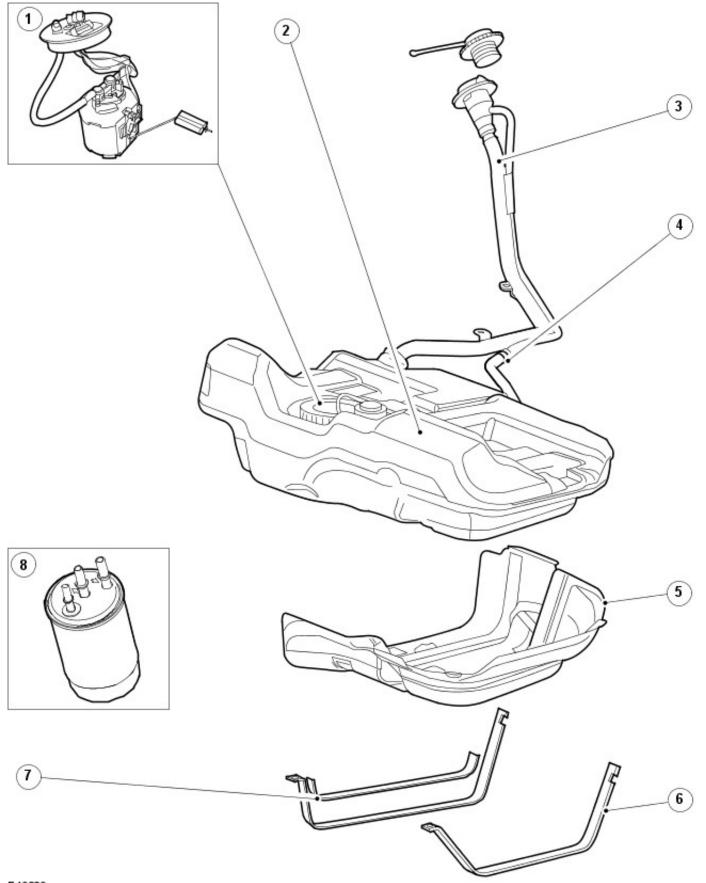
Fuel Tank and Lines - Fuel Tank and Lines Description and Operation

Vehicles with 2.0L engine



Item	Part Number	Description
1	-	Fuel pump module
2	-	Fuel tank
3	-	Lower fuel tank filler pipe retaining nut
4	-	Upper fuel tank filler pipe retaining nut
5	-	Fuel tank filler pipe
6	-	Fuel tank filler pipe breather hose
7	-	Fuel tank heat shield
8	-	Fuel tank heat shield retaining clips
9	-	Fuel tank support straps
10	-	Fuel tank support straps retaining bolts
11	-	Fuel tank support strap insulator
12	-	Fuel filter

Vehicles with diesel engine



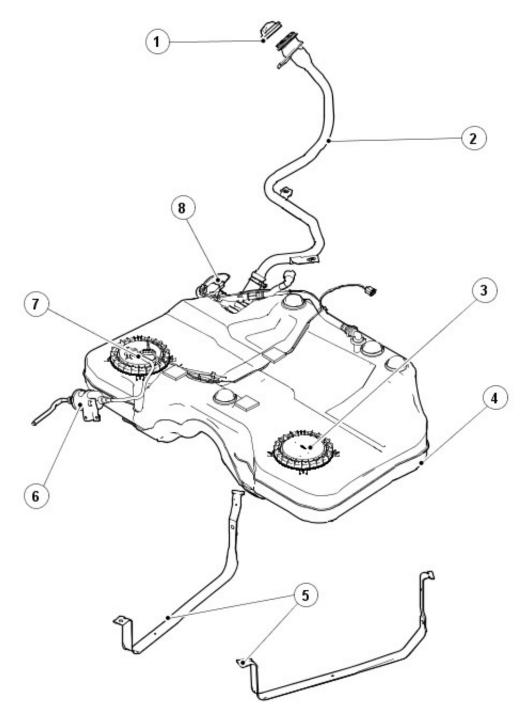
E49029

Item	Part Number	Description
1	-	Fuel level sensor
2	-	Fuel tank
3	-	Fuel tank filler pipe

4	_	Fuel tank filler pipe breather hose
5	-	Fuel tank heat shield
6	-	Fuel tank support straps
7	-	Fuel tank support strap insulator
8	-	Fuel filter

Vehicles with 2.5L or 3.0L engine

• NOTE: Federal market vehicle shown, non federal market vehicle similar.



E49051

Item	Part Number	Description
1	_	Fuel filler cap
2	_	Fuel tank filler pipe
3	_	Fuel transfer pump
4	_	Fuel tank
5	_	Fuel tank support straps
6	_	Fuel filter
7	_	Fuel pump module

Fuel Tank

The fuel tank is of a plastic construction and is retained to the vehicle by two steel support straps. The fuel tank support straps are mounted onto the underside of the vehicle chassis towards the rear of the fuel tank and retained by bolts to the vehicle towards the front of the fuel tank. Fuel tank ventilation is achieved through two fuel tank roll-over valves into an evaporative emission canister which absorbs fuel tank vapor. The fuel tank roll-over valves are integral to the fuel tank and will prevent fuel loss from the fuel tank if the vehicle becomes inverted. A fuel level valve is also incorporated into the fuel tank to prevent fuel overfilling, this allows the fuel tank to maintain adequate space for expansion of the fuel.

For additional information, refer to: <u>Evaporative Emissions</u> (303-13 Evaporative Emissions, Description and Operation).

Federal market vehicles only are fitted with leak check diagnostics which detect leaks in the fuel vapor system using signals from a vapor pressure sensor mounted in the evaporative emission canister purge vapor line.

Fuel Filter - Vehicles with 2.0L, 2.5L or 3.0L 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 in front of the fuel tank, on the right-hand side of the floor pan.

Fuel Filter - Vehicles with diesel engine

The fuel filter is located at the top of the bulkhead on the right-hand side of the vehicle. The fuel filter incorporates a fuel pre heat function, which utilizes a ball valve operated by a bimetallic strip. When the temperature is less than 15°C (59°F), the ball valve allows the warm fuel in the fuel return system to pass back through the fuel filter to the fuel pump to improve cold running. Once the temperature exceeds 31°C (88°F) a bimetallic strip closes the ball valve in the fuel filter and all of the fuel in the fuel return system is directed back to the fuel tank.

Fuel Tank Filler Pipe

The fuel tank filler pipe is of a steel construction and is retained to the vehicle by means of three retaining nuts, one retaining the filler neck to the body and two nuts retaining the filler pipe to the vehicle chassis. The fuel tank filler pipe is fitted with a screw turn 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. The shutoff switch is located behind the right-hand cowl side trim panel.

Fuel pump - Vehicles with 2.0L, 2.5L or 3.0L engine

On all wheel drive vehicles, the fuel is pumped by a transfer pump and an electric turbine pump. Both pumps are fitted with fuel level sender units which are serviced separately. On two wheel drive vehicles, the fuel is pumped by a single electric turbine pump which is fitted with a separately serviced fuel level sender. The fuel pumps are fixed to the fuel tank by means of a locking ring and seal, which can only be accessed by removing the fuel tank.

On 2.0L vehicles the fuel tank is of a conventional design, a fuel pump module with mechanical pressure regulator and a local returnless circuit through the fuel filter is incorporated.

On 2.5L and 3.0L vehicles the fuel tank is of a saddle design, incorporating a fuel pump module and a transfer pump module. The transfer pump module (jet pump), located in the left-hand saddle, transfers low pressure fuel (high flow) to the right-hand saddle of the tank. The fuel pump module located in the right-hand saddle, supplies high pressure fuel (low flow) to the fuel pump on the engine.

Fuel Pump - Vehicles with diesel engine

For additional information, refer to: <u>Fuel Charging and Controls</u> (303-04B Fuel Charging and Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Description and Operation).

Fuel Tank and Lines - Fuel Tank and Lines

Diagnosis and Testing

Inspection and verification

- 1. 1. Verify the customer concern.
- 2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.

Visual inspection, vehicles with petrol engines

Mechanical	Electrical
 Fuel line(s) Push connect fittings Fuel leak(s) Fuel filler cap Fuel tank filler pipe Fuel filter Fuel tank Fuel tank Fuel tank roll-over valve 	 Inertia fuel shutoff (IFS) switch Electrical connector(s) Damaged or corroded wiring harness Fuel pump module Fuel transfer pump Fuse(s)

Visual inspection, vehicles with diesel engines

Mechanical	Electrical
Fuel line(s)	Inertia fuel shutoff (IFS) switch
Fuel leak(s)	
Fuel filler cap	
Fuel tank filler pipe	
Fuel filter	
Fuel tank	
Fuel tank roll-over valve	

• WARNINGS:

Vehicles with diesel engine only. 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.

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.

Vehicles with diesel engine only. The fuel system remains pressurized after the ignition is switched off. If communications with a suitable tester (able to read fuel rail pressure and temperature) can be established, wait until the tester indicates pressure of less than 20 bar (290 lb/in²), and temperature of less than 35° C (95° F) before working on the system. If communications with a suitable tester cannot be established, the fuel system must **NOT** be worked on for a period of fifteen minutes following the ignition being switched off. Failure to follow this instruction 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 this instruction may result in personal injury.

Vehicles with diesel engine only. 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.

If fuel is taken internally, **DO NOT** induce vomiting. Seek immediate medical attention. Failure to follow this instruction may result in personal injury.

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.

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.

• CAUTIONS:

Vehicles with diesel engine only. 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.

Vehicles with diesel engine only. 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.

Vehicles with diesel engine only. 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.

Vehicles with diesel engine only. 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.

Vehicles with diesel engine only. Do not interchange fuel injectors. Improper injector installation can cause misfires, poor running and severe engine damage.

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.

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.

Vehicles with diesel engine only. Make sure that clean, non-plated tools are used. Clean tools using a new brush that will not lose it's bristles and fresh cleaning fluid prior to starting work on the vehicle. Failure to follow this instruction may result in damage to the vehicle.

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.

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: **Vehicles with diesel engine only.** As well as carrying out its normal function the glow plug indicator also acts as an engine check lamp which will flash continuously when a hard diagnostic trouble code (DTC) is detected by the ECM. Soft DTCs are also stored by the ECM but will only be identified if the system is checked for DTCs using the Jaguar approved diagnostic system.
- NOTE: If a DTC is detected, all DTCs must be cleared after the concern is repaired. Failure to clear all DTCs may cause driveability concerns.
- NOTE: **Vehicles with diesel engine only.** If the fuel level in the fuel tank drops below approximately four liters, rough running will occur. This is to signal to the driver that the vehicle requires refuelling in order to prevent the fuel system from running dry.
- 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 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.
 - 3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

Symptom chart (vehicles with petrol engine only)

Symptom	Possible source	Action
Engine cranks,	IFS switch	Check that the IFS switch is in the 'down' position, check the fuel
but does not		level and condition, GO to Pinpoint Test F. Check for DTCs indicating
start	 ECM malfunction 	fuel pump inactive. For ECM tests,
		REFER to: Electronic Engine Controls - 2.0L NA V6 - AJV6 (303-14A
		Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing) /
		Electronic Engine Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27,
		VIN Range: E96603->J28492 (303-14A Electronic Engine Controls -
		2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis
- 100		and Testing).
Difficult to start		Check the fuel level and condition, GO to Pinpoint Test <u>F.</u> For evaporative emission system tests,
	Purge valveFuel pump	REFER to: Evaporative Emissions - 2.0L NA V6 - AJV6 (303-13
	Engine coolant	Evaporative Emissions, Diagnosis and Testing).
	temperature (ECT)	and/or
	sensor	REFER to: Evaporative Emissions - 2.5L NA V6 - AJV6/3.0L NA V6 -
	Ignition system Pattery (sharging)	AJ27 (303-13 Evaporative Emissions, Diagnosis and Testing).
	 Battery/charging system 	Check for fuel pump DTCs, refer to DTC table. For engine coolant temperature sensor tests,
	3y3tem	REFER to: Electronic Engine Controls - 2.0L NA V6 - AJV6 (303-14A
		Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 -
		AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
		and/or
		REFER to: <u>Electronic Engine Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492</u> (303-14A Electronic Engine
		Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27,
		Diagnosis and Testing).
		For ignition system tests,
		REFER to: Engine Ignition - 2.0L NA V6 - AJV6 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27,
		Diagnosis and Testing).
		and/or
		REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27
		(303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L
		NA V6 - AJ27, Diagnosis and Testing). For charging system tests,
		REFER to: <u>Battery</u> (414-01 Battery, Mounting and Cables, Diagnosis
		and Testing).
		and/or
		REFER to: Generator (414-02 Generator and Regulator, Diagnosis
Difficult to start	. Injector look	and Testing).
Difficult to start hot	Injector leakFuel temperature	For fuel injector tests, REFER to: <u>Fuel Charging and Controls - 2.0L NA V6 - AJV6</u> (303-04A
	sensor	Fuel Charging and Controls - 2.5L NA V6 - AJV6/2.0L NA V6 -
	IAT sensor	AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
	MAF sensor	and/or
	 Engine coolant temperature (ECT) 	REFER to: Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-04A Fuel Charging and
	sensor	Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27,
	Purge valve	Diagnosis and Testing).
	 Fuel pump 	For sensor tests,
	Ignition system	REFER to: Electronic Engine Controls - 2.0L NA V6 - AJV6 (303-14A
	 EGR valve stuck open 	Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
		and/or
		REFER to: Electronic Engine Controls - 2.5L NA V6 - AJV6/3.0L NA V6
		- AJ27, VIN Range: E96603->J28492 (303-14A Electronic Engine
		Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27,
		Diagnosis and Testing). For evaporative emission system tests,
		REFER to: Evaporative Emissions - 2.0L NA V6 - AJV6 (303-13
		Evaporative Emissions, Diagnosis and Testing).
		and/or
		REFER to: Evaporative Emissions - 2.5L NA V6 - AJV6/3.0L NA V6 -
		AJ27 (303-13 Evaporative Emissions, Diagnosis and Testing). Check for fuel pump DTCs, refer to DTC table. For ignition system
		To hear for facility bros, refer to bro table. For ignition system
		·

		tests, REFER to: Engine Ignition - 2.0L NA V6 - AJV6 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing). and/or REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing). For EGR system tests, REFER to: Engine Emission Control (303-08 Engine Emission Control - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Diagnosis and Testing).
Engine stalls soon after start	 Low/contaminated fuel Breather system disconnected/restricted ECM relay MAF sensor Engine coolant temperature (ECT) sensor Ignition system Fuel rail pressure sensor Air filter restricted Air leakage 	Check the fuel level and condition, GO to Pinpoint Test F. For breather system tests, REFER to: Engine Emission Control (303-08 Engine Emission Control - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Diagnosis and Testing). For ECM relaly and sensor tests, REFER to: Electronic Engine Controls - 2.0L NA V6 - AJV6 (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing). and/or REFER to: Electronic Engine Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing). For ignition system tests, REFER to: Engine Ignition - 2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing). and/or REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing). and/or REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing). and/or REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-04A Fuel Charging and Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-04A Fuel Charging an
Engine hesitates/poor acceleration/pre- detonation at high engine speeds	 Low/contaminated fuel Restricted pedal travel (carpet, etc) Fuel pump No fuel pump commands Throttle sensors APP sensor HO2 sensors Engine control module (ECM) Ignition system EGR valve stuck open Air leakage Fuel starvation 	Check the fire level and condition, GO to Pinpoint Test F. Check the accelerator pedal for full travel. Check for fuel pump and related DTCs. For sensor and ECM tests, REFER to: Electronic Engine Controls - 2.0L NA V6 - AJV6 (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing). and/or REFER to: Electronic Engine Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing). For ignition system tests, REFER to: Engine Ignition - 2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing). and/or REFER to: Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing). and/or REFER to: Engine Ignition - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-07A Engine Ignition - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJV
Difficulty in fuelling vehicle	incorrect filling procedure ◆ Service station	Refer to owner's handbook. Check if filling difficulty is consistent, or intermittent. Check for obstructions/damage at filler neck. Check the vent system (this will vary dependent on market). Check for DTCs indicating an evaporative emissions system valve malfunction. For evaporative emissions system tests,

	 Obstructions in/damage to filler neck/pipe Blockage in vent system Canister close valve blockage Purge valve malfunction Water ingress into carbon canister Snow or ice pack around the canister outlet or filter 	REFER to: Evaporative Emissions - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-13 Evaporative Emissions, Diagnosis and Testing). Check the condition of the carbon canister.
Fuel smells in/around the vehicle	fitted Leaks from joints Leaks from module seals Leak from inlet/outlet pipes at purge valve	Check that the filler cap is correctly fitted and secure (the filler cap must be tightened to at least three 'clicks'). Inspect the pipes and joints for evidence of leakage, using an HC detector. Inspect the fuel tank for evidence indicating a leak from the module seals. If such evidence is found, the fuel tank should be removed to check the seals. Check for DTCs indicating an evaporative emissions system purge valve malfunction. For evaporative emissions system tests, REFER to: Evaporative Emissions - 2.5L NA V6 - AJV6/3.0L NA V6 - AJZ7 (303-13 Evaporative Emissions, Diagnosis and Testing).
Engine stops with fuel indicated on the gauge	malfunction (2.5/3.0 L only) • Level sensor malfunction • Transfer pipes split/kinked (2.5/3.0 L only) • Blocked transfer pump module jet (2.5/3.0 L only)	Check for DTCs indicating a failure to transfer fuel, refer to the DTC index. For fuel transfer test, GO to Pinpoint Test C. Check the internal transfer pipes for damage/kinking. Check the 2mm hole as detailed in bulletin A310-01. Check for DTCs indicating a non fuel-related fault. For a full list of DTCs, REFER to: Electronic Engine Controls - 2.0L NA V6 - AJV6 (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing) / Electronic Engine Controls - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27, VIN Range: E96603->J28492 (303-14A Electronic Engine Controls - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/2.0L NA V6 - AJV6/2.0L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27, Diagnosis and Testing).
Fuel pump noise	Fuel pump module malfunction	For a basic noise test, GO to Pinpoint Test <u>D.</u>

Symptom chart (vehicles with diesel engine only)

Symptom	Possible source	Action
Engine cranks, but does not start	 IFS switch Low/contaminated fuel Blocked fuel filter 	Check that the inertia switch has not tripped. Check fuel level/condition. For fuel system tests, REFER to: Fuel Charging and Controls (303-04B Fuel Charging and Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Diagnosis and Testing).
Difficult to start	fuel Blocked fuel filter Low pressure circuit fault	Check fuel level/condition. For fuel system tests, REFER to: Fuel Charging and Controls (303-04B Fuel Charging and Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq- TDCi, Diagnosis and Testing). Check the injector programming using the Jaguar approved diagnostic system.
Rough idle	fuel Blocked fuel filter Fuel metering valve	Check fuel level/condition. For fuel system tests, REFER to: Fuel Charging and Controls (303-04B Fuel Charging and Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Diagnosis and Testing). Check the injector programming using the Jaguar approved diagnostic

	Low pressure circuit faultInjector(s) failure/programming	system.
Lack of power when accelerating	 Air intake circuit fault Catalyst blocked Low fuel pressure EGR valve fault Turbocharger fault 	For fuel system tests, REFER to: Fuel Charging and Controls (303-04B Fuel Charging and Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Diagnosis and Testing). For exhaust system tests, REFER to: Exhaust System (309-00 Exhaust System, Diagnosis and Testing). For EGR tests, REFER to: Engine Emission Control (303-08 Engine Emission Control - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Diagnosis and Testing). For turbocharger tests, REFER to: Turbocharger (303-04C Fuel Charging and Controls - Turbocharger, Diagnosis and Testing).
Engine stops/stalls	 Low/contaminated fuel Low pressure circuit fault Fuel metering valve blocked/contaminated Fuel metering valve leak High pressure leak 	Check fuel level/condition. For fuel system tests, REFER to: Fuel Charging and Controls (303-04B Fuel Charging and Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi, Diagnosis and Testing).
Engine judders	 Low/contaminated fuel Low pressure circuit fault Fuel metering valve blocked/contaminated Fuel metering valve leak High pressure leak Pump fault 	Check fuel level/condition. For fuel system tests, REFER to: Fuel Charging and Controls (303-04B Fuel Charging and Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq- TDCi, Diagnosis and Testing).
Excessive fuel consumption	 Low pressure circuit fault Fuel metering valve leak Fuel temperature sensor leak High pressure leak Injector(s) failure/programming 	Check fuel level/condition. For fuel system tests, REFER to: Fuel Charging and Controls (303-04B Fuel Charging and Controls - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq- TDCi, Diagnosis and Testing).

DTC index (for a full list of DTCs for both petrol and diesel engines, refer to sections 303.14 A or B)

DTC	Condition	Possible source	Action
	Evaporative emissions system, incorrect purge flow	leaking or disconnectedCanister vent restricted	For evaporative emissions system tests, REFER to: Evaporative Emissions - 2.0L NA V6 - AJV6 (303-13 Evaporative Emissions, Diagnosis and Testing) / Evaporative Emissions - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-13 Evaporative Emissions, Diagnosis and Testing).
	Evaporative emissions system canister purge valve circuit; open circuit	 Canister purge valve to ECM drive circuit; open circuit, high resistance 	For evaporative emissions system tests, REFER to: Evaporative Emissions - 2.0L NA V6 - AJV6 (303-13 Evaporative Emissions, Diagnosis and Testing) / Evaporative Emissions - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-13 Evaporative Emissions, Diagnosis and

1 1		ı	Testing)
	Evaporative emissions system canister purge valve circuit; short circuit	 Canister purge valve to ECM drive circuit; short circuit to ground Canister purge valve failure 	For evaporative emissions system tests, REFER to: Evaporative Emissions - 2.0L NA V6 - AJV6 (303-13 Evaporative Emissions, Diagnosis and Testing) / Evaporative Emissions - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (303-13 Evaporative Emissions, Diagnosis and Testing).
	Fuel level sensor range/performance	 Fuel level sensor 	Refer to technical bulletin A310-02. For fuel level sensor circuit tests, GO to Pinpoint Test <u>A.</u>
	No fuel pump commands received by ECM	 ECM to fuel pump control module and/or feedback circuits: open circuit, short circuit, high resistance Fuel pump control module failure 	_
	Fuel pump not activated when requested by the ECM	 ECM to fuel pump control module and/or feedback circuits: open circuit, short circuit, high resistance Fuel pump control module failure 	_
	Fuel pump feedback circuit high/low voltage	 ECM to fuel pump control module and/or feedback circuits: open circuit, short circuit, high resistance Fuel pump control module failure 	For fuel pump module circuit tests, GO to Pinpoint Test <u>B.</u>
	Fuel level sensor 1 circuit fault		For fuel level sensor circuit tests, GO to Pinpoint Test <u>A.</u>
	Fuel level sensor 1 circuit fault		For fuel level sensor circuit tests, GO to Pinpoint Test <u>A.</u>
	Fuel level sensor 2 circuit fault		For fuel level sensor circuit tests, GO to Pinpoint Test <u>A.</u>
	Fuel level sensor 2 circuit fault		For fuel level sensor circuit tests, GO to Pinpoint Test <u>A.</u>
B2879	Failure to transfer fuel		Carry out fuel transfer test, GO to Pinpoint Test <u>C.</u> Refer to bulletin A310-01.

Pinpoint tests

PINPOINT TEST A: P0460, B1202, B1204, B2627, B2628: FUEL LEVEL SENSORS • NOTE: In the event of a fault with the level sensors, only the relevant module should be replaced. There is no requirement to replace the fuel tank. TEST CONDITIONS A1: CHECK THE FUEL LEVEL SENSOR GROUND CIRCUITS 1 Disconnect the fuel level sensor connector(s): Vehicles with 2.5/3.0 L engine, ROW; • FT02 and FT03. Vehicles with 2.5/3.0 L engine, USA;

• CA415.

Vehicles with 2.0/2.2 L diesel engines;

Vehicles with 2.0 L petrol engine;

	◆ CA415.
	2 Turn the ignition switch to the ON position.
	3 Measure the resistance between:
	Vehicles with 2.5/3.0 L engine, ROW;
	FT02, pin 03 (B) and GROUND.FT03, pin 03 (B) and GROUND.
	Vehicles with 2.5/3.0 L engine, USA;
	FT06, pin 02 (B) and GROUND.FT06, pin 04 (B) and GROUND.
	Vehicles with 2.0 L petrol;
	• CA415, pin 04 (B) and GROUND.
	Vehicles with 2.0 /2.2 L diesel engines;
	CA415, pin 04 (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
A 2. CLIECK T	GO to A2.
AZ: CHECK I	HE FUEL LEVEL SENSOR SIGNAL CIRCUIT FOR HIGH RESISTANCE 1 Disconnect the Instrument cluster connector, IP10.
	2 Measure the resistance between IP10, pin 07 (WU) and:
	Vehicles with 2.5/3.0 L engine, ROW;
	• FT02, pin 01 (WU).
	Vehicles with 2.5/3.0 L engine, USA;
	• FT06, pin 03 (WU).
	Vehicles with 2.0 L petrol;
	• CA415, pin 02 (WB).
	Vehicles with 2.0/2.2 L diesel engines;
	• CA415, pin 02 (WB).
	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 A3.
A3: CHECK T	HE FUEL LEVEL SENSOR SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND 1 Measure the resistance between;
	Vehicles with 2.5/3.0 L engine, ROW;
	• FT02, pin 01 (WU) and GROUND.
	Vehicles with 2.5/3.0 L engine, USA;
	FT06, pin 03 (WU) and GROUND.
	Vehicles with 2.0 L petrol engine;
	CA415, pin 02 (WB) and GROUND.
	Vehicles with 2.0/2.2 L diesel engines;
	CA415, pin 02 (WB) and GROUND.
	Is the resistance less than 10,000 ohms?
l	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 A4. A4: CHECK THE FUEL LEVEL SENSOR (2) SIGNAL CIRCUIT FOR HIGH RESISTANCE NOTE: Vehicles with 2.0 L petrol or 2.0/2.2 L diesel engines are only fitted with one sensor. Measure the resistance between IP10 pin 08 (WB) and: Vehicles with 2.5/3.0 L engine, ROW; • FT03, pin 01 (WB). Vehicles with 2.5/3.0 L engine, USA; • F06, pin 05 (WB). 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 A6. A5: CHECK THE FUEL LEVEL SENSOR (2) SIGNAL CIRCUIT FOR SHORT CIRCUIT TO GROUND Measure the resistance between; Vehicles with 2.5/3.0 L engine, ROW; FT03, pin 01 (WB) and GROUND. Vehicles with 2.5/3.0 L engine, USA; • F06, pin 05 (WB) 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 A6. A6: CHECK THE FUEL LEVEL SENSOR RANGE Measure the resistance between: Vehicles with 2.5/3.0 L engine, ROW; Pins 01 and 03 of the fuel pump module at FT02. Vehicles with 2.5/3.0 L engine, USA; Pins 03 and 04 of the fuel pump module. Vehicles with 2.0 L petrol engine; • Pins 02 and 04 of the fuel pump module/level sensor. Vehicles with 2.0/2.2 L diesel engine; Pins 02 and 04 of the fuel pump module/level sensor. Is the resistance between 11 ohms and 165 ohms? Yes Vehicles with 2.0 L petrol or 2.0/2.2 L diesel engines, Reflash the engine control module using the Jaguar approved diagnostic system, Vehicles with 2.5/3.0 L engine GO to A7. No INSTALL a new fuel level sensor. REFER to: Fuel Level Sensor - 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi (310-01 Fuel Tank and Lines, Removal and Installation). INSTALL a new fuel pump module, REFER to: Fuel Pump Module - 2.0L NA V6 - AJV6 (310-01 Fuel Tank and Lines, Removal and Installation) / Fuel Pump Module - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (310-01 Fuel Tank and Lines, Removal and Installation) / Fuel Pump Module - 2.0L NA V6 - AJV6 (310-01 Fuel Tank and Lines, Removal and Installation).

A7: CHECK TI	HE FUEL LEVEL SENSOR (2) WANGE for normal operation.
 NOTE: Vehic 	les with 2.0 L petrol or 2.0/2.2 L diesel engines are only fitted with one sensor.
	1 Measure the resistance between:
	Vehicles with 2.5/3.0 L engine, ROW;
	Pins 01 and 03 of the fuel level sensor at FT03.
	Vehicles with 2.5/3.0 L engine, USA;
	Pins 02 and 05 of the fuel level sensor.
	Is the resistance between 11 ohms and 165 ohms?
	Yes Reflash the engine control module using the Jaguar approved diagnostic system. No INSTALL a new fuel transfer pump module, REFER to: Fuel Transfer Pump (310-01 Fuel Tank and Lines, Removal and Installation). CLEAR the DTC, test the system for normal operation.

	CLEAR the DTC, test the system for normal operation.	
PINPOINT TEST B: P1234, P1236, P1338: FUEL PUMP CONTROL MODULE		
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS	
B1: CHECK TH	HE POWER SUPPLY TO THE FUEL PUMP MODULE	
	1 Disconnect the fuel pump module connector, CA105.	
	2 Turn the ignition switch to the ON position.	
	3 Measure the voltage between CA105, pin 09 (NG) and GROUND.	
	Is the voltage greater than 10 volts?	
	Yes	
	GO to B2.	
	No REPAIR the circuit between CA105 pin 09 (NG) and the ignition switch. This circuit includes the	
	passenger junction box (fuse 17), ignition relay, and the inertia switch. For additional information,	
	refer to the wiring diagrams. CLEAR the DTC, test the system for normal operation.	
B2: CHECK TH	HE GROUND CIRCUIT TO THE FUEL PUMP MODULE	
	1 Measure the resistance between CA105, 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 CO to B2	
D2. CLIECK TI	GO to B3. HE SIGNAL GROUND CIRCUIT TO THE FUEL PUMP MODULE	
	rest would be necessary if there were an EMC (Electro Magnetic Compatibility) issue with the vehicle.	
• NOTE. THIS I	1 Turn the ignition switch to the CRANK position.	
	2 Measure the resistance between CA105, pin 04 (BG) and GROUND.	
	Is the resistance greater than 5 ohms?	
	Yes	
	REPAIR the high resistance circuit. This circuit includes the ECM. For additional information, refer	
	to the wiring diagrams. CLEAR the DTC, test the system for normal operation.	
	0	
	No	
	GO to B4.	
B4: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE FUEL PUMP	
	1 Reconnect the fuel pump module connector, CA105.	
	2 Disconnect the fuel pump connector:	
	Vehicles with 2.5/3.0 L engine, ROW;	
	Vernoles With 2.3/3.0 L engine, NOW,	
	• FT02.	
	Vehicles with 2.5/3.0 L engine, USA;	
	Vernetes with 2.5/3.0 L engine, USA,	
	• FT06.	
	3 Turn the ignition switch to the ON position.	
	4 Measure the voltage between:	
•	1	

1 1	Vehicles with 2.5/3.0 L engine, ROW;
	• FT02, pin 02 (R) and GROUND.
	Vehicles with 2.5/3.0 L engine, USA;
	• FT06, pin 06 (R) and GROUND.
	Is the voltage less than 10 volts?
	Yes
	INSTALL a new fuel pump module. REFER to: <u>Fuel Pump Module - 2.0L NA V6 - AJV6</u> (310-01 Fuel Tank and Lines, Removal and
	Installation) /
	Fuel Pump Module - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (310-01 Fuel Tank and Lines, Removal
	and Installation).
	CLEAR the DTC, test the system for normal operation.
	No CO to DE
DE: CHECK TH	GO to B5. HE SIGNAL GROUND CIRCUIT FOR CONTINUITY
BS. CHECK IF	Disconnect the fuel pump module connector, CA105.
	2 Measure the resistance between CA105, pin 03 (Y) and:
	Vehicles with 2.5/3.0 L engine, ROW;
	• FT02, pin 04 (Y).
	Vehicles with 2.5/3.0 L engine, USA;
	• FT06, pin 01 (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
	INSTALL a new fuel pump module.
	REFER to: Fuel Pump Module - 2.0L NA V6 - AJV6 (310-01 Fuel Tank and Lines, Removal and
	Installation) /
	Fuel Pump Module - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (310-01 Fuel Tank and Lines, Removal
	and Installation).
	CLEAR the DTC, test the system for normal operation.

PINPOINT TEST C : FUEL TRANSFER TEST

MARNING: Use extreme care when carrying out the fuel transfer test not to endanger other road users or infringe any road traffic regulations. Ideally, this should be carried out away from public roads.

• NOTE: Make sure the fuel tank is between one quarter and half full as indicated by the fuel gauge before beginning this test.

• NOTE: If the 'F2****' value in step 6 of this test is '255', suspect an open or short circuit through the level

concor	Г	value in step 6 of this test is 255, suspect an open of short circuit through the level
TEST CONDITIONS		DETAILS/RESULTS/ACTIONS
C1: CHECK TH	ΗE '	F2****' VALUES
	1	Turn the ignition switch to the OFF position.
	2	Depress the trip button on the indicator stalk and turn the ignition switch to the ON position.
	3	Continue to hold the trip button in until 'TEST' appears on the instrument cluster display.
	4	Release the trip button.
	5	Press the trip button repeatedly until 'F2****' is displayed (this is the sender value of the transfer fuel pump module).
	6	Start the engine and drive the vehicle in a tight right-hand circle to transfer fuel from the fuel pump module side of the fuel tank to the transfer pump module side.
	7	Monitor the 'F2****' value (with assistance, if necessary), and once the value is greater than 60, bring the vehicle to rest.
	8	Monitor the 'F2****' value over approximately 3 minutes.
	Do	es the 'F2****' value decrease steadily?
	Yes	
		If the 'F2***' value decreases steadily, this indicates that fuel is transferring.
	No	If the 'F2****' value does not decrease, or increases, return to the symptom chart and follow the actions listed for 'engine stops with fuel indicated on the gauge'.

PINPOINT TEST D : FUEL PUMP NOISE (VEHICLES WITH 2.5/3.0L ENGINES ONLY)	
 NOTE: A cert 	ain amount of 'swishing' from the fuel tank is normal as fuel is transferred around the fuel modules.
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
D1: VERIFY THAT THE FUEL PUMP IS THE SOURCE OF THE NOISE	
	1 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 Start the engine and allow to idle.
	4 While the engine is idling, disconnect the main tank harness and monitor the noise (the engine will
	continue to run briefly to allow this test to be performed).
	Does the noise continue?
	Yes
	The noise is not caused by the fuel pumps. Clear any DTCs, recheck the system.
	No
	INSTALL a new fuel pump module,
	REFER to: Fuel Pump Module - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (310-01 Fuel Tank and Lines,
	Removal and Installation).
	CLEAR any DTCs, test the system for normal operation.

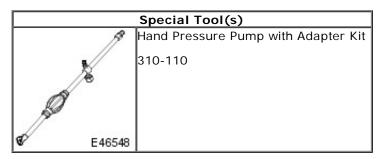
PINPOINT TE	ST E : FUEL STARVATION
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
E1: CHECK FU	EL PRESSURE
• NOTE: Petrol	l vehicles only.
	WARNING: This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal njury.
	NOTE: Vehicles built to Vin: D86654. 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 fuel rail.
a C F	NOTE: Vehicles built from Vin: D86655 . 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. REFER to: Fuel System Pressure Check (310-00 Fuel System - General Information, General Procedures).
	NOTE: The fuel pressure should rise to nominal pressure (320 - 380 Kpa [46 - 55 lb/in²]) within 2 seconds of starting.
	1 Install the fuel pressure gauge to the fuel Schraeder valve.
	2 Apply the parking brake.
	Make sure the gear selector is in the NEUTRAL position for vehicles fitted with manual transmission, PARK position for vehicles fitted with automatic transmission.
	4 Start the engine.
	Make sure there are no leaks from the gauge connections
	5 Hold the engine at a steady light throttle and monitor the fuel pressure.
	Does the fuel pressure decrease as the throttle is held steady? Yes
	CHECK the following; Visual inspections from this sectionSender function, GO to Pinpoint Test A. If this fails to resolve the issue, install a new fuel pump module, REFER to: Fuel Pump Module - 2.0L NA V6 - AJV6 (310-01 Fuel Tank and Lines, Removal and Installation) /
	<u>Fuel Pump Module - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27</u> (310-01 Fuel Tank and Lines, Removal and Installation). and transfer pump,
	REFER to: Fuel Transfer Pump (310-01 Fuel Tank and Lines, Removal and Installation). Clean and flush any heavy contamination from the fuel tank. Clear any DTCs, test the system for normal operation.
	No CHECK the ECM for DTCs indicating another cause for the problem.

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PINPENNT T	EST F : FUEL CONTAMINATION DETAILS/RESULTS/ACTIONS
F1: CHECK FO	OR THE PRESENCE OF CONTAMINANTS IN THE FUEL
	1 Extract approximately 1 liter of fuel from the rail into a suitable clear container.
	2 Allow to settle for 2 minutes and check for separation of the fuel into layers.
	Is there visible separation of the fuel? Yes REMOVE the fuel tank. Drain off the fuel. Clean and flush the fuel tank and lines. Refill with fresh fuel. Clear any DTCs, test the system for normal operation. No CHECK the ECM for DTCs indicating another cause for the problem.

Fuel Tank and Lines - Fuel Filter 2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi

Removal and Installation



Removal

• WARNINGS:

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 can 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.

• CAUTIONS:

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.

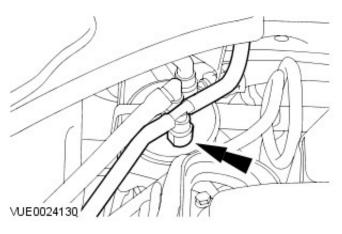
Always carry out the cleaning process before carrying out any repairs to the fuel injection system components. Failure to follow these instructions may result in foreign matter ingress to the fuel injection system.

1. CAUTION: The generator must be protected from contamination. Failure to follow this instruction may cause premature failure of the generator.

Protect the generator with lint-free material to prevent contamination.

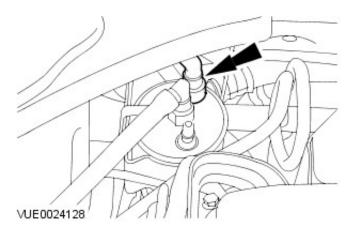
2. Disconnect the fuel pump to fuel filter fuel return line from the fuel filter.

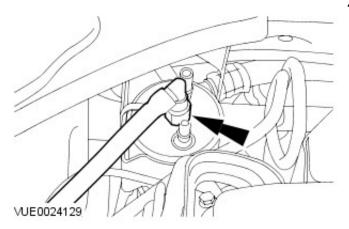
For additional information, refer to: <u>Quick Release</u> <u>Coupling - Push Connect</u> (310-00 Fuel System - General Information, General Procedures).



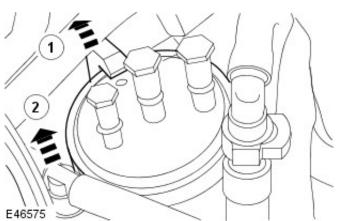
3. Disconnect the fuel tank to fuel filter fuel supply line from the fuel filter.

For additional information, refer to: <u>Quick Release</u> <u>Coupling - Push Connect</u> (310-00 Fuel System - General Information, General Procedures).





- Disconnect the fuel filter to fuel pump fuel supply line from the fuel filter.
 For additional information, refer to: <u>Quick Release</u> <u>Coupling - Push Connect</u> (310-00 Fuel System - General
 - Install a blanking plug to the fuel pump fuel supply line.

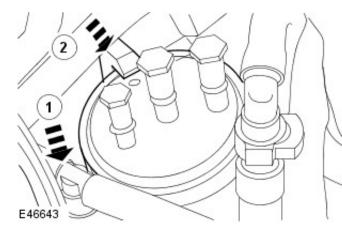


- 5. Remove the fuel filter
 - 1. Detach the fuel filter retaining clip.
 - 2. Remove the fuel filter.

Information, General Procedures).

Installation





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 can 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.

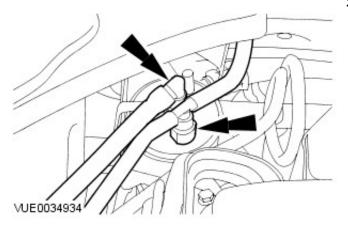
CAUTION: Diesel fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is therefore essential that absolute cleanliness is observed

when working with these components. Always fit blanking plugs to any open orifices or lines.

• NOTE: Make sure that the fuel filter is fully installed into the fuel filter retaining bracket.

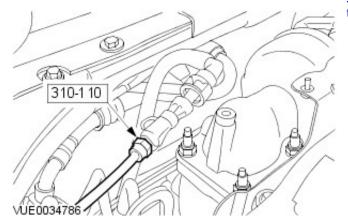
Install the fuel filter.

- 1. Install the fuel filter.
- 2. Attach the fuel filter retaining clip.
- 2. Connect the fuel pump to fuel filter fuel supply and fuel return lines to the fuel filter.
 For additional information, refer to: Quick Release
 Coupling Push Connect (310-00 Fuel System General Information, General Procedures).
 - · Remove the blanking plugs.



3. NOTE: Make sure that the hand primer arrow indicating the fuel flow is pointing towards the fuel filter.

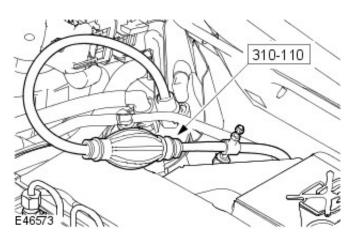
Install the hand pressure pump special tool between the fuel filter and the fuel filter fuel supply line.



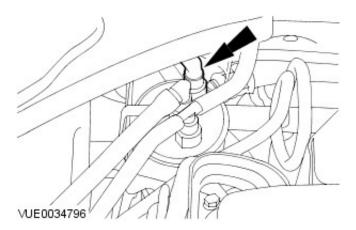
4. NOTE: Once the hand pressure pump special tool bellow has become firm hold the pressure for five minutes.

Operate the hand pressure pump special tool until fuel starts to flow through the fuel filter and the special tool becomes firm.

5. Remove the hand pressure pump special tool.



Connect the fuel tank to fuel filter fuel supply line to the fuel filter.



For additional information, refer to: <u>Quick Release</u> <u>Coupling - Push Connect</u> (310-00 Fuel System - General Information, General Procedures).

7. Remove the lint-free material from the generator.

Fuel Tank and Lines - Fuel Filter 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27

Removal and Installation

Removal

1. WARNINGS:

Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.

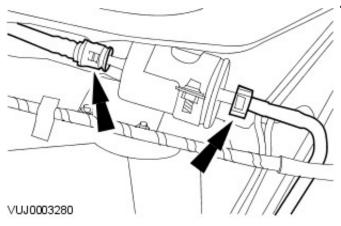
Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

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.

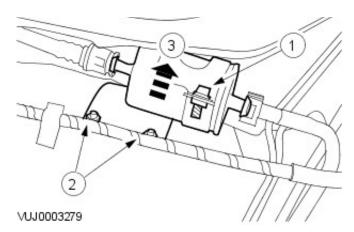
This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

Disconnect the battery ground cable. For additional information, refer to Section 414-01 Battery, Mounting and Cables.

- 2. De-pressurize the fuel system. For additional information, refer to Section_310-00 Fuel System General Information.
- **3.** Raise and support the vehicle. For additional information, refer to Section_100-02 Jacking and Lifting.
- **4.** Disconnect the fuel line quick release couplings. For additional information, refer to Section 310-00 Fuel System General Information.



- **5.** Remove the fuel filter and bracket assembly.
 - 1. Loosen the fuel filter bracket retaining bolt.
 - 2. Remove the retaining bracket nuts.
 - 3. Remove the fuel filter and bracket assembly.



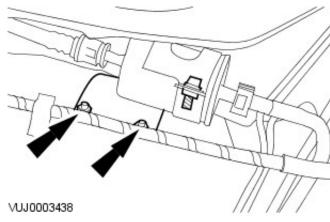


6. Remove the fuel filter.

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Installation





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.

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.

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: Observe the direction of the flow arrow.

To install, reverse the removal procedure.

• Tighten to 4 Nm.

Fuel Tank and Lines - Fuel Level Sender 2.0L NA V6 - AJV6

Removal and Installation

Removal

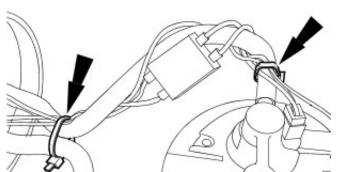
• WARNINGS:

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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.

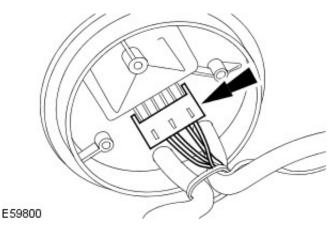
Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

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.



- Remove the fuel pump module.
 For additional information, refer to: <u>Fuel Pump Module 2.0L NA V6 AJV6</u> (310-01 Fuel Tank and Lines, Removal and Installation).
- **2.** NOTE: Note the position of the tie straps securing the harness to the fuel pipes.

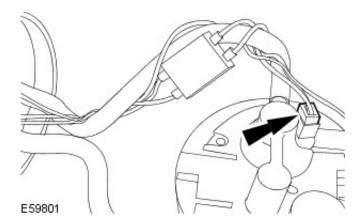
Remove the tie straps.

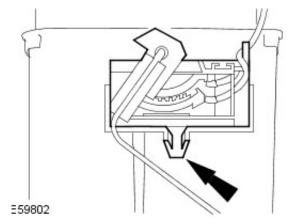


3. NOTE: Vehicle with single electrical connector shown, vehicles with multiple electrical connectors similar.

Disconnect the electrical connector from the fuel pump module flange.

4. Disconnect the electrical connector from the fuel pump.





5. Remove the fuel level sender.

Installation

• WARNINGS:

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.

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.

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 float or arm are not damaged while installing the fuel pump module.

1. To install, reverse the removal procedure.

Fuel Tank and Lines - Fuel Level Sender 2.2 L Durator q-TDCi (110kW/150PS) - Puma/2.0 L Durator q-TDCi

Removal and Installation

Removal

• WARNINGS:

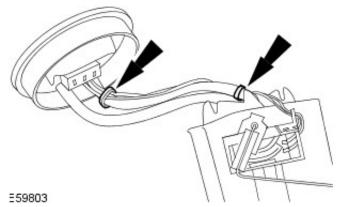
Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

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.

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.

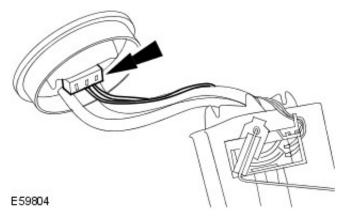
- Remove the fuel level sensor.
 For additional information, refer to: <u>Fuel Level Sensor 2.2L Duratorg-TDCi (110kW/150PS) Puma/2.0L Duratorg-TDCi (310-01 Fuel Tank and Lines, Removal and Installation).</u>
- **2.** NOTE: Note the position of the tie straps securing the harness to the fuel pipes.

Remove the tie straps.

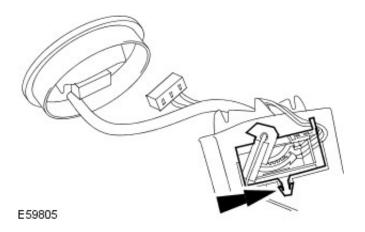


3. NOTE: Vehicle with single electrical connector shown, vehicles with multiple electrical connectors similar.

Disconnect the electrical connector from the fuel level sensor flange.



4. Remove the fuel level sender.



Installation

• WARNINGS:

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.

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.

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 Tank and Lines - Fuel Level Sender LH2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Removal and Installation

Removal

• WARNINGS:

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.

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.

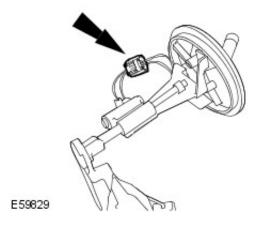
This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

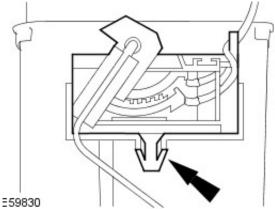
1. NOTE: All vehicles.

Remove the transfer pump. For additional information, refer to: <u>Fuel Transfer Pump</u> (310-01 Fuel Tank and Lines, Removal and Installation).

2. NOTE: Non federal market vehicles only.

Disconnect the fuel level sender electrical connector.



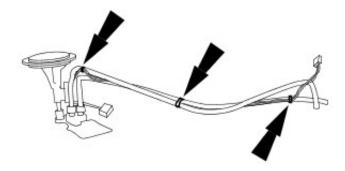


3. NOTE: Non federal market vehicles only.

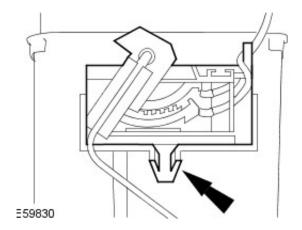
Remove the fuel level sender.

- 4. NOTE: Federal market vehicles only.
- NOTE: Note the position of the tie straps securing the harness to the fuel pipes.

Remove the tie straps.



E60159



5. NOTE: Federal market vehicles only.

Remove the fuel level sender and harness.

Installation

• WARNINGS:

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.

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.

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 Tank and Lines - Fuel Level Sender RH2.5L NA V6 - AJV6/3.0L NA V6 -**AJ27**

Removal and Installation

Removal

• WARNINGS:

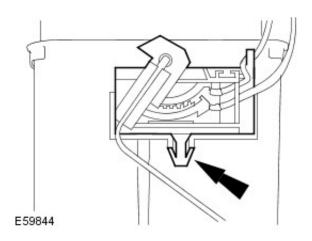
Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

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

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 - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (310-01 Fuel Tank and
- 2. Disconnect the fuel level sender electrical connector.



3. Remove the fuel level sender.

Installation

• WARNINGS:

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.

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

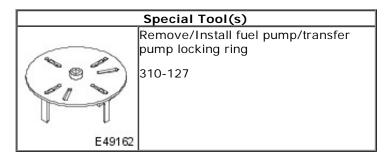
injury.

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 Tank and Lines - Fuel Level Sensor2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi

Removal and Installation



Removal

• WARNINGS:

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.

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.

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.

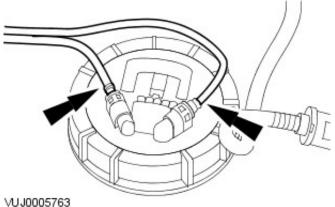
- 1. Remove the fuel tank.

 For additional information, refer to: Fuel Tank 2.2L

 Duratorq-TDCi (110kW/150PS) Puma/2.0L Duratorq-TDCi

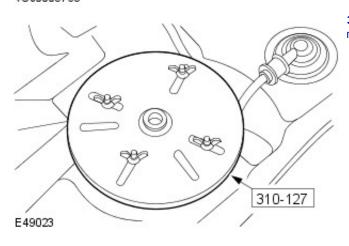
 (310-01 Fuel Tank and Lines, Removal and Installation).
- Disconnect the fuel lines.
 For additional information, refer to: <u>Quick Release Coupling</u>

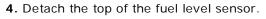
 Push Connect (310-00 Fuel System General Information, General Procedures).

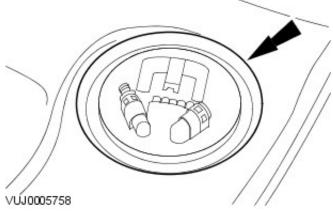


3. NOTE: Note the orientation of the fuel level sensor before removal.

Using the special tool, remove the locking ring.



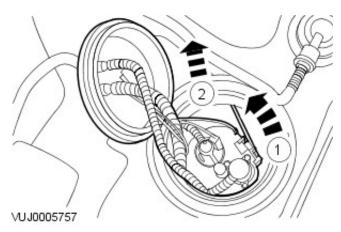




5. CAUTION: Make sure the float or arm are not damaged while removing the fuel level sensor.

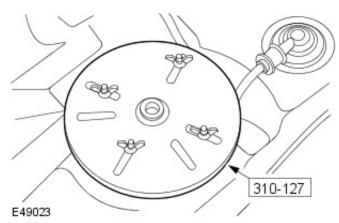
Remove the fuel level sensor.

- 1. Rotate the lower part of the fuel level sensor.
- 2. Remove the fuel level sensor.
- Remove and discard the seal.



Installation

1. WARNINGS:



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.

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.

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 float or arm are not damaged while installing the fuel level sensor.

- NOTE: Install a new seal.
- NOTE: Make sure the fuel level sensor is correctly orientated.

To install, reverse the removal procedure.

• Tighten to 85 Nm.

Fuel Pump Module 19.45.08

Special Service tools



310-072A

Remove/Install fuel pump/transfer pump locking ring 310-072A

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.

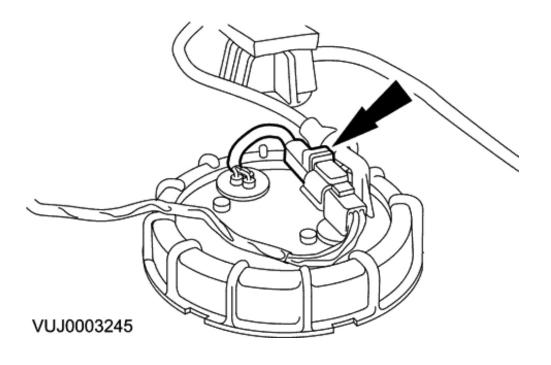


WARNING:

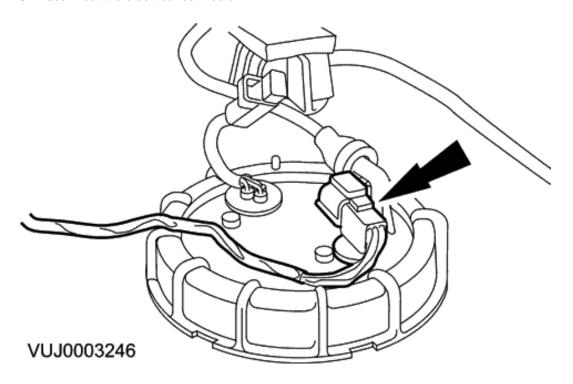
THIS PROCEDURE INVOLVES FUEL HANDLING. BE PREPARED FOR FUEL SPILLAGE AT ALL TIMES AND ALWAYS OBSERVE FUEL HANDLING PRECAUTIONS. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

Disconnect the battery ground cable. For additional information, refer to <<414-01>>.

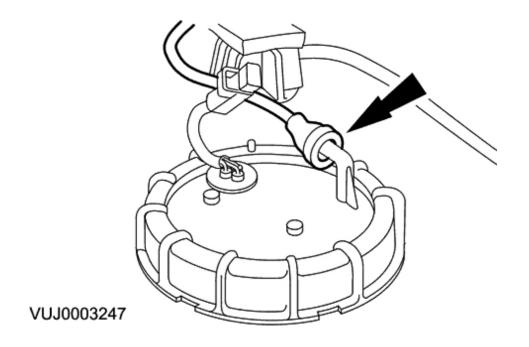
2. Remove the fuel transfer pump. For additional information, refer to << Fuel Transfer Pump>>.



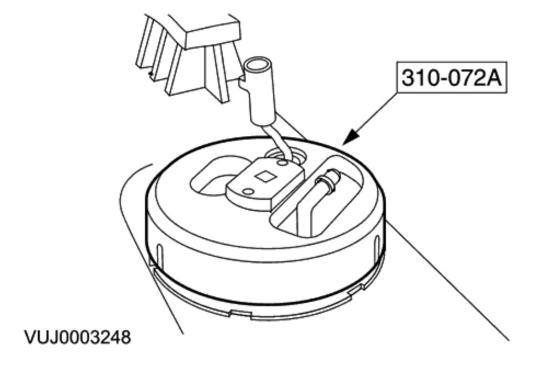
3. Disconnect the electrical connector.



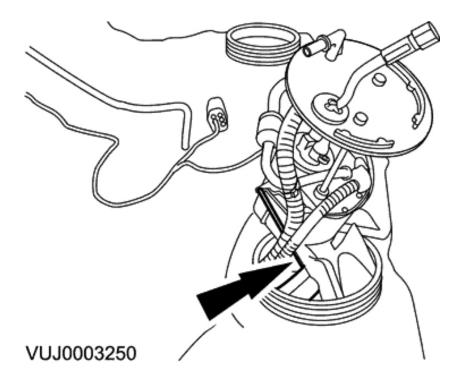
4. Detach the electrical connector.



5. Disconnect the fuel supply pipe.



6. Using the special tool, remove the locking ring.



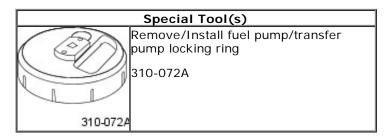
CAUTION:

Make sure the float or arm are not damaged while removing the fuel pump module.

Guide the fuel pump module through the aperture.

Fuel Tank and Lines - Fuel Pump Module 2.0L NA V6 - AJV6

Removal and Installation



Removal

• WARNINGS:

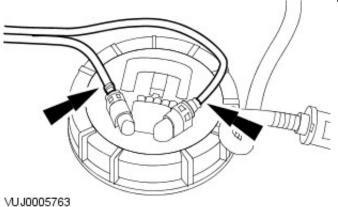
Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

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.

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.

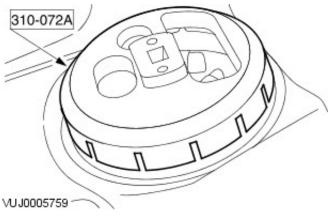
- 1. Remove the fuel tank.

 For additional information, refer to: Fuel Tank 2.0L NA V6 AJV6 (310-01 Fuel Tank and Lines, Removal and Installation).
- 2. Disconnect the fuel lines.
 For additional information, refer to: Quick Release Coupling
 Push Connect (310-00 Fuel System General Information,
 General Procedures).

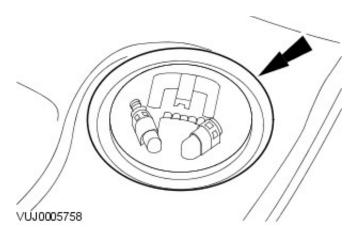


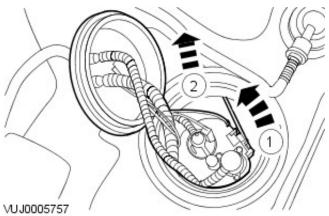
3. NOTE: Note the orientation of the fuel pump module before removal.

Using the special tool, remove the locking ring.



4. Detach the top of the fuel pump module.

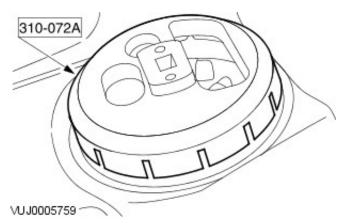




5. CAUTION: Make sure the float or arm are not damaged while removing the fuel pump module.

Remove the fuel pump module.

- 1. Rotate the lower part of the fuel pump module.
- 2. Remove the fuel pump module.
- · Remove and discard the seal.



Installation

1. WARNINGS:

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.

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.

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 float or arm are not damaged while installing the fuel pump module.

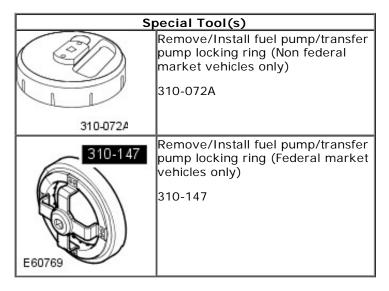
• NOTE: Make sure the fuel pump module is correctly orientated.

To install, reverse the removal procedure.

- Install a new seal.
- Tighten to 85 Nm.

Fuel Tank and Lines - Fuel Pump Module 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Removal and Installation



Removal

• WARNINGS:



Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.

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.

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.

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.

After carrying out repairs, the fuel system must be checked visually for leaks. 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.

If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.

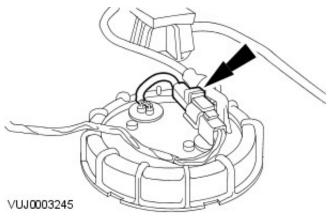
Mash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

- NOTE: Non federal market vehicles, refer to steps 1 to 8.
- NOTE: Federal market vehicles, refer to steps 9 to 19.
 - 1. NOTE: Non federal market vehicles only.

Remove the fuel transfer pump. For additional information, refer to: <u>Fuel Transfer Pump</u> (310-01 Fuel Tank and Lines, Removal and Installation).

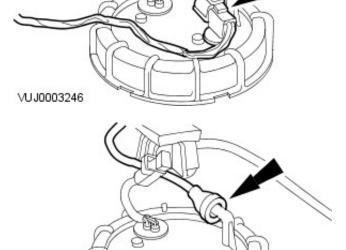
2. NOTE: Non federal market vehicles only.





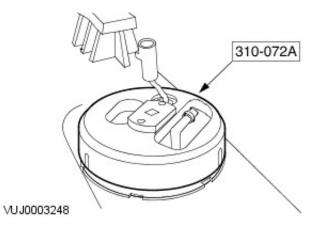
3. NOTE: Non federal market vehicles only.

Detach the electrical connector.



4. NOTE: Non federal market vehicles only.

Disconnect the fuel supply pipe. For additional information, refer to: <u>Quick Release Coupling - Push Connect</u> (310-00 Fuel System - General Information, General Procedures).



VUJ0003247

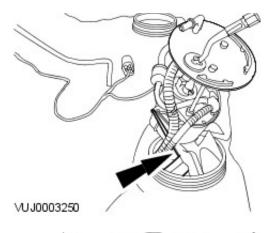
- 5. NOTE: Non federal market vehicles only.
- NOTE: Note the orientation of the fuel pump module before removal.

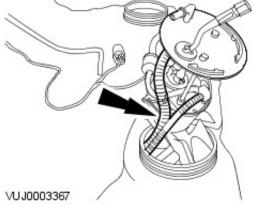
Using the special tool, remove the locking ring.

6. CAUTION: Make sure the float or arm are not damaged while removing the fuel pump module.

• NOTE: Non federal market vehicles only.

Guide the fuel pump module through the aperture.



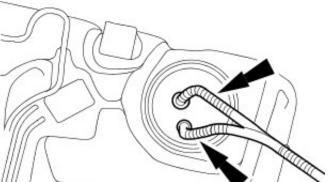


VUJ0003251

7. CAUTION: Make sure damage to the fuel crossover pipes does not occur.

• NOTE: Non federal market vehicles only.

Guide the crossover pipes through the aperture.



8. NOTE: Non federal market vehicles only.

Remove the fuel pump module and crossover pipes.

• Remove and discard the O-ring seal.



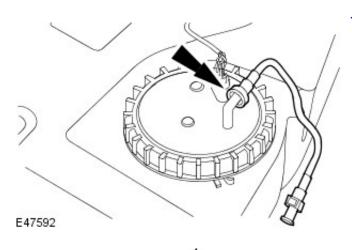
Remove the fuel tank.

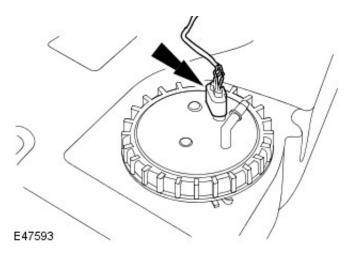
For additional information, refer to: Fuel Tank - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (310-01 Fuel Tank and Lines, Removal and Installation).

10. NOTE: Federal market vehicles only.

Remove the fuel supply pipe.

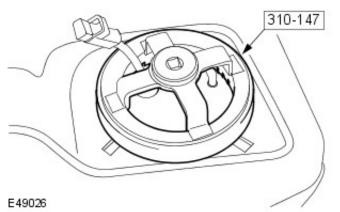
For additional information, refer to: Quick Release Coupling - Push Connect (310-00 Fuel System - General Information, General Procedures).





11. NOTE: Federal market vehicles only.

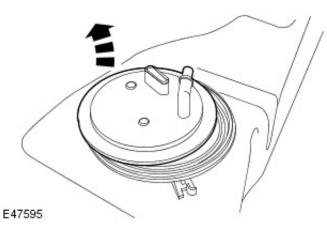
Disconnect the electrical connector.



12. NOTE: Federal market vehicles only.

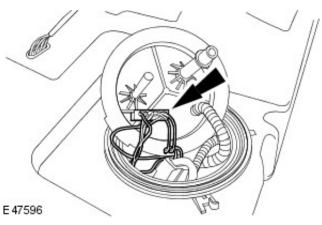
• NOTE: Note the orientation of the fuel pump module before removal.

Using the special tool, remove the locking ring.



13. NOTE: Federal market vehicles only.

Detach the fuel pump module flange from the fuel pump module base.

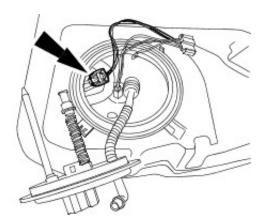


14. NOTE: Federal market vehicles only.

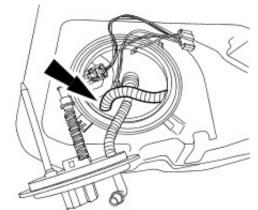
Disconnect the electrical connector.

15. NOTE: Federal market vehicles only.

Disconnect the electrical connector.

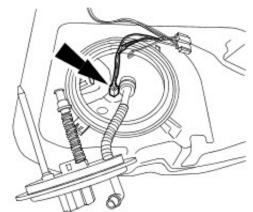


E47598



16. Detach the fuel crossover pipe from the fuel pump module hase

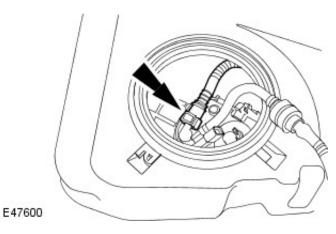
E47597



17. NOTE: Federal market vehicles only.

Disconnect the electrical connector.

E47599

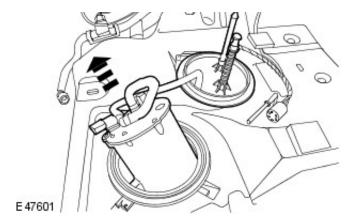


18. NOTE: Federal market vehicles only.

Disconnect the fuel crossover pipe from the fuel pump module base.

19. CAUTION: Make sure the float or arm are not damaged while removing the fuel pump module.

• NOTE: Federal market vehicles only.



Remove the fuel pump module base from the fuel tank.

Installation

• WARNINGS:



Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.

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.

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.

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.

After carrying out repairs, the fuel system must be checked visually for leaks. 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.

If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



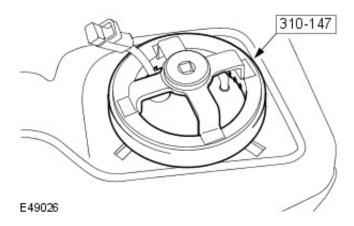
If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.

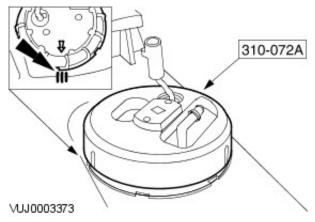
Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

- NOTE: Federal market vehicles, refer to step 1.
- NOTE: Non federal market vehicles, refer to step 2.
- 1. CAUTION: Make sure the float or arm are not damaged while installing the fuel pump module.
- NOTE: Federal market vehicles only.
- NOTE: Make sure the fuel pump module is correctly orientated.

To install, reverse the removal procedure.

- Install a new O-ring seal.
- Tighten to 120 Nm.





2. CAUTIONS:

Make sure the float or arm are not damaged while installing the fuel pump module.

Make sure the fuel cross over pipes are not damaged while installing the fuel pump module.

- NOTE: Non federal market vehicles only.
- NOTE: Make sure the fuel pump module is correctly orientated.

To install, reverse the removal procedure.

- Install a new O-ring seal.
- Tighten to 70 Nm.

Fuel Tank 19.55.01

Special Service tools



Powertrain Assembly Jack HTJ1200-2

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:

THE FUEL TANK CANNOT BE DRAINED IN VEHICLE. DUE TO THE HEAVY WEIGHT, MAKE SURE THAT THE FUEL TANK IS SECURELY ATTACHED TO THE LOWERING EQUIPMENT WHEN REMOVING.



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.

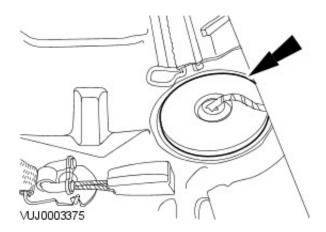


WARNING:

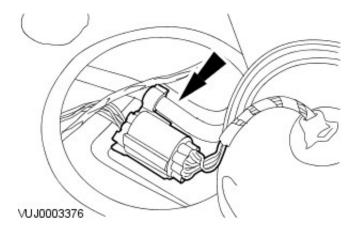
THIS PROCEDURE INVOLVES FUEL HANDLING. BE PREPARED FOR FUEL SPILLAGE AT ALL TIMES AND ALWAYS OBSERVE FUEL HANDLING PRECAUTIONS. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

Disconnect the battery ground cable. For additional information, refer to <<414-01>>.

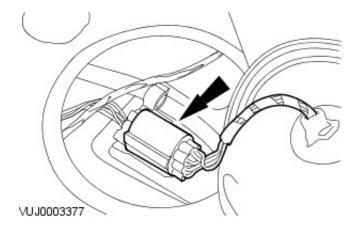
- 2. Remove the fuel filler cap.
- 3. De-pressurize the fuel system. For additional information, refer to <<310-00>>.
- 4. Remove the rear seat cushion. For additional information, refer to <<501-10>>.



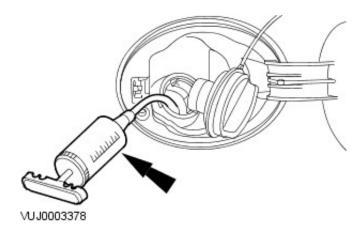
5. Detach the wiring harness grommet.



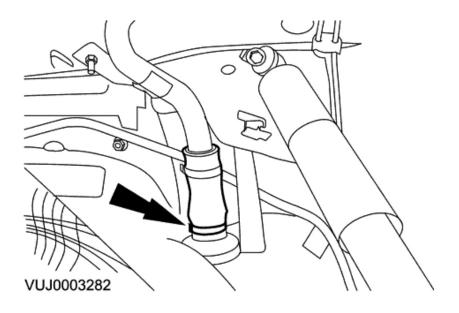
6. Detach the electrical connector.



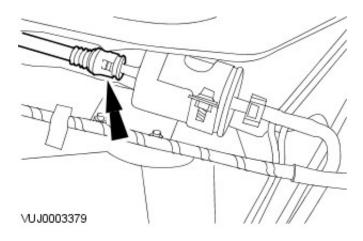
7. Disconnect the electrical connector.



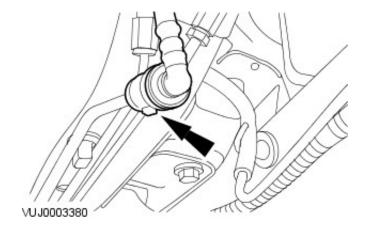
- 8. Using a suitable suction device drain the fuel tank filler pipe.
- 9. Remove the rear subframe. For additional information, refer to <<**502-00>>**.



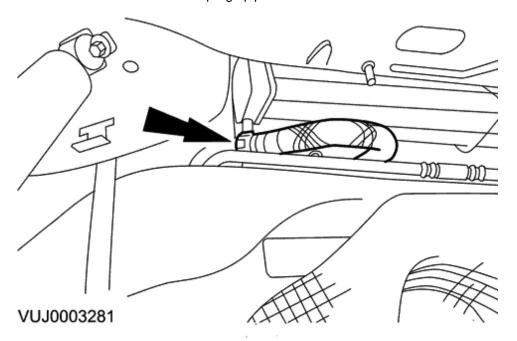
10. Detach the fuel tank filler pipe hose from the fuel tank.



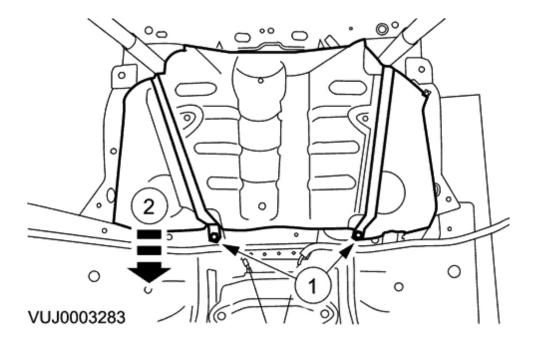
11. Disconnect the fuel filter line quick release coupling. For additional information, refer to <<310-00>>.



12. Disconnect the fuel tank purge pipe.



13. Disconnect the evaporative emission canister hose.



14.

WARNING:

THE FUEL TANK CANNOT BE DRAINED IN VEHICLE. DUE TO THE HEAVY WEIGHT, MAKE SURE THAT THE FUEL TANK IS SECURELY ATTACHED TO THE POWERTRAIN ASSEMBLY JACK WHEN REMOVING.



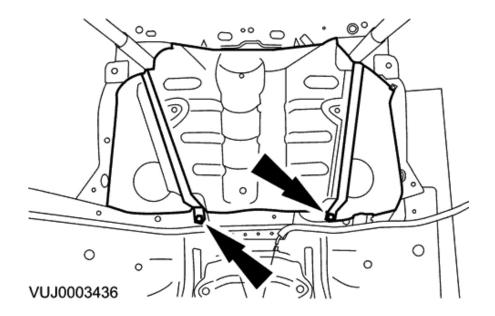
CAUTION:

Use a suitable packing material to prevent damage to the underside of the fuel tank.

Remove the fuel tank.

- 1. Remove the fuel tank support strap retaining bolts.
- 2. Remove the fuel tank.

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 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.

To install, reverse the removal procedure.

• Tighten to 25 Nm.

Fuel Tank and Lines - Fuel Tank 2.0L NA V6 - AJV6

Removal and Installation

Removal

• WARNINGS:

Place the vehicle in a well ventilated, quarantined area and arrange **No Smoking/Petrol Fumes** signs about the vehicle.

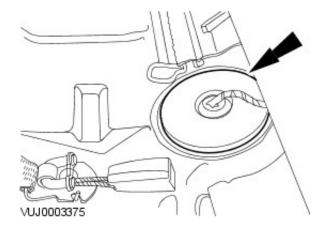
Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete.

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.

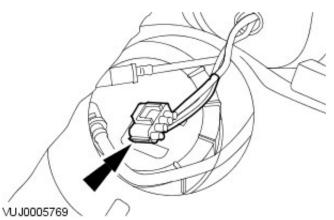
Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

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.

- De-pressurize the fuel system.
 For additional information, refer to: <u>Fuel System Pressure Release</u> (310-00 Fuel System General Information, General Procedures).
- 2. Remove the rear seat cushion.
 For additional information, refer to: Rear Seat Cushion (501-10 Seating, Removal and Installation).
- 3. Detach the wiring harness grommet.



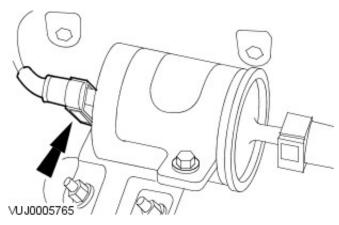
4. Disconnect the electrical connector.



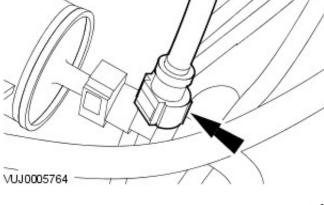
5. Drain the fuel tank. For additional information, refer to: Fuel Tank Draining -

2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (310-00 Fuel System - General Information, General Procedures).

- Raise and support the vehicle.
 For additional information, refer to: <u>Lifting</u> (100-02 Jacking and Lifting, Description and Operation).
- Disconnect the fuel filter line quick release coupling.
 For additional information, refer to: <u>Quick Release Coupling Push Connect</u> (310-00 Fuel System General Information, General Procedures).

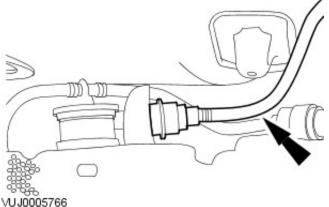


8. Disconnect the fuel filter line quick release coupling. For additional information, refer to: Quick Release Coupling-Push Connect (310-00 Fuel System - General Information, General Procedures).

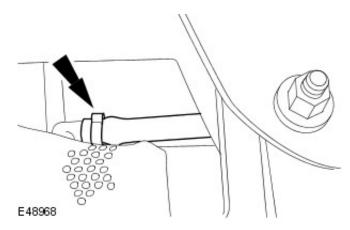


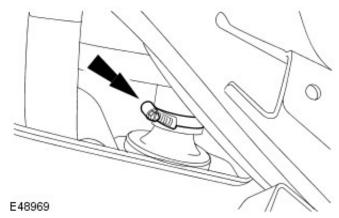
Disconnect the evaporative emission canister hose.
 For additional information, refer to: <u>Quick Release Coupling</u>

 Push Connect
 (310-00 Fuel System - General Information, General Procedures).



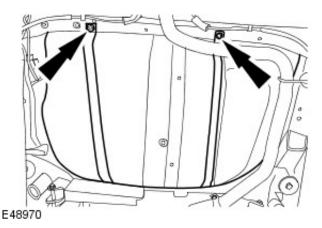
10. Detach the breather hose from the fuel tank.





11. NOTE: Note the orientation of the fuel tank filler pipe to fuel tank hose retaining clip before loosening.

Loosen the fuel tank filler pipe to fuel tank hose retaining clip.



12. NOTE: An assistant will be required to remove the fuel tank.

Remove the fuel tank.

• Remove the fuel tank support straps.

Installation

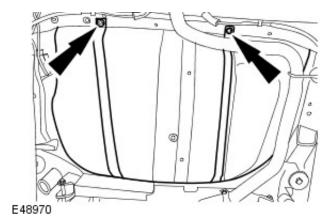
• WARNINGS:

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.

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.

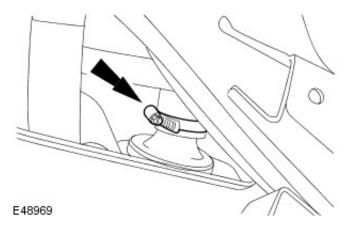
This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

- 1. NOTE: An assistant will be required to install the fuel tank.
- NOTE: Make sure the fuel filler pipe hose is connected to the fuel tank as it is installed.



Install the fuel tank.

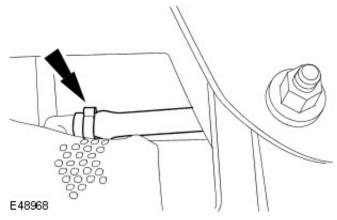
- Install the fuel tank support straps.
- Tighten to 25 Nm.



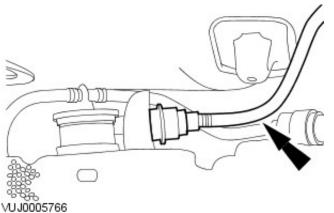
2. NOTE: Make sure the fuel tank filler pipe to fuel tank hose retaining clip is correctly orientated.

Tighten the fuel tank filler pipe to fuel tank hose retaining clip.

• Tighten to 3 Nm.



3. Attach the breather hose from the fuel tank.

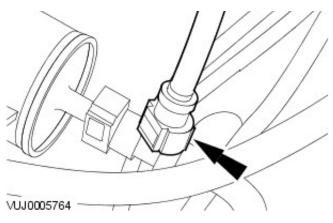


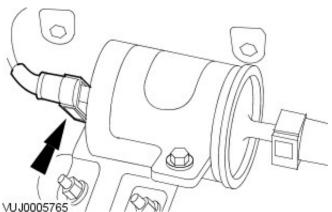
Connect the evaporative emission canister hose.
 For additional information, refer to: <u>Quick Release Coupling</u>

 Push Connect
 (310-00 Fuel System - General Information, General Procedures).

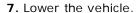
Connect the fuel filter line quick release coupling.
 For additional information, refer to: <u>Quick Release Coupling</u>

 Push Connect (310-00 Fuel System - General Information, General Procedures).

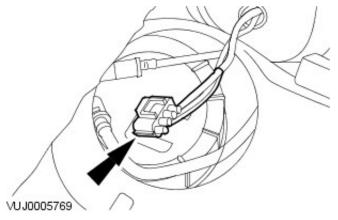




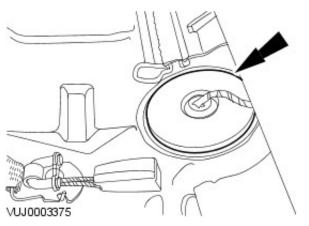
6. Connect the fuel filter line quick release coupling. For additional information, refer to: <u>Quick Release Coupling - Push Connect</u> (310-00 Fuel System - General Information, General Procedures).



- 8. Fill the fuel tank with fuel.
- 9. Connect the electrical connector.



10. Attach the wiring harness grommet.



11. Install the rear seat cushion. For additional information, refer to: Rear Seat Cushion (501-10 Seating, Removal and Installation).

For additional information, refer to: <u>Battery Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

Fuel Tank and Lines - Fuel Tank2.2L Duratorq-TDCi (110kW/150PS) - Puma/2.0L Duratorq-TDCi

Removal and Installation

Removal

• WARNINGS:



Place the vehicle in a well ventilated, quarantined area and arrange **No Smoking** signs about the vehicle.

Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Failure to follow these instructions may result in personal injury.

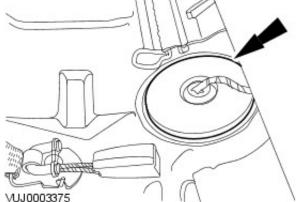
Before any work is carried out on the fuel system, ground the vehicle to earth and maintain the ground connection until the work is complete. Failure to follow this instruction may result in personal injury.

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.

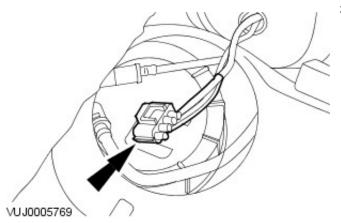
After carrying out repairs, the fuel system must be checked for leaks. Failure to follow this instruction may result in personal injury.

Remove the rear seat cushion.
 For additional information, refer to: Rear Seat Cushion (501-10 Seating, Disassembly and Assembly).

 Detach the wiring harness grommet.

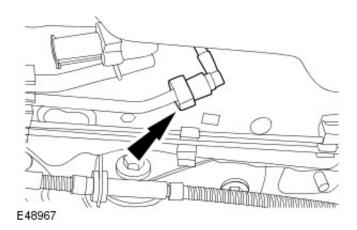


3. Disconnect the electrical connector.



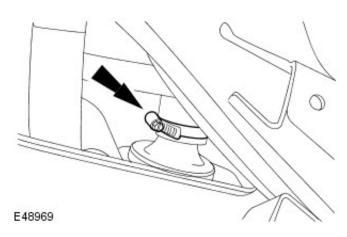
- 4. Drain the fuel tank.

 For additional information, refer to: Fuel Tank Draining 2.2L Duratorq-TDCi (110kW/150PS) Puma/2.0L DuratorqTDCi (310-00 Fuel System General Information, General Procedures).
- 5. Disconnect the fuel return line.



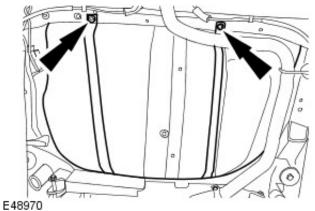
E48968

6. Detach the breather hose from the fuel tank.



7. NOTE: Note the orientation of the fuel tank filler pipe to fuel tank hose retaining clip before loosening.

Loosen the fuel tank filler pipe to fuel tank hose retaining clip.



8. NOTE: An assistant will be required to remove the fuel tank.

Remove the fuel tank.

• Remove the fuel tank support straps.

Installation

• WARNINGS:

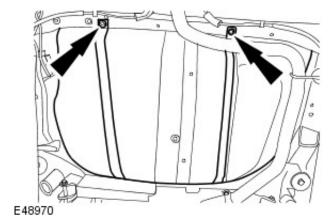


Do not smoke or carry lighted tobacco or an open flame of any type when working on or near any fuel related components. Failure to follow these instructions may result in personal injury.

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.

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.

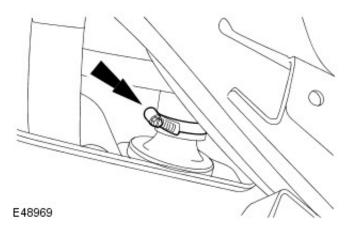
After carrying out repairs, the fuel system must be checked for leaks. Failure to follow this instruction may result in personal injury.



- 1. NOTE: An assistant will be required to install the fuel tank.
- NOTE: Make sure the fuel filler pipe hose is connected to the fuel tank as it is installed.

Install the fuel tank.

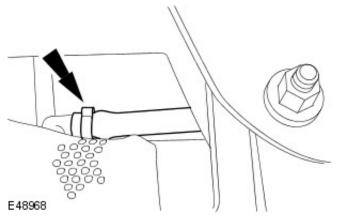
- Install the fuel tank support straps.
- Tighten to 25 Nm.



2. NOTE: Make sure the fuel tank filler pipe to fuel tank hose retaining clip is correctly orientated.

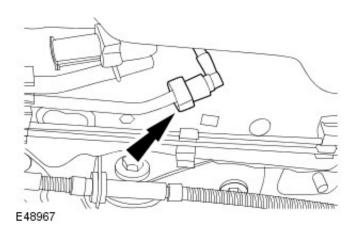
Tighten the fuel tank filler pipe to fuel tank hose retaining clip.

• Tightyen to 3 Nm.



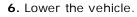
3. Attach the breather hose to the fuel tank.

4. Connect the fuel return line.

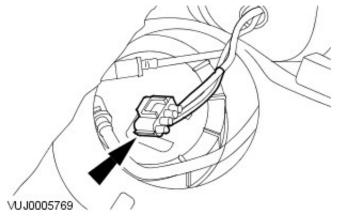


E 46543

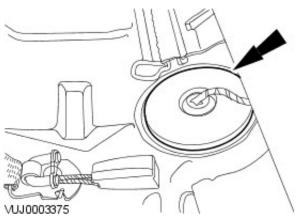
5. Connect the fuel supply line.



- 7. Fill the fuel tank with fuel.
- **8.** Connect the electrical connector.



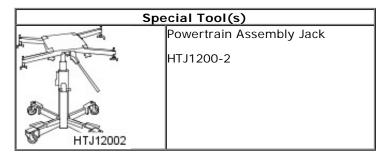
9. Attach the wiring harness grommet.



11. Connect the battery ground cable. For additional information, refer to: <u>Battery Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

Fuel Tank and Lines - Fuel Tank2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Removal and Installation



Removal

• WARNINGS:

Place the vehicle in a well ventilated, quarantined area and arrange **No Smoking/Petrol Fumes** signs about the vehicle.

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.

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.

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.

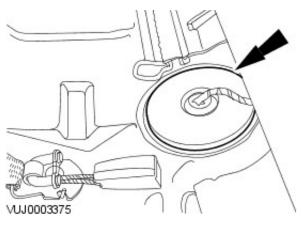
This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

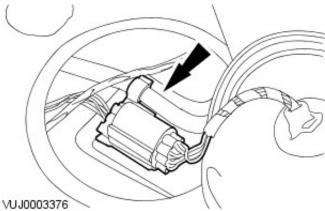
- NOTE: Non federal market vehicles, refer to steps 29 and 32.
- NOTE: Federal market vehicles, refer to steps 23, 24, 28 and 31.

1. NOTE: All vehicles

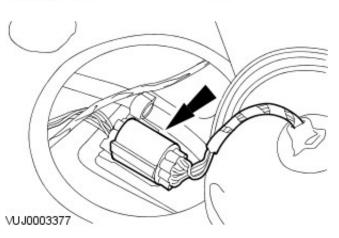
Disconnect the battery ground cable. For additional information, refer to: <u>Battery Disconnect and Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

- 2. Remove the fuel filler cap.
- 3. De-pressurize the fuel system.
 For additional information, refer to: Fuel System Pressure
 Release (310-00 Fuel System General Information,
 General Procedures).
- **4.** Remove the rear seat cushion. For additional information, refer to: Rear Seat Cushion (501-10 Seating, Removal and Installation).
- 5. Detach the wiring harness grommet.

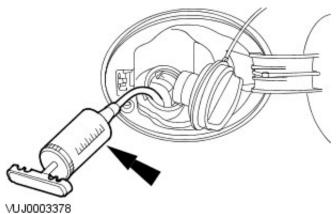




6. Detach the electrical connector.



7. Disconnect the electrical connector.



8. Using a suitable suction device drain the fuel tank filler pipe.

9. NOTE: To prevent the vehicle becoming unstable when the fuel tank has been removed, install the vehicle tie down straps.

Raise and support the vehicle.

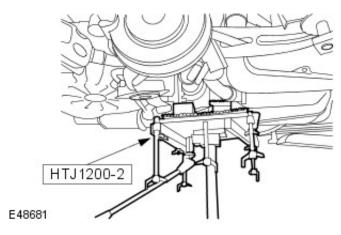
For additional information, refer to: Lifting (100-02 Jacking

and Lifting, Description and Operation).

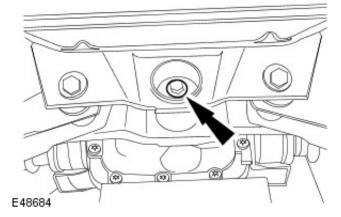
10. Remove the driveshaft. For additional information, refer to: Driveshaft (205-01 Driveshaft, Removal and Installation).

11. Remove the front muffler.
For additional information, refer to: Front Muffler - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (309-00 Exhaust System, Removal and Installation).

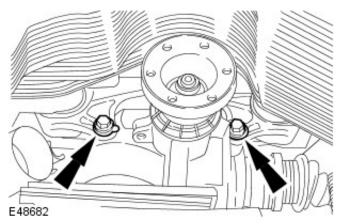
12. Using the special tool, support the axle assembly.



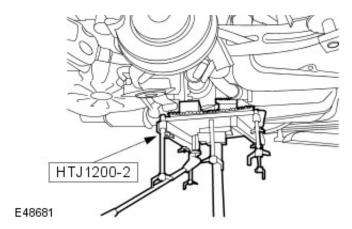
13. Remove the axle assembly rear retaining bolt.

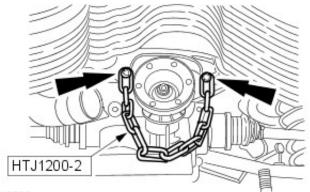


14. Remove the axle assembly front retaining bolts.



15. Using the special tool, lower the axle assembly approximately 75 mm (2.95 inches).



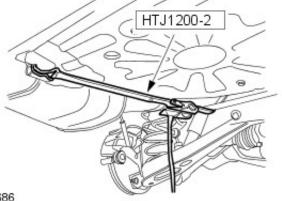


16. Install the chain supplied with the special tool HTJ1200-2 to the axle assembly front support bracket.



E48685

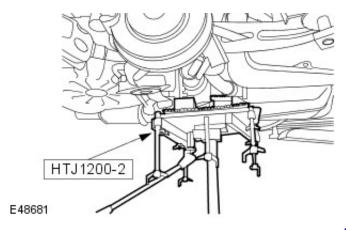
17. Install the securing strap supplied with the special tool HTJ1200-2 to the axle assembly.

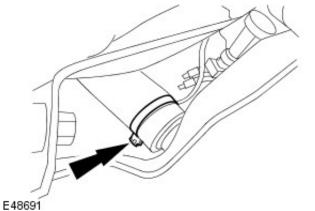


18. Attach the securing strap supplied with the special tool HTJ1200-2 to the rear towing eye thread and support the rear of the axle assembly.

E48686

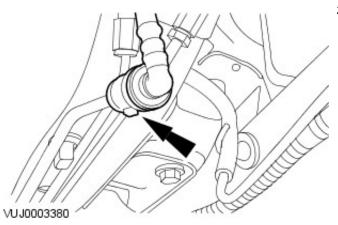
19. Remove the special tool.





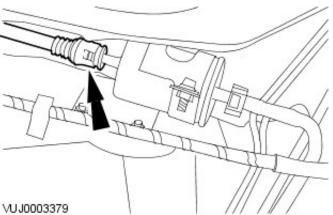
20. NOTE: Note the orientation of the fuel tank filler pipe to fuel tank hose retaining clip before loosening.

Loosen the fuel tank filler pipe to fuel tank hose retaining clip.



21. Disconnect the evaporative emission canister purge hose quick release coupling.

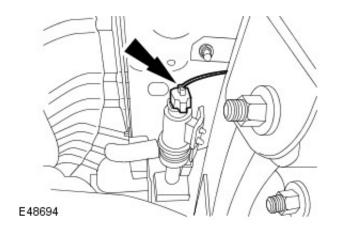
For additional information, refer to: <u>Quick Release Coupling</u> - <u>Push Connect</u> (310-00 Fuel System - General Information, General Procedures).

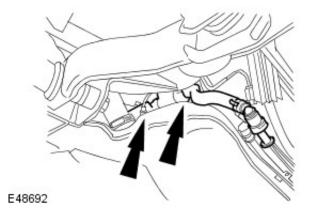


- 22. Disconnect the fuel filter line quick release coupling. For additional information, refer to: <u>Quick Release Coupling - Push Connect</u> (310-00 Fuel System - General Information, General Procedures).
 - Install blanking plugs to the male and female connectors.

23. NOTE: Federal market vehicles only.

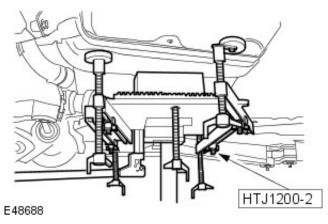
Disconnect the evaporative emission canister close valve electrical connector.





24. NOTE: Federal market vehicles only.

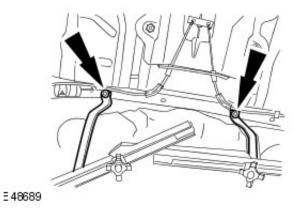
Detach the evaporative emission canister purge hose from the fuel tank retaining clips.



25. CAUTION: Use packing blocks supplied with the special tool HTJ1200-2 to prevent damage to the underside of the fuel tank. Failure to follow this instruction may result in damage to the fuel tank.

• NOTE: All vehicles

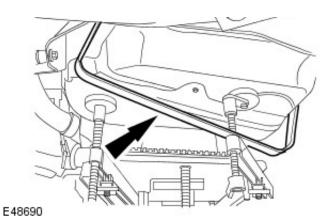
Using the special tool, support the fuel tank.

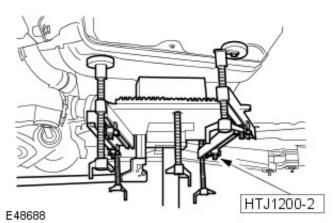


26. Remove the fuel tank support straps retaining bolts.

27. NOTE: Right-hand shown, left-hand similar.

Remove the fuel tank support straps.

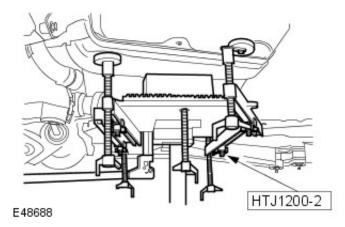




28. NOTE: Federal market vehicles only.

Using the special tool, lower the fuel tank approximately 100 mm (3.94 inches).

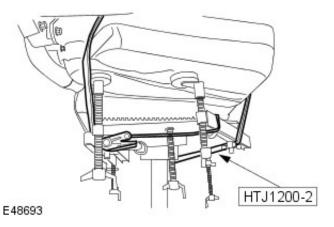
- Detach the fuel filler pipe hose from the fuel tank.
- Install blanking plugs to the fuel tank and fuel filler pipe hose.



29. NOTE: Non federal market vehicles only.

Using the special tool, lower the fuel tank approximately 75 mm (2.95 inches).

- Detach the fuel filler pipe hose from the fuel tank.
- Install blanking plugs to the fuel tank and fuel filler pipe hose.

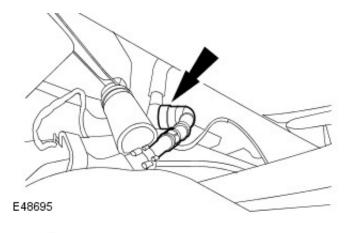


30. NOTE: All vehicles

Install the securing strap supplied with the special tool HTJ1200-2 to secure the fuel tank to the special tool.

31. NOTE: Federal market vehicles only.

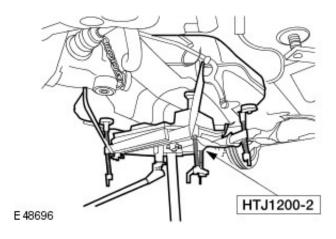
Disconnect the evaporative emission canister hose from the evaporative emission canister.





32. NOTE: Non federal market vehicles only.

Disconnect the evaporative emission canister hose from the evaporative emission canister.



33. WARNING: The fuel tank cannot be drained in vehicle. Due to the heavy weight, make sure that the fuel tank is securely attached to the powertrain assembly jack when removing. Failure to follow this instruction may result in personal injury.

• NOTE: All vehicles

Using the special tool, remove the fuel tank.

Installation

• WARNINGS:

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.

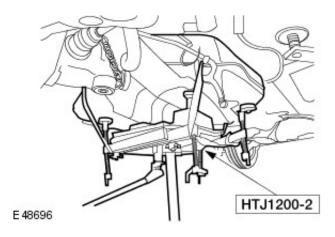
Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

Due to the heavy weight, make sure that the fuel tank is securely attached to the powertrain assembly jack when installing.

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.

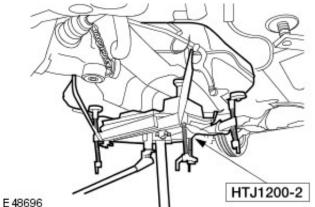
• NOTE: Non federal vehicles, refer to steps 2 and 3.

• NOTE: Federal vehicles, refer to steps 1, 4, 10 and 11.



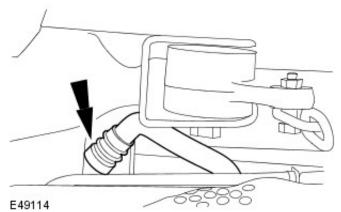
1. NOTE: Federal market vehicles only.

Using the special tool, position the fuel tank approximately 100 mm (3.94 inches) lower than the fully installed position.



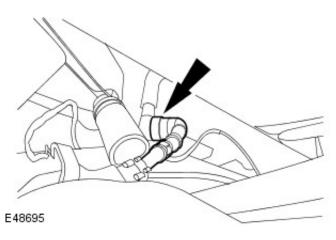
2. NOTE: Non federal market vehicles only.

Using the special tool, position the fuel tank approximately 75 mm (2.95 inches) lower than the fully installed position.



3. NOTE: Non federal market vehicles only.

Connect the evaporative emission canister hose to the evaporative emission canister.



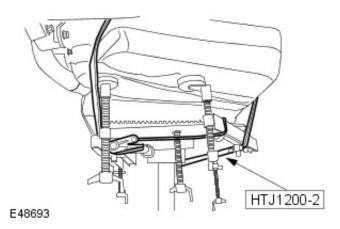
4. NOTE: Federal market vehicles only.

Connect the evaporative emission canister hose to the evaporative emission canister.

5. NOTE: All vehicles

Remove the securing strap from the fuel tank and the

special tool.

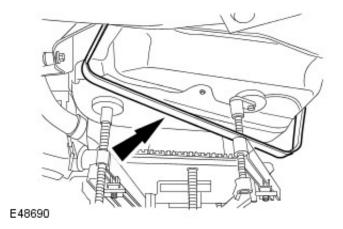


HTJ1200-2

E48688

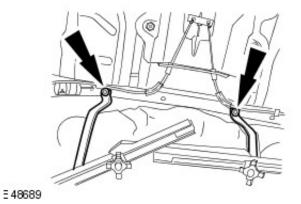
- **6.** NOTE: Remove the blanking plugs from the fuel tank and fuel filler pipe hose.
- NOTE: Make sure the fuel filler pipe hose is connected to the fuel tank as it is installed.

Using the special tool, install the fuel tank.



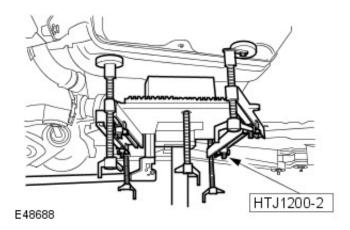
7. NOTE: Right-hand shown, left-hand similar.

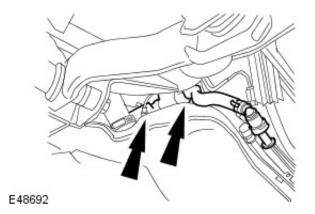
Install the fuel tank support straps.



- 8. Install the fuel tank support straps retaining bolts.
 - Tighten to 25 Nm.

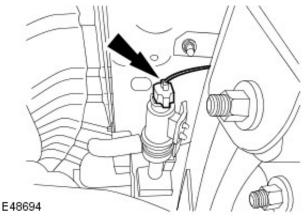
9. Remove the special tool.





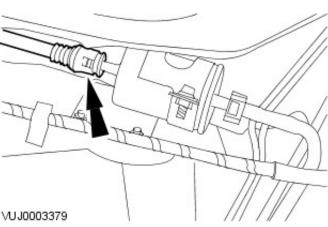
10. NOTE: Federal market vehicles only.

Attach the evaporative emission canister purge hose to the fuel tank retaining clips.



11. NOTE: Federal market vehicles only.

Connect the evaporative emission canister close valve electrical connector.



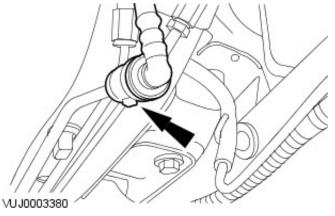
12. NOTE: All vehicles

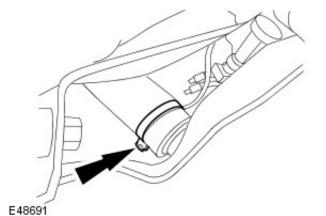
• NOTE: Remove the blanking plugs.

Connect the fuel filter line quick release coupling. For additional information, refer to: <u>Quick Release Coupling - Push Connect</u> (310-00 Fuel System - General Information, General Procedures).

13. Connect the evaporative emission canister purge hose quick release coupling.

For additional information, refer to: <u>Quick Release Coupling</u> - <u>Push Connect</u> (310-00 Fuel System - General Information, General Procedures).

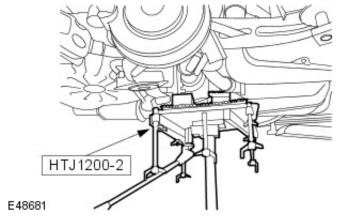




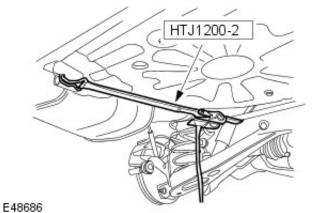
14. NOTE: Make sure the fuel tank filler pipe to fuel tank hose retaining clip is correctly orientated.

Tighten the fuel tank filler pipe to fuel tank hose retaining clip.

• Tighten to 3 Nm.

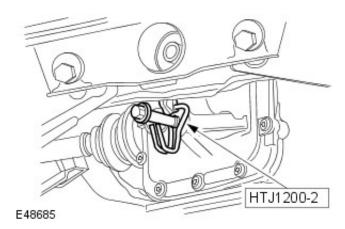


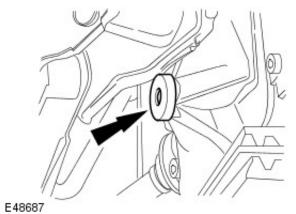
15. Using the special tool, support the axle assembly.



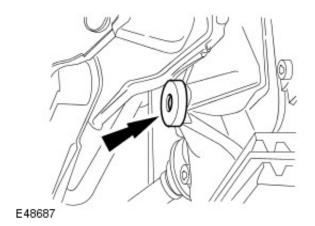
16. Detach the securing strap from the rear towing eye thread.

- 17. Remove the securing strap from the axle assembly.
 - Discard the axle assembly rear retaining bolt.

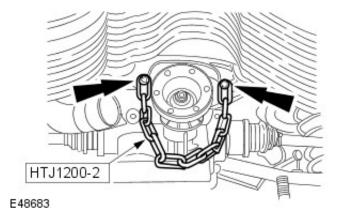




18. Remove and discard the axle assembly washer.

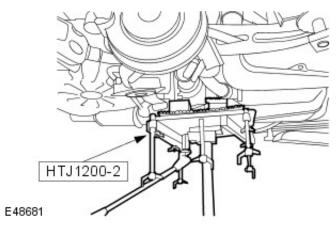


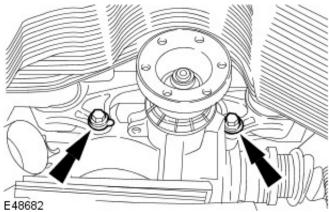
19. Install a new axle assembly washer.



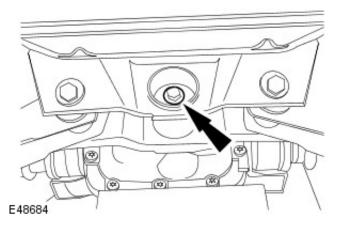
20. Remove the chain from the axle assembly front support bracket.

21. Using the special tool, install the axle assembly.

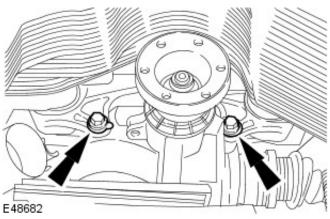




22. Loosely install the axle assembly front retaining bolts.

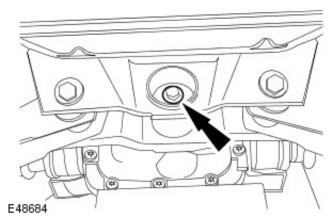


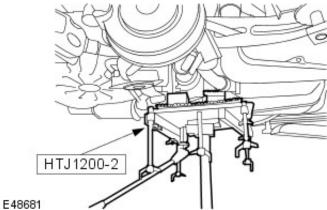
23. Loosely install a new axle assembly rear retaining bolt.



24. Tighten to 90 Nm.

25. Tighten to 110 Nm.





26. Remove the special tool.

27. Install the front muffler.

For additional information, refer to: Front Muffler - 2.5L NA V6 - AJV6/2.0L NA V6 - AJV6/3.0L NA V6 - AJ27 (309-00 Exhaust System, Removal and Installation).

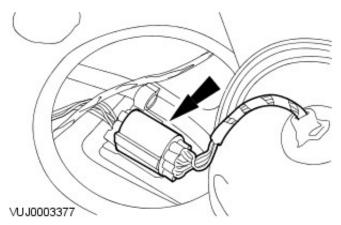
28. Install the driveshaft.

For additional information, refer to: Driveshaft (205-01 Driveshaft, Removal and Installation).

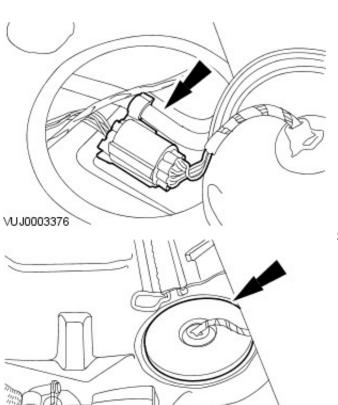
29. NOTE: Remove the the vehicle tie down straps.

Lower the vehicle.

30. Connect the electrical connector.



31. Attach the electrical connector.



VUJ0003375

32. Attach the wiring harness grommet.

- **33.** Install the rear seat cushion. For additional information, refer to: Rear Seat Cushion (501-10 Seating, Removal and Installation).
- **34.** Fill the fuel tank with the fuel drained from the fuel filler pipe.
- **35.** Install the fuel filler cap.
- **36.** Connect the battery ground cable. For additional information, refer to: <u>Battery Connect</u> (414-01 Battery, Mounting and Cables, General Procedures).

Fuel Tank and Lines - Fuel Tank Filler Pipe

Removal and Installation

Removal

1. WARNINGS:

Place the vehicle in a guarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.

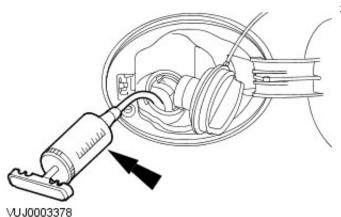
Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

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.

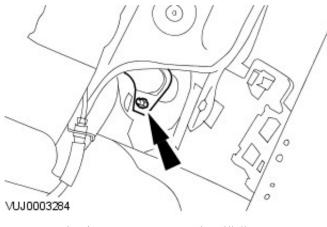
This procedure involves fuel handling. Be prepared for fuel spillage at all times and always observe fuel handling precautions. Failure to follow these instructions may result in personal injury.

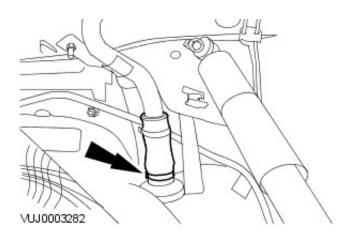
Disconnect the battery ground cable. For additional information, refer to Section 414-01 Battery, Mounting and Cables.

- 2. Remove the fuel filler cap.
- 3. Using a suitable suction device drain the fuel tank filler pipe.

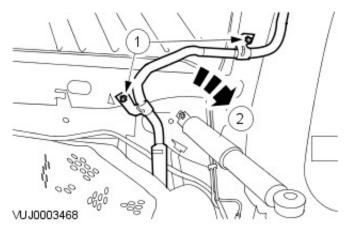


- 4. Remove the rear subframe. For additional information, refer to Section 502-00 Uni-Body, Subframe and Mounting System.
- 5. Detach the fuel tank filler pipe.





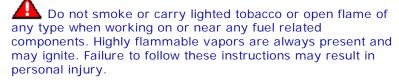
6. Detach the fuel tank filler pipe hose from the fuel tank.



- 7. Remove the fuel tank filler pipe and hose.
 - 1. Remove the retaining nuts.
 - 2. Remove the fuel tank filler pipe and hose.

Installation



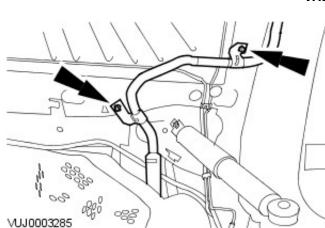


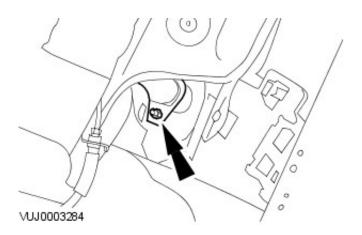
Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapours are always present and may ignite. Failure to follow these instructions may result in personal injury.

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.

To install, reverse the removal procedure.

- Tighten to 4 Nm.
- 2. Tighten to 4 Nm.





Fuel Tank Pressure Sensor 19.55.31

RemovalNOTE:

The fuel tank pressure sensor is fitted to USA market vehicles only.



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:

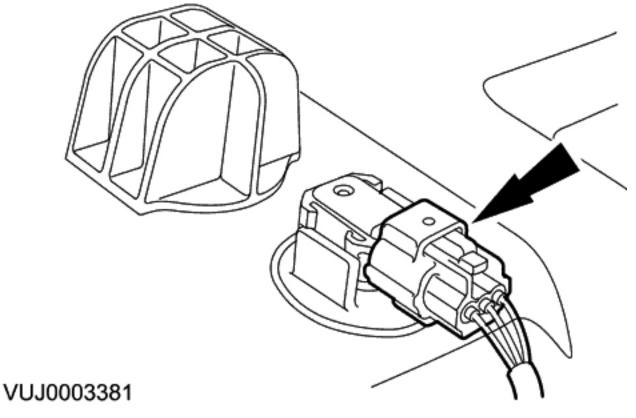
DO NOT CARRY OR OPERATE CELLULAR PHONES WHEN WORKING ON OR NEAR ANY FUEL RELATED COMPONENTS. HIGHLY FLAMMABLE VAPOURS ARE ALWAYS PRESENT AND MAY IGNITE. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.



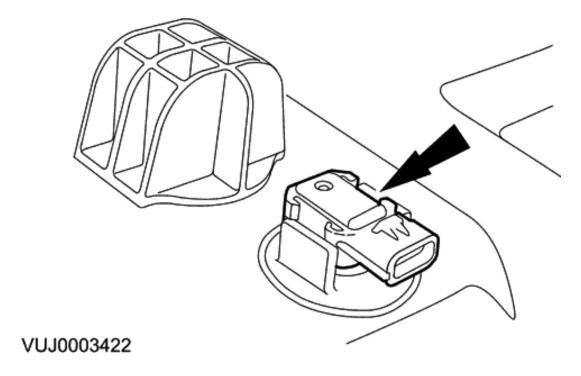
WARNING:

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.

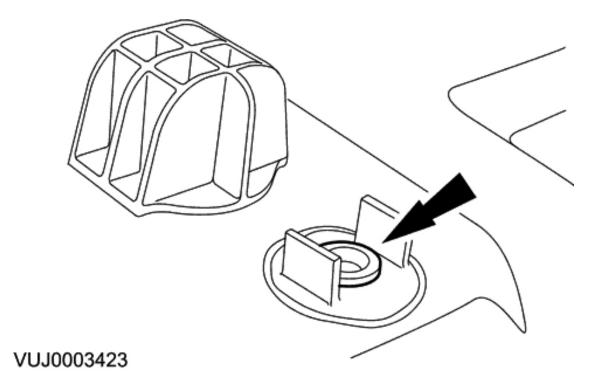
Remove the fuel tank. For additional information, refer to << Fuel Tank>>.



2. Disconnect the electrical connector.

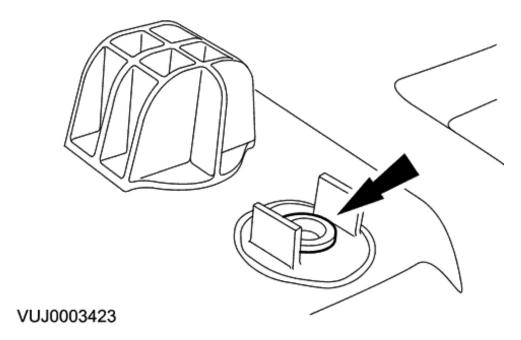


3. Remove the fuel tank pressure sensor.



4. Remove and discard the grommet.

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 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 VAPOURS 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.

To install, reverse the removal procedure.

• Install a new grommet.

Fuel Tank and Lines - Gas Fuel Tank Pressure Sensor

Removal and Installation

Removal

• NOTE: The fuel tank pressure sensor is fitted to federal market vehicles only.

1. WARNINGS:

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 can result in personal injury.

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.

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.

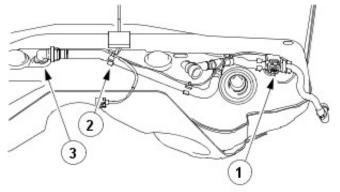
Remove the fuel tank.

For additional information, refer to: Fuel Tank - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27 (310-01 Fuel Tank and Lines, Removal and Installation).

2. NOTE: The fuel tank pressure sensor is supplied as an assembly with the evaporative emission hoses.

Remove the fuel tank pressure sensor assembly.

- 1. Disconnect the electrical connector.
- 2. Detach the wiring harness.
- 3. Remove the fuel tank pressure sensor assembly.



E49044

Installation

1. WARNINGS:

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.

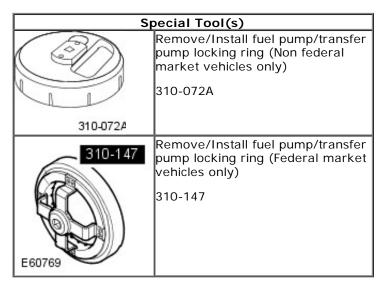
Do not carry or operate cellular phones when working on or near any fuel related components. Highly flammable vapors are always present and may ignite. Failure to follow these instructions may result in personal injury.

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.

To install, reverse the removal procedure.

Fuel Tank and Lines - Fuel Transfer Pump

Removal and Installation



Removal

• WARNINGS:



Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.

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.

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.

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.

After carrying out repairs, the fuel system must be checked visually for leaks. 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.

If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.

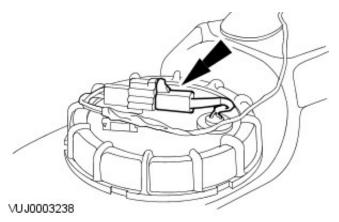
Mash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

- NOTE: Non federal market vehicles, refer to steps 1 to 6.
- NOTE: Federal market vehicles, refer to steps 7 to 10.
 - 1. NOTE: Non federal market vehicles only.

Remove the fuel tank. For additional information, refer to: <u>Fuel Tank - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27</u> (310-01 Fuel Tank and Lines, Removal and Installation).

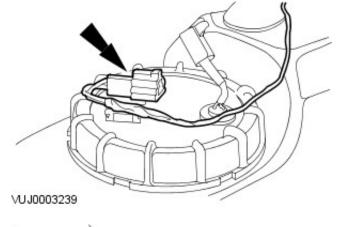
2. NOTE: Non federal market vehicles only.





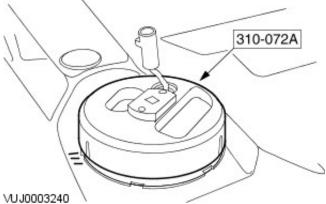
3. NOTE: Non federal market vehicles only.

Detach the electrical connector.



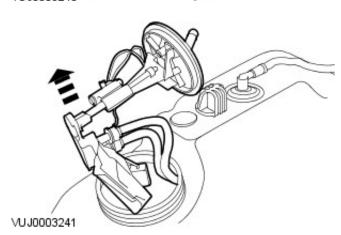
- 4. NOTE: Non federal market vehicles only.
- NOTE: Note the orientation of the fuel transfer pump before removal.

Using the special tool, remove the locking ring.



- 5. CAUTION: Make sure the float or arm are not damaged while removing the fuel transfer pump.
- NOTE: Non federal market vehicles only.

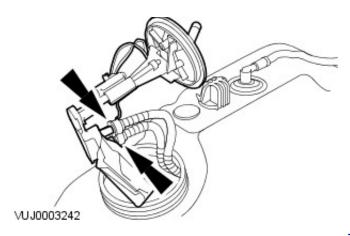
Detach the fuel transfer pump from the fuel tank.



6. NOTE: Non federal market vehicles only.

Remove the fuel transfer pump.

- Disconnect the fuel crossover pipes.
- Remove and discard the O-ring seal.

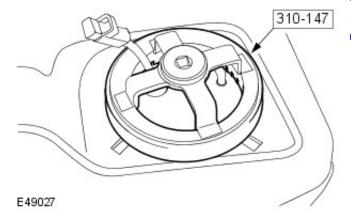




Remove the fuel pump module. For additional information, refer to: <u>Fuel Pump Module - 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27</u> (310-01 Fuel Tank and Lines, Removal and Installation).

- 8. NOTE: Federal market vehicles only.
- NOTE: Note the orientation of the fuel transfer pump before removal.

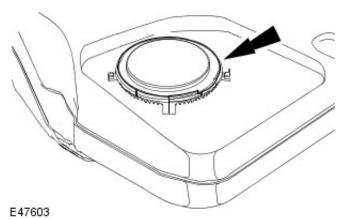
Using the special tool, remove the locking ring.



9. CAUTION: Make sure the float or arm are not damaged while removing the fuel transfer pump.

• NOTE: Federal market vehicles only.

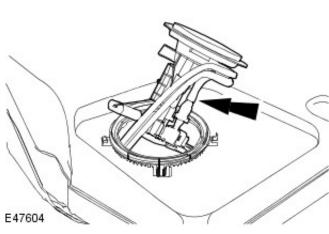
Detach the fuel transfer pump from the fuel tank.



10. NOTE: Federal market vehicles only.

Remove the fuel transfer pump and fuel crossover pipes.

• Remove and discard the O-ring seal.



Installation

• WARNINGS:



Place the vehicle in a quarantined area and arrange "No Smoking/Petrol Fumes" signs about the vehicle.

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.

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.

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.

After carrying out repairs, the fuel system must be checked visually for leaks. 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.

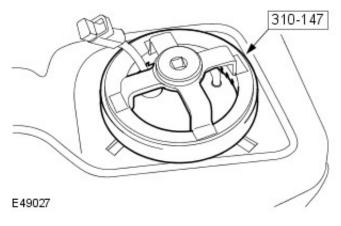
If taken internally do not induce vomiting, seek immediate medical attention. Failure to follow these instructions may result in personal injury.



If fuel contacts the eyes, flush the eyes with cold water or eyewash solution and seek medical attention.

Wash hands thoroughly after handling, as prolonged contact may cause irritation. Should irritation develop, seek medical attention.

- NOTE: Federal market vehicles, refer to step 1.
- NOTE: Non federal market vehicles, refer to step 2.



1. CAUTION: Make sure the float or arm are not damaged while installing the fuel pump module.

- · NOTE: Federal market vehicles only.
- NOTE: Make sure the fuel transfer pump is correctly orientated.

To install, reverse the removal procedure.

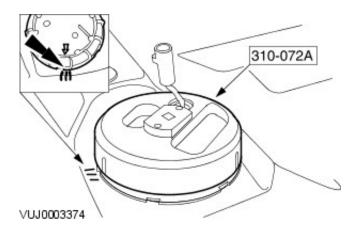
- Install a new O-ring seal.
- Tighten to 120 Nm.

2. CAUTIONS:

Make sure the float or arm are not damaged while installing the fuel pump module.

Make sure the fuel crossover pipes are not damaged while installing the fuel pump module.

- NOTE: Non federal market vehicles only.
- NOTE: Make sure the fuel transfer pump is correctly orientated.



To install, reverse the removal procedure.

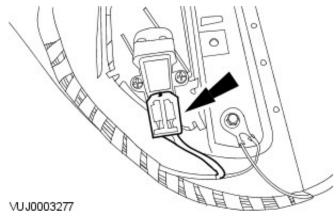
- Install a new O-ring seal.
- Tighten to 70 Nm.

Fuel Tank and Lines - Inertia Fuel Shutoff (IFS) Switch

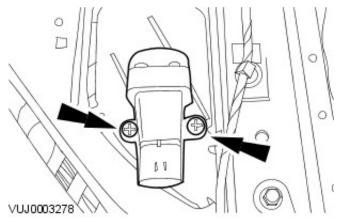
Removal and Installation

Removal

- Remove the cowl side trim panel. For additional information, refer to Section 501-05 Interior Trim and Ornamentation.
- **2.** Disconnect the electrical connector.



3. Remove the inertia fuel shutoff (IFS) switch.



Installation

1. To install, reverse the removal procedure.

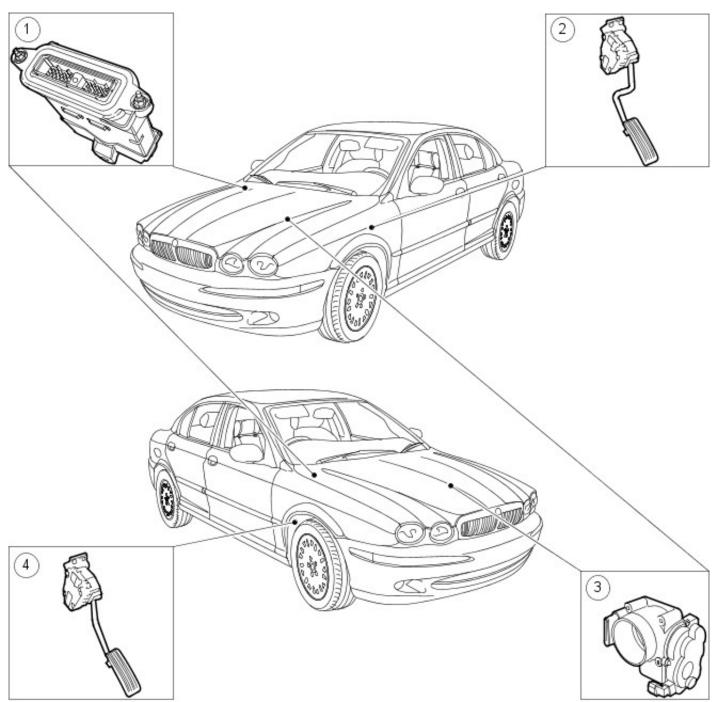
Acceleration Control -

Torque Specifications

Description	Nm	lb-ft	lb-in
Accelerator pedal	9	-	80

Acceleration Control - Acceleration Control

Description and Operation



VUJ0004039

Item	Part Number	Description
1	_	Engine control module (ECM)
2	_	Accelerator pedal (left-hand drive vehicles)
3	_	Throttle body
4	_	Accelerator pedal (right-hand drive vehicles)

Vehicles with 2.0L engine

The acceleration control consists of the pedal and shaft assembly, accelerator cable and accelerator cable bracket.

WARNING: Make sure surrounding components such as wiring, hoses, sound insulation and floor carpeting are not contacting the sliding inner cable or the accelerator pedal and shaft. Failure to follow these instructions may result in personal injury.

The throttle is controlled by an accelerator cable attached to the accelerator pedal and shaft. The accelerator pedal

and shaft should travel smoothly from the idle to the wide-open throttle positions. Hesitation on return or prevention of return to the idle position must not occur.

Vehicles with 2.5L, 3.0L or diesel engine

The accelerator pedal demand sensor provides an analogue voltage to the ECM which is proportional to the accelerator pedal position. A throttle position sensor provides a signal to the ECM which monitors throttle plate position.

After receiving these signals and monitoring the wheel speed signal output, coolant temperature, rotary switch status (automatic transmission) and inertia switch confirmation, the ECM then issues a throttle request signal. A motor within the throttle body rotates the throttle plate to a position which is relative to the position demanded.

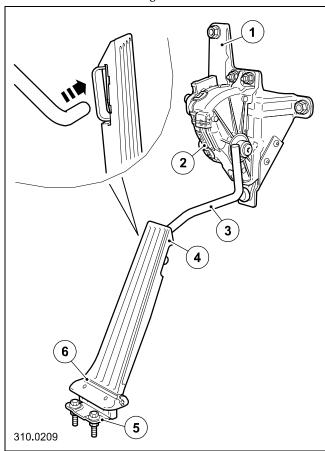
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Organ Throttle Pedal (Estate and Sedan)

The organ throttle pedal supplements the driver lower air bag module. It helps control the driver's heel point and offers a more refined pedal feel over the former pendulum pedal. The organ throttle pedal comprises:

- throttle sensor mounting bracket with pedal stop;
- · throttle sensor;
- · organ pad;
- · organ pedal mounting bracket.

The throttle sensor's control arm engages with the organ pad and slides freely over its rear bearing when the organ pad articulates from its 'live' hinge.

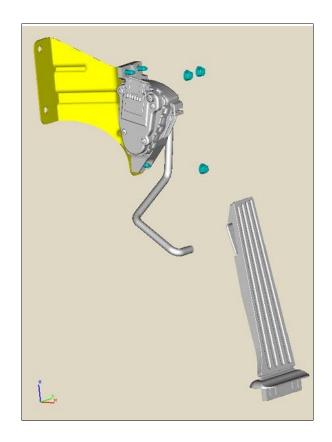


Organ throttle pedal

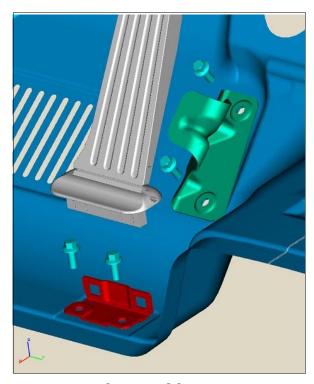
- 1. Throttle sensor mounting bracket with pedal stop
- 2. Throttle sensors
- 3. Sensor control arm
- 4. Organ pad
- 5. Organ pedal mounting bracket
- 6. Live hinge

Throttle Sensor/Pad assembly

The sensor bracket is mounted to a combination of the brake pedal assembly. (LHD Only) and direct to the bulkhead.

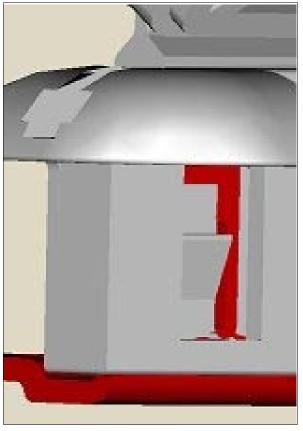


Fixings for the throttle sensor are mounted on the sensor bracket. The throttle sensor is mounted to the bracket with 3x M6 nuts.



Pad Assembly - Service

Once Pad is located onto sensor arm it can be dropped over the floor bracket and locked via two mechanical clips housed in the pad socket.



Pad assembly mechanical clip

The organ-type pad assembly can be disassembled by inserting 2 x 2 mm diameter prongs into 2 holes located on the front socket fascia (not shown in illustration). Prongs will release clips engaged with floor bracket.

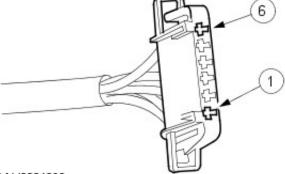
Acceleration Control - Acceleration Control

Diagnosis and Testing

- 1. **1.** Verify the customer concern by operating the system.
- 2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.
- 3. **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. **4.** If the concern is not visually evident, use a fault code reader to retrieve the fault codes before proceeding to the Symptom Chart.

Symptom Chart

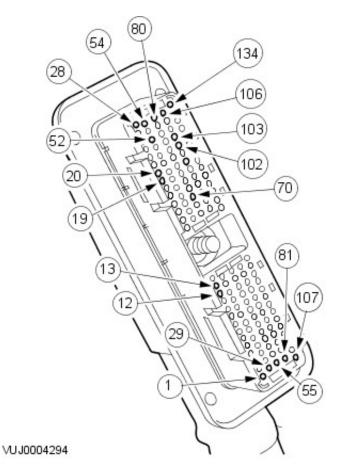
Symptom	Possible Sources	Action
DTC P1240, P1241, P1242	* Accelerator pedal power supply circuit out of range	* GO to Pinpoint Test A.
DTC P1122, P1123, P1215, P1216, P1344	* Accelerator pedal demand sensor output circuit out of range	* GO to Pinpoint Test B.
DTC P0121, P0122, P0123	* Throttle position sensor circuit out of range	* GO to Pinpoint Test C.
DTC P1251, P1658, P1631, P1657	* Throttle motor relay failure	* GO to Pinpoint Test D.
DTC P1243	* Accelerator pedal demand sensor ground; open circuit	* GO to Pinpoint Test E.
DTC P1506, P1507, P1611, P1633	* Engine control module (ECM) failure	* INSTALL a new ECM. For additional information, refer toSection 303-14A Electronic Engine ControlsSection 303-14B Electronic Engine Controls.
DTC P1254, P1250	* Throttle limp home spring malfunction.	* INSTALL a new throttle motor. For additional information refer toSection 303-14A Electronic Engine ControlsSection 303-14B Electronic Engine Controls.



VUJ0004293

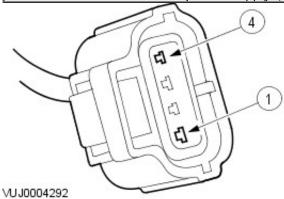
Accelerator Pedal Demand Sensor Electrical Connector (PA1, Harness Side)

Pin Number	Circuit Function	Circuit Color
1	Sensor Ground	Black/Green
2	Sensor Ground	Black/Green
3	Output Signal	Red
4	Sensor Power Supply (5 volts)	Orange/Yellow
5	Sensor Power Supply (5 volts)	Yellow
6	Output Signal	Yellow



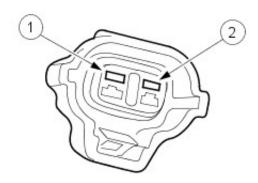
Engine Control Module (ECM) Electrical Connector (EN16, Harness Side)

Pin Number	Circuit Function	Circuit Color
12	Output (5 volts)	Orange/Yellow
13	Output (5 volts)	Yellow
19	Ground	Black/Green
20	Ground	Black/Green
52	Throttle Relay Ground	Green/Red
75	Input	Purple
76	Input	Yellow
80	Throttle motor	Green
102	Input	Red
103	Input	Yellow
106	Throttle motor	Red
134	Power Supply (12 volts)	Red/White



Throttle Position Sensor Electrical Connector (EN13, Harness Side)

Pin Number	Circuit Function	Circuit Color
1	Sensor Ground	Black/Green
2	Output Signal	Yellow
3	Output Signal	Purple
4	Sensor Power Supply (5 volts)	Orange/Yellow



VUJ0004291

Throttle Motor Electrical Connector (EN10, Harness Side)

Pin Number	Circuit Function	Circuit Color
80	Throttle motor	Green
106	Throttle motor	Red

PINPOINT T	EST A: DTC P1240, P1241, P1242
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
A1: CHECK TH	HE POWER SUPPLY TO THE ACCELERATOR PEDAL DEMAND SENSOR
	1 TURN the ignition switch to the RUN position.
	2 Measure the voltage between electrical connector PA1-5 and ground.
	3 Measure the voltage between electrical connector PA1-4 and ground.
	Is the voltage less than 4.5 volts?
	Yes
	GO to A2.
	No State Note that the state of
	DIAGNOSE the electronic engine control system. For additional information, refer to Section 303-14A Electronic Engine Controls Section 303-14B Electronic Engine Controls.
A 2 · CHECK CC	ONTINUITY OF THE ACCELERATOR PEDAL DEMAND SENSOR POWER SUPPLY CIRCUIT
112. 01.201. 00	1 Turn the ignition switch to the OFF position.
	 Disconnect the ECM electrical connector EN16 and the accelerator pedal electrical connector PA1.
	3 Measure the resistance between EN16-13 and PA1-5.
	Measure the resistance between EN16-12 and PA1-4.
	Is the resistance less than 5 ohms?
	Yes
	GO to A3
	No
	REPAIR the power supply circuit from the ECM to the accelerator pedal. CLEAR the DTC. TEST the
	•
A3: CHECK TH	
	·
	system for normal operation.
	system for normal operation. HE ACCELERATOR PEDAL DEMAND SENSOR POWER SUPPLY FOR A SHORT CIRCUIT TO GROUNI 1 Measure the resistance between PA1-5 and ground. 2 Measure the resistance between PA1-4 and ground. Is the resistance greater than 10,000 ohms? Yes DIAGNOSE the electronic engine control system. For additional information, refer to Section 303-14A Electronic Engine Controls Section 303-14B Electronic Engine Controls. No REPAIR the power supply circuit from the ECM to the accelerator pedal. CLEAR the DTC. TEST th system for normal operation.

PINPOINT T	EST B : DTC P1122, P1123, P1215, P1216, P1344
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: CHECK TH	HE ACCELERATOR PEDAL DEMAND SENSOR OUTPUT
	1 Turn the ignition switch to the RUN position.
	2 Measure the voltage between electrical connector PA1-6 and ground with the accelerator pedal released and with the accelerator pedal at full throttle.
	3 Measure the voltage between electrical connector PA1-3 and ground with the accelerator pedal released and with the accelerator pedal at full throttle.
I .	Does the voltage vary between 0.3 volts and 5 volts? Yes

I	GO to B4
	No The state of th
200000	GO to B2
B2: CARRY O	UT AN ACCELERATOR PEDAL POSITION SENSOR COMPONENT CHECK
	Remove the accelerator pedal. For additional information, refer to Pedal.
	Measure the resistance between pin 1 and pin 6 of the accelerator pedal.
	Measure the resistance between pin 2 and pin 3 of the accelerator pedal.
	Is the resistance between pin 1 and pin 6 between 546 and 1134 ohms, and between pin 2 and pin 3 between 975 and 2025 ohms?
	Yes
	GO to B3
	No
	INSTALL a new accelerator pedal. For additional information, refer to Pedal . CLEAR the DTC. TES the system for normal operation.
B3. CHECK T	HE ACCELERATOR PEDAL DEMAND SENSOR CIRCUIT FOR A SHORT TO GROUND
B3. CHECK II	1 Disconnect the ECM electrical connector EN16.
	Measure the resistance between electrical connector PA1-6 and ground.
	3 Measure the resistance between electrical connector PA1-3 and ground.
	Is the resistance greater than 10,000 ohms? Yes
	GO to B4
	No State of the st
	REPAIR the accelerator pedal demand sensor circuit from the ECM to the accelerator pedal. CLEA
	the DTC. TEST the system for normal operation.
B4: CHECK T	HE ACCELERATOR PEDAL DEMAND SENSOR CIRCUIT FOR OPEN CIRCUIT
	1 Disconnect the ECM electrical connector EN16 and the accelerator pedal electrical connector PA1
	2 Measure the resistance between EN16-103 and PA1-6.
	3 Measure the resistance between EN16-102 and PA1-3.
	Is the resistance less than 5 ohms?
	Yes
	DIAGNOSE the electronic engine control system. For additional information, refer to Section 303-
	14A Electronic Engine Controls Section 303-14B Electronic Engine Controls.
	No
	REPAIR the accelerator pedal demand sensor circuit from the ECM to the accelerator pedal. CLE the DTC. TEST the system for normal operation.

	TEST C : DTC P0121, P0122, P0123
TEST	DETAILS/RESULTS/ACTIONS
CONDITION	·)
C1: 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 EN13-4 and ground
	Is the voltage less than 4.5 volts?
	Yes
	GO to C2 No
	GO to C4
2: 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 EN16 and the throttle position sensor electrical connector
	EN13.
	3 Measure the resistance between EN16-12 and EN13-4.
	Is the resistance less than 5 ohms?
	Yes
	GO to C3 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.
3: CHECK	THE THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT FOR A SHORT TO GROUND
	1 Measure the resistance between EN13-4 and ground.
	Is the resistance greater than 10,000 ohms?
	Yes
	DIAGNOSE the electronic engine control system. For additional information, refer to Section 303-
	14A Electronic Engine Controls Section 303-14B Electronic Engine Controls.
	No REPAIR the throttle position sensor power supply circuit from the ECM to the throttle position

PINPOINT T	EST D : DTC P1251, P1658, P1631, P1657
	for normal operation.
	No REPAIR the circuit from the ECM to the throttle position sensor. CLEAR the DTC. TEST the system.
	14A Electronic Engine Controls Section 303-14B Electronic Engine Controls.
	DIAGNOSE the electronic engine control system. For additional information, refer to Section 303-
	Yes
	Is the resistance greater than 10,000 ohms?
	2 Measure the resistance between EN13-2 and ground.
	1 Measure the resistance between EN13-3 and ground.
C8: CHECK TH	IE THROTTLE POSITION SENSOR OUTPUT CIRCUIT FOR A SHORT TO GROUND
	for normal operation.
	REPAIR the circuit from the ECM to the throttle position sensor. CLEAR the DTC. TEST the system
	GO to C8 No
	Yes
	Is the resistance less than 5 ohms?
	2 Measure the resistance between EN16-76 and EN13-2.
	1 Measure the resistance between EN16-75 and EN13-3.
C7: CHECK CC	ONTINUITY OF THE THROTTLE POSITION SENSOR OUTPUT CIRCUIT
27 011501151	Electronic Engine Controls Section 303-14B Electronic Engine Controls.
	INSTALL a new throttle position sensor. For additional information refer to Section 303-14A
	No
	GO to C7.
	Yes
	Are the resistor values the same?
	2 Measure the resistance between EN13-3 and EN13-4.
	1 Measure the resistance between EN13-2 and EN13-4.
C6: CHECK TH	HE THROTTLE POSITION SENSOR
	CLEAR the DTC. TEST the system for normal operation.
	No REPAIR the throttle position sensor ground circuit from the ECM to the throttle position sensor.
	GO to C6.
	Yes
	Is the resistance less than 5 ohms?
	2 Measure the resistance between EN16-13 and EN13-1.
	EN13.
	1 Disconnect the ECM electrical connector EN16 and the throttle position sensor electrical connector
C5: CHECK TH	IE THROTTLE POSITION SENSOR GROUND WIRE FOR OPEN CIRCUIT
	<u>GO to C5</u>
	No Section 1981
	GO to C6
	Yes
	Is the resistance less than 5 ohms?
	Disconnect the throttle position sensor electrical connector EN13.Measure the resistance between EN13-1 and ground.
	1 Turn the ignition switch to the OFF position.
	1 Turn the ignition equitor to the OFF necition
O 7. OLILOK II	HE THROTTLE POSITION SENSOR GROUND CIRCUIT

TEST	EST D : DTC P1251, P1658, P1631, P1657	
	DETAILS/RESULTS/ACTIONS	
CONDITIONS		
D1: CHECK THE THROTTLE MOTOR RELAY		
	1 Turn the ignition switch to the RUN position.	
	Does the throttle relay make an audible click?	
	Yes	
	GO to D2.	
	No	
	<u>GO to D8</u>	
D2: CHECK THE ECM POWER SUPPLY FROM THE THROTTLE MOTOR RELAY		
	1 Measure the voltage between the throttle motor relay connector JB34-138 and ground.	
	Is the voltage greater than 10 volts?	
	Yes	
	GO to D3.	
	No	
	GO to D4	

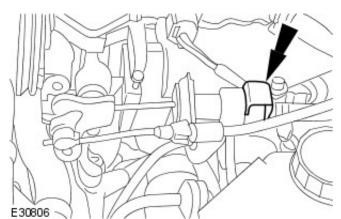
	ONTINUITY OF THE ECM POWER SUPPLY WIRE FROM THE THROTTLE MOTOR RELAY
	1 Turn the ignition switch to the OFF position.
	Disconnect the ECM electrical connector EN16 and remove the throttle motor relay.
	Measure the resistance between the throttle motor relay electrical connector JB34-138 and the ECM electrical connector EN16-134.
	Is the resistance less than 5 ohms? Yes
	DIAGNOSE the electronic engine control system. For additional information, refer to Section 303-14A Electronic Engine Controls Section 303-14B Electronic Engine Controls. No
	REPAIR the ECM power supply wire from the throttle motor relay. CLEAR the DTC. TEST the system for normal operation.
04: CHECK FU	USE 33 IN THE ENGINE COMPARTMENT FUSE BOX.
	1 Check the fuse.
	Is the fuse OK?
	Yes
	<u>GO to D5</u>
	No CO to D/
E OUEOK TI	GO to D6
5: CHECK IF	HE THROTTLE MOTOR RELAY POWER SUPPLY CIRCUIT
	1 Remove the throttle motor relay.
	2 Measure the voltage between the throttle motor relay connector JB34-139 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 mater relevance for DTC. TEST the system for normal apprection
4. CHECK EI	INSTALL a new throttle motor relay. CLEAR the DTC. TEST the system for normal operation. USE 33 FOR A SHORT TO GROUND
6: CHECK FU	Measure the resistance between fuse 33 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.
7: CHECK FL	USE 36 IN THE ENGINE COMPARTMENT FUSE BOX
	1 Check the fuse.
	Is the fuse OK?
	Yes
	GO to D7.
	No GO to D10
O. CHECK TI	HE POWER SUPPLY CIRCUIT TO THE THROTTLE MOTOR RELAY COIL
6: CHECK IF	
	Turn the ignition switch to the RUN position.
	2 Measure the voltage between the throttle motor relay connector JB34-137 and ground.
	Is the voltage greater than 10 volts?
	Yes GO to D11
	No State Strice
	GO to D9
9: CHECK CO	ONTINUITY OF THE POWER SUPPLY CIRCUIT TO THE THROTTLE MOTOR RELAY COIL
1	1 Disconnect the ECM electrical connector EN16 and remove the throttle motor relay.
	2 Measure the resistance between the throttle motor relay electrical connector JB34-137 and the ECM electrical connector EN16-52.
	Is the resistance less than 5 ohms?
	Yes
	GO to D11
	No The state of th
	REPAIR the throttle motor relay coil power supply circuit from the engine compartment fuse box.
	CLEAR the DTC. TEST the system for normal operation.
	CLEAR the DTC. TEST the system for normal operation. FUSE 36 OF THE PASSENGER COMPARTMENT FUSE BOX FOR A SHORT TO GROUND
010: CHECK F	CLEAR the DTC. TEST the system for normal operation. FUSE 36 OF THE PASSENGER COMPARTMENT FUSE BOX FOR A SHORT TO GROUND 1 Measure the resistance between fuse 36 of the passenger compartment fuse box and ground.
D10: CHECK F	CLEAR the DTC. TEST the system for normal operation. FUSE 36 OF THE PASSENGER COMPARTMENT FUSE BOX FOR A SHORT TO GROUND 1 Measure the resistance between fuse 36 of the passenger compartment fuse box and ground. Is the resistance less than 10,000 ohms?
D10: CHECK F	CLEAR the DTC. TEST the system for normal operation. FUSE 36 OF THE PASSENGER COMPARTMENT FUSE BOX FOR A SHORT TO GROUND 1 Measure the resistance between fuse 36 of the passenger compartment fuse box and ground.

No	coil. CLEAR the DTC. TEST the system for normal operation.		
	INSTALL a new fuse. CLEAR the DTC. TEST the system for normal operation. NTINUITY 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?		
Ye	s		
	GO to D12		
No			
	INSTALL a new throttle motor relay. CLEAR the DTC. TEST the system for normal operation.		
D12: CHECK CONTINUITY OF THE THROTTLE MOTOR RELAY GROUND CIRCUIT			
1	Disconnect the ECM electrical connector EN16.		
2	Measure the resistance between the throttle motor relay electrical connector JB34-135 and the ECM electrical connector EN16-52.		
Is	the resistance less than 5 ohms?		
Ye	s		
	DIAGNOSE the electronic engine control system. For additional information, refer to Section 303-		
	14A Electronic Engine ControlsSection 303-14B Electronic Engine Controls.		
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.		

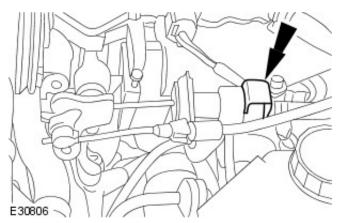
PINPOINT TEST E : DTC P1254, P1250			
TEST	DETAILS/RESULTS/ACTIONS		
CONDITIONS			
E1: CHECK THE ACCELERATOR PEDAL DEMAND SENSOR GROUND CIRCUIT			
	1 Disconnect the ECM electrical connector EN16 and the accelerator pedal electrical connector PA1.		
	2 Measure the resistance between EN16-19 and PA1-1.		
	3 Measure the resistance between EN16-20 and PA1-2.		
	Is the resistance less than 5 ohms?		
	Yes		
	DIAGNOSE the electronic engine control system. For additional information, refer toSection 303-14A Electronic Engine ControlsSection 303-14B Electronic Engine Controls.		
	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.		

Acceleration Control - Accelerator Cable Adjustment2.0L NA V6 - AJV6

General Procedures



1. Remove the primary cable retaining clip.



2. NOTE: Make sure the accelerator cable is seated fully in the retaining bracket.

Fully depress the accelerator pedal and hold down.

3. NOTE: Make sure the throttle actuator is in the fully open position.

Install the retaining clip.

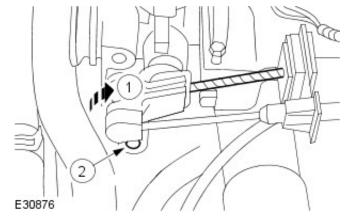
- 4. Release the accelerator pedal.
- **5.** Fully depress the accelerator pedal and hold down.
- **6.** If the accelerator actuator is not in the fully open position, repeat the above procedure.

Acceleration Control - Accelerator Cable 2.0L NA V6 - AJV6

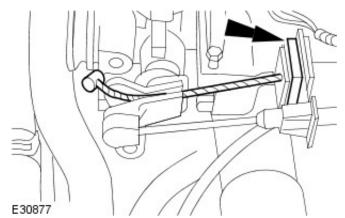
Removal and Installation

Removal

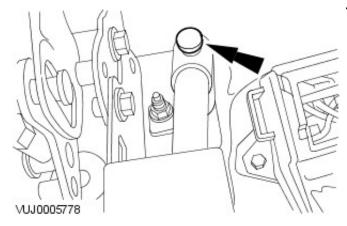
- Disconnect the battery ground cable.
 For additional information, refer to Section <u>414-01 Battery</u>, <u>Mounting and Cables</u>.
- 2. Detach the accelerator cable.
 - 1. Position the accelerator actuator to the fully open position.
 - 2. Detach the accelerator cable.



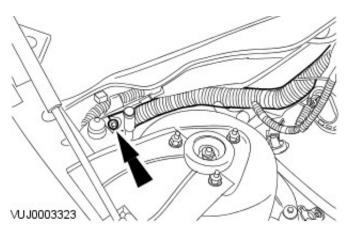
3. Detach the outer accelerator cable.

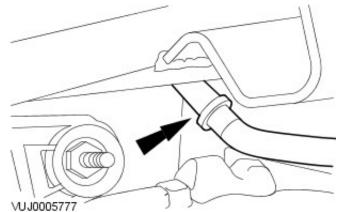


4. Detach the accelerator cable from the accelerator pedal.



5. Disconnect the engine control module (ECM) electrical connector.

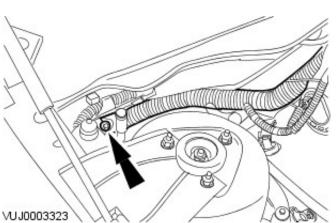




- **6.** Remove the accelerator cable.
 - Detach the accelerator cable grommet.

Installation

- **1.** To install, reverse the removal procedure.
- 2. Tighten to 5 Nm.



3. Adjust the accelerator cable. For additional information, refer to Accelerator Cable Adjustment-2.0L in this section.

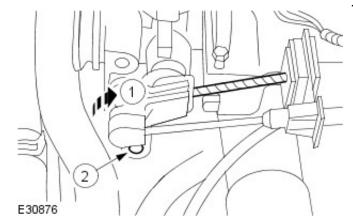
Acceleration Control - Accelerator Pedal

Removal and Installation

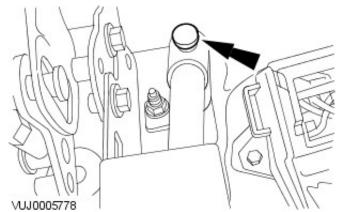
Removal

Vehicles with 2.0L engine

- 1. Detach the accelerator cable.
 - 1. Position the accelerator actuator to the fully open position.
 - 2. Detach the accelerator cable.

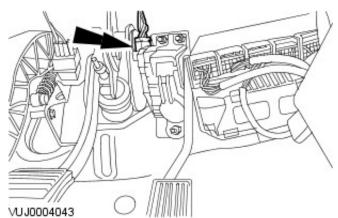


2. Detach the accelerator cable.



Vehicles with 2.5L, 3.0L or diesel engine

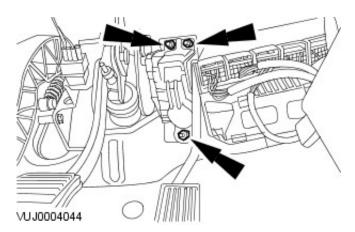
3. Disconnect the accelerator pedal electrical connector.

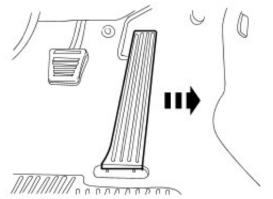


All vehicles

4. NOTE: Vehicles with 2.5L, 3.0L or diesel engine shown, 2.0L similar.

Remove the accelerator pedal retaining nuts.

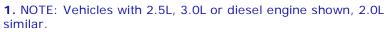




5. Remove the accelerator pedal.

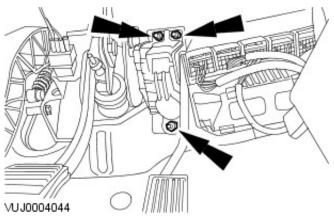


Installation



To install, reverse the removal procedure.

• Tighten to 9 Nm.



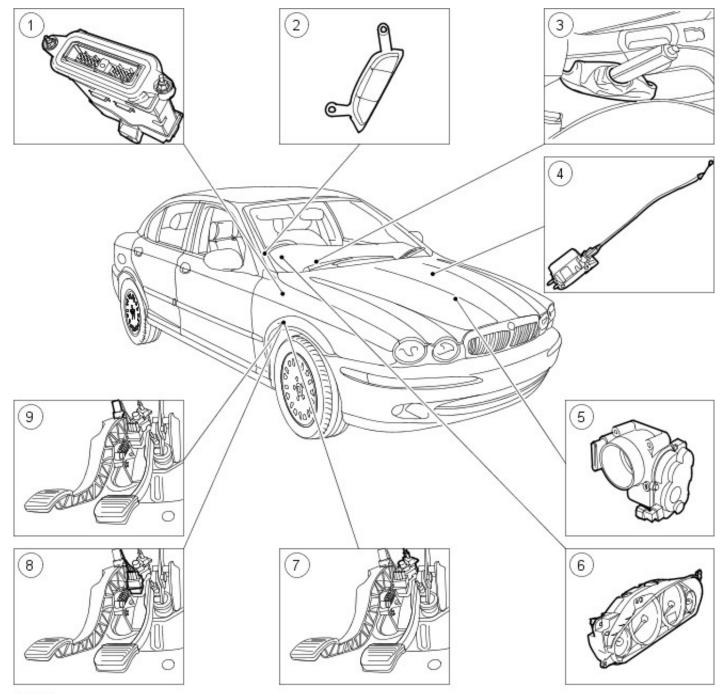
Speed Control -

Torque Specifications

Description	Nm	lb-ft	lb-in
Cruise control switch retaining screws	3	I_	27

Speed Control - Speed Control Description and Operation

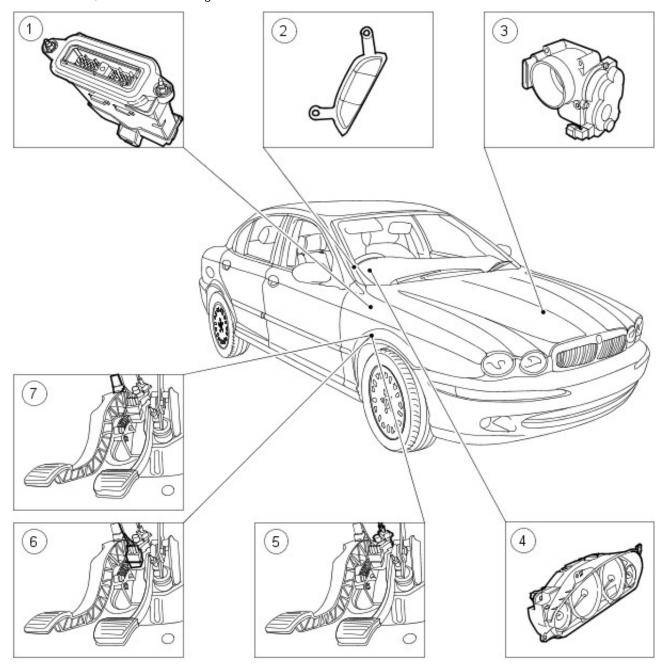
2.0L vehicles



E31059

Item	Part Number	Description
1	_	Engine control module (ECM)
2	_	Cruise control switch
3	_	Handbrake switch
4	_	Cruise control module
5	_	Throttle body
6	_	Instrument cluster (IC)
7	-	Speed control deactivator switch (brake pedal position primary switch, black)
8	-	Speed control deactivator switch (brake pedal position secondary switch)
9	-	Speed control deactivator switch (clutch pedal position switch, red, vehicles fitted with manual transmission)

Vehicles with 2.5L, 3.0L or diesel engine



VUJ0004372

Item	Part Number	Description
1	_	Engine control module (ECM)
2	_	Cruise control switch
3	_	Throttle body
4	_	Instrument cluster (IC)
5	_	Speed control deactivator switch (brake pedal position secondary switch, green)
6	_	Speed control deactivator switch (brake pedal position primary switch, black)
7	_	Speed control deactivator switch (clutch pedal position switch, red, vehicles fitted with manual transmission)

System operation

The speed control system operates between the following speeds:

• On vehicles with 2.0L engine the speed range is 40km/h (25mile/h) and 192km/h (120mile/h). On vehicles with 2.5L, 3.0L or diesel engine the speed range is 40km/h (25mile/h) and 180km/h (112mile/h).

The speed control system is designed to maintain a selected vehicle speed between these two parameters.

Vehicles with 2.0L engine

Any of the deactivator switches operated by the handbrake, footbrake or clutch pedal (vehicles fitted with manual transmission) or by information sent by the engine control module (ECM) to the cruise control module will interrupt the speed control operation. This will allow the system to go into STANDBY mode. Operating the RESUME switch with the system in STANDBY mode will allow the vehicle to accelerate until the last set speed is resumed, providing the vehicle speed remains between the upper and lower operating limits of the speed control system.

Vehicles with 2.5L, 3.0L or diesel engine

Any of the deactivator switches operated by the brake or clutch pedal (vehicles fitted with manual transmission) will interrupt the speed control operation by switching the signal to the ECM. This will allow the system to go into STANDBY mode. Operating the RESUME switch with the system in STANDBY mode will allow the vehicle to accelerate until the last set speed is resumed, providing the vehicle speed remains between the upper and lower operating limits of the speed control system.

Vehicle Speed Signal

The vehicle speed signal for the speed control system comes from the anti-lock control system (ABS) through the control area network (CAN) via the (EMS).

Actuator Switches

ON Switch

When the ON switch is operated the speed control system is activated and providing the vehicle is travelling at a speed greater than 40km/h (25mile/h), the speed control system will accept the speed inputs. The instrument cluster (IC) will inform the driver that the speed control has been activated.

OFF Switch

When the OFF switch is operated the speed control system is deactivated and the speed setting stored in the ECM memory will be erased. The speed control warning in the IC will be extinguished.

RESUME Switch

When the RESUME switch is operated with the system in STANDBY mode, providing the vehicle speed is above, 40km/h (25mile/h) the vehicle will accelerate until the last set speed is reached.

The RESUME switch will not function if:

- The OFF switch has been operated.
- The ignition switch has been turned to the OFF position.
- The vehicle speed is below 40km/h (25mile/h).
- There is a loss of drive between the driveline system and the road wheels.
- The diagnostic system has detected a fault with the speed control system.

CANCEL Switch

When the CANCEL switch is operated with the vehicle speed control system active, the system will enter STANDBY mode.

SET Switch

When the SET switch is operated, providing the vehicle is travelling above 40 km/h (25mile/h) the system allows the vehicle speed to be maintained to \pm 2km/h (1 mile/h). When the vehicle speed control system is active, operating the SET switch will increase or decrease the vehicle speed respectively until the switch is released. If the SET switch is operated momentarily, the vehicle speed will increase or decrease in 2km/h (1 mile/h) increments.

Handbrake switch (vehicles with 2.0L engine only)

If the handbrake is operated when the speed control system is active, the cruise control module will receive a signal from the handbrake position switch via the (EMS). This will put the system into STANDBY mode and allow the vehicle to return to a speed demanded by the throttle pedal position.

Brake Pedal Position Switches

Vehicles with 2.0L engine

If the brake pedal is operated when the speed control system is active, the cruise control module will receive a signal from the brake pedal position primary and secondary switches. This will put the system into STANDBY mode and allow

the vehicle to return to a speed demanded by the throttle pedal position.

Vehicles with 2.5L, 3.0L or diesel engine

If the brake pedal is operated when the speed control system is active, the ECM will receive a signal from the brake pedal position primary and secondary switches. This will put the system into STANDBY mode and allow the vehicle to return to a speed demanded by the throttle pedal position.

The brake pedal position primary switch is also used to operate the stop lamps.

Clutch Pedal Position Switch (vehicles fitted with manual transmission)

Vehicles with 2.0L or diesel engine

If the clutch pedal is operated when the speed control system is active, the cruise control module will receive a signal from the clutch pedal position (CPP) switch. This will put the system into STANDBY mode and allow the vehicle to return to a speed demanded by the throttle pedal.

Vehicles with 2.5L, 3.0L or diesel engine

If the clutch pedal is operated when the speed control system is active, the ECM will receive a signal from the clutch pedal position (CPP) switch. This will put the system into STANDBY mode and allow the vehicle to return to a speed demanded by the throttle pedal.

Throttle Body

The throttle body moves the throttle plate to a position demanded by the throttle pedal or the speed control system.

Cruise control module (vehicles with 2.0L engine only)

The cruise control module receives information from the sensors and the ECM, which enables it to hold the throttle lever in a set position, this is achieved via a cable which is attached to the throttle lever. The cruise control actuator cable is permanently attached to the cruise control module and cannot be replaced or adjusted.

Speed Control - Speed Control 2.0L NA V6 - AJV6

Diagnosis and Testing

The complexity of the electronics involved with the vehicle speed control system and the communication network which is connected to the system, preclude the use of workshop general electrical test equipment. For diagnosis and testing of the vehicle speed control system, refer to the Jaguar approved diagnostic system.

Inspection and Verification

- 1. 1. Verify the customer concern.
- 2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Throttle body mechanism	ModuleSwitch(es)Instrument cluster

- 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. 4. If the cause is not visually evident, verify the symptom and refer to the Jaguar approved diagnostic system.
- 5. The DTC summaries are generated to support the Jaguar approved diagnostic system, but also provide the basis for diagnosis of OBD related concerns using a suitable generic scan tool, in conjunction with the electrical guides. Until the DTC summaries and electrical guides are available, the speed control system can only be accurately diagnosed using the Jaguar approved diagnostic system. For additional information, refer to Dealer technical support.

Speed Control - Speed Control 2.5L NA V6 - AJV6/3.0L NA V6 - AJ27

Diagnosis and Testing

The complexity of the electronics involved with the vehicle speed control system and the communication network which is connected to the system, preclude the use of workshop general electrical test equipment. For diagnosis and testing of the vehicle speed control system, refer to the Jaguar approved diagnostic system.

The Jaguar approved diagnostic system tests and analyses all functions of the vehicle speed control system. The following DTCs may be tested using a suitable meter.

Inspection and Verification

- 1. 1. Verify the customer concern.
- 2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Throttle body mechanism	 Throttle body actuator Module Switch(es) Instrument cluster

- 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. 4. If the cause is not visually evident, verify the symptom and refer to the Jaguar approved diagnostic system.

Diagnostic Trouble Code (DTC) Index

DTC	Description	Possible Source	Action
P0568	Speed control input signal low/high resistance, open circuit.	 Speed control switches internal steering wheel circuit, open circuit, high resistance. Cassette reel open circuit, high resistance. Cassette reel to engine control module (ECM) circuit, open circuit, high resistance 	GO to Pinpoint Test A.
P0565	Speed control ON/OFF switch fault.	 Speed control switches internal steering wheel circuit, short to ground. Cassette reel short to ground. Cassette reel to ECM circuit short to ground. ON/OFF switch failure. (Stuck on) 	GO to Pinpoint Test B.
P0566	Speed control CANCEL switch fault.	 Speed control switches internal steering wheel circuit, short to ground. Cassette reel short to ground. Cassette reel to ECM circuit short to ground CANCEL switch failure. (Stuck on). 	GO to Pinpoint Test C.
P0567	Speed control RESUME switch fault.	 Speed control switches internal steering wheel circuit, short to ground. Cassette reel short to ground. Cassette reel to ECM circuit short to ground. RESUME switch failure. (Stuck on) 	GO to Pinpoint Test D.
P0569	Speed control SET/- switch fault.	 Speed control switches internal steering wheel circuit, short to ground. Cassette reel short to ground. Cassette reel to ECM circuit short to ground. SET/- switch failure. 	GO to Pinpoint Test E.
P0570	Speed control SET/+ switch fault.	 Speed control switches internal steering wheel circuit, short to ground. Cassette reel short to ground. Cassette reel to ECM circuit short to ground. SET/+ switch failure. 	GO to Pinpoint Test F.
P0831	Clutch cancel switch, low voltage. (Switch normally closed).	Switch supply open circuit.Switch to ECM circuit open circuit or high	GO to Pinpoint Test

		resistance. • Switch failure.	<u>G.</u>
P0832	Clutch cancel switch, high voltage. (Switch normally closed).	Switch short circuit to battery.Switch failure.	GO to Pinpoint Test G.
	Clutch pedal safety switch, low voltage. (Switch normally open).	 Clutch pedal safety switch supply circuit open circuit. Clutch pedal safety switch to ECM circuit open circuit/high resistance. Switch failure. 	GO to Pinpoint Test <u>H.</u>
P0835	Clutch pedal safety switch, high voltage. (Switch normally open).	 Clutch pedal safety switch to ECM circuit short circuit to battery. Switch failure. 	GO to Pinpoint Test H.
	Brake ON/OFF switch, brake cancel switch malfunction.	 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. 	GO to Pinpoint Test L.

Pinpoint Tests

DINDOINT	EST A : P0568. CHECK SPEED CONTROL INPUT WIRE FOR OPEN CIRCUIT/HIGH		
RESISTANCE			
TEST			
CONDITIONS	DETAILS/RESULTS/ACTIONS		
	ITERNAL STEERING WHEEL CIRCUIT FOR OPEN CIRCUIT/HIGH RESISTANCE (INPUT)		
ATT. GITEGIC III	1 Disconnect steering wheel internal connector, SW5.		
	Disconnect steering wheel connector, SW4.		
	3 Measure the resistance between SW5, pin 4 (YR) and SW4, pin 1 (YR).		
	Is the resistance less than 5 ohms?		
	Yes		
	GO to A3.		
	No Section 1.		
	INSTALL a new steering wheel assembly.		
	REFER to Section 211-04 Steering Column.		
	CLEAR the DTC. TEST the system for normal operation.		
A2: CHECK IN	ITERNAL STEERING WHEEL CIRCUIT FOR OPEN CIRCUIT/HIGH RESISTANCE (SIGNAL)		
	1 Measure the resistance between SW5, pin 2 (B) and SW4, pin 3.		
	Is the resistance less than 5 ohms?		
	Yes		
	GO to A3. No		
	INSTALL a new steering wheel assembly.		
	REFER to Section 211-04 Steering Column.		
	CLEAR the DTC. TEST the system for normal operation.		
A3: CHECK ST	FEERING WHEEL CASSETTE FOR OPEN CIRCUIT/HIGH RESISTANCE (INPUT)		
	1 Disconnect steering wheel Cassette connector, IP34.		
	2 Reconnect steering wheel internal connector, SW5.		
	3 Measure the resistance between SW5, pin 4 (YR) and IP34, pin 8 (YR).		
	Is the resistance less than 5 ohms?		
	Yes		
	GO to A4.		
	No		
	INSTALL a new steering wheel Cassette assembly.		
	REFER to Section 211-04 Steering Column.		
A A CUECK CO	CLEAR the DTC. TEST the system for normal operation.		
A4: CHECK S	TEERING WHEEL CASSETTE FOR OPEN CIRCUIT/HIGH RESISTANCE (SIGNAL)		
	1 Disconnect steering wheel cassette connector, IP34.		
	Measure the resistance between SW5, pin 2 (B) and IP34, pin 6 (YG).		

ISTANCE
to wiring
to wiring
3

PINPOINT TEST B: P0565. SPEED CONTROL ON/OFF SWITCH MALFUNCTION			
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS		
B1: CHECK SWITCH F	B1: CHECK SWITCH FUNCTION OF ON/OFF SWITCH		
	1 Connect an Ohmmeter between pins 1 and 3 of the Speed Control switchpack.		
	2 Set the switch to the ON position.		
	Does the resistance vary by 2200 ohms?		
	Yes		
	GO to B2.		
	No		
	INSTALL a new switchpack.		
	REFER to Speed Control Switch in this section.		
	CLEAR the DTC. TEST the system for normal operation.		
B2: CHECK SWITCH F	UNCTION OF ON/OFF SWITCH		
	1 Set the switch to the OFF position.		
	Is the resistance 0 ohms?		
	Yes		
	No electrical fault in switchpack. RECHECK DTCs.		
	No		
	INSTALL a new switchpack.		
	REFER to Speed Control Switch in this section.		
	CLEAR the DTC. TEST the system for normal operation.		

PINPOINT TEST C : P0566. SPEED CONTROL CANCEL SWITCH MALFUNCTION			
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS		
C1: CHECK SWITCH F	C1: CHECK SWITCH FUNCTION OF CANCEL SWITCH		
	1 Connect an Ohmmeter between pins 1 and 3 of the Speed Control switchpack.		
	2 Operate the Cancel switch.		
	Does the resistance vary by 4200 ohms?		
Yes No electrical fault in switchpack. RECHECK DTCs. No INSTALL a new switchpack. REFER to Speed Control Switch in this section. CLEAR the DTC. TEST the system for normal operation.			

PINPOINT TEST D: P0567. SPEED CONTROL RESUME SWITCH MALFUNCTION		
TEST CONDITIONS	TEST CONDITIONS DETAILS/RESULTS/ACTIONS	
D1: CHECK SWITCH FUNCTION OF RESUME SWITCH		
	1 Connect an Ohmmeter between pins 1 and 3 of the Speed Control switchpack.	
2 Operate the Resume switch.		

I	Does the resistance vary by 3200 ohms?	L
	Yes	L
	No electrical fault in switchpack. RECHECK DTCs.	L
	No ·	L
	INSTALL a new switchpack.	L
	REFER to Speed Control Switch in this section.	L
	CLEAR the DTC. TEST the system for normal operation.	L

PINPOINT TEST E : P0569. SPEED CONTROL SET/- SWITCH MALFUNCTION			
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS		
E1: CHECK SWITCH F	E1: CHECK SWITCH FUNCTION OF SET/- SWITCH		
	1 Connect an Ohmmeter between pins 1 and 3 of the Speed Control switchpack.		
	2 Operate the Set /- switch.		
	Does the resistance vary by 4000 ohms?		
	Yes		
	No electrical fault in switchpack. RECHECK DTCs.		
	No		
	INSTALL a new switchpack.		
	REFER to Speed Control Switch in this section.		
	CLEAR the DTC. TEST the system for normal operation.		

PINPOINT TEST F: P0570. SPEED CONTROL SET/+ SWITCH MALFUNCTION		
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS	
F1: CHECK SWITCH FUNCTION OF SET/+ SWITCH		
	1 Connect an Ohmmeter between pins 1 and 3 of the Speed Control switchpack.	
	2 Operate the Set /+ switch.	
	Does the resistance vary by 3700 ohms?	
	Yes	
	No electrical fault in switchpack. RECHECK DTCs.	
	No	
	INSTALL a new switchpack.	
	REFER to Speed Control Switch in this section.	
	CLEAR the DTC. TEST the system for normal operation.	

PINPOINT T	EST G : P0831, P0832. CLUTCH CANCEL SWITCH, HIGH/LOW VOLTAGE
TEST	DETAILS/RESULTS/ACTIONS
CONDITIONS	
G1: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE CLUTCH CANCEL SWITCH
	1 Disconnect the clutch cancel switch electrical connector, PA4.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between PA4, pin 1 (RW) and GROUND.
	Is the voltage greater than 10 volts?
	Yes
	GO to G2.
	No REPAIR the circuit between the clutch cancel switch electrical connector, PA4, pin 1 (RW) and the
	ignition switch. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the
	system for normal operation.
	(This circu t includes the ignition relay and the inertia switch)
1	HE POWER SUPPLY CIRCUIT TO THE CLUTCH CANCEL SWITCH FOR SHORT CIRCUIT TO
BATTERY	
	1 Disconnect the clutch cancel switch electrical connector, PA4.
	2 Turn the ignition switch to the OFF position.
	3 Measure the voltage between PA4, pin 1 (RW) and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	Repair the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No
	GO to G3.
G3: CHECK TH	HE SWITCH ACTION OF THE CLUTCH CANCEL SWITCH
	1 Connect an ohmmeter between pins 1 and 3 of the clutch cancel switch.
	2 Operate the clutch pedal up and down, while observing the resistance reading.
	Does the resistance switch between open and closed circuit as the pedal is operated?
	Yes
	GO to G4.
I	L.

I	No
	INSTALL a new clutch cancel switch. CLEAR the DTC. TEST the system for normal operation.
G4: CHEC	K THE SWITCH ACTION OF THE CLUTCH CANCEL SWITCH
	1 Disconnect the ECM electrical connector, EN16.
	2 Reconnect the clutch cancel switch electrical connector, PA4.
	3 Connect a voltmeter between ECM electrical connector EN16, pin 33 (WG) and GROUND.
	4 Turn the ignition switch to the ON position.
	5 Operate the clutch pedal up and down, while observing the voltage reading.
	Does the voltage switch between 0 volts and battery voltage as the pedal is operated? Yes
	INSTALL a new ECM. REFER to Section 303-14A Electronic Engine Controls / 303-14B Electronic Engine Controls. Before replacing a ECM, contact Dealer technical support. CLEAR the DTC. TEST the system for normal operation. No GO to G5.
G5: CHEC	K THE CLUTCH CANCEL SWITCH SIGNAL WIRE FOR CONTINUITY
OS. CITE	1 Turn the ignition switch to the OFF position.
	Disconnect clutch cancel switch electrical connector, PA4.
	3 Measure the resistance between clutch cancel switch electrical connector PA4, pin 3 (W) and ECM electrical connector EN16, pin 33 (WG).
	Is the resistance less than 5 ohms? Yes No electrical fault in circuit. RECHECK DTCs.
	No electrical fault in circuit. Recheck Dics.
	REPAIR the circuit between clutch cancel switch electrical connector PA4, pin 3 (W) and ECM electrical connector EN16, pin 33 (WG). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

<u> </u>	CLEAR the DTC. TEST the system for normal operation.
DINIDOINT	FEST II - DOOG A DOOG E CHUTCH DEDAL CAFETY CWITCH HIGH /I OW VOLTAGE
	TEST H: P0834, P0835. CLUTCH PEDAL SAFETY SWITCH, HIGH/LOW VOLTAGE
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	·
H1: CHECK I	HE POWER SUPPLY CIRCUIT TO THE CLUTCH PEDAL SAFETY SWITCH
	1 Disconnect the clutch pedal safety switch electrical connector, PA5.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between PA5, pin 1 (RW) and GROUND.
	Is the voltage greater than 10 volts?
	Yes
	GO to H3.
	No
	REPAIR the circuit between the clutch pedal safety switch electrical connector, PA5, pin 1 (RW) and
	the ignition switch. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
LIQ. CLIECK T	THE POWER SUPPLY CIRCUIT TO THE CLUTCH PEDAL SAFETY SWITCH FOR SHORT CIRCUIT TO
BATTERY	HE POWER SUPPLY CIRCUIT TO THE CLUTCH PEDAL SAFETY SWITCH FOR SHORT CIRCUIT TO
DATTERT	1 Disconnect the clutch pedal safety switch electrical connector, PA5.
	2 Turn the ignition switch to the OFF position.
	3 Measure the voltage between PA5, pin 1 (RW) and GROUND.
	Is the voltage greater than 1 volt?
	Yes DEDAID the chart sircuit. For additional information, refer to wiring diagrams. CLEAD the DEC
	REPAIR the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
	No
	GO to H3.
H3: CHECK T	THE SWITCH ACTION OF THE CLUTCH PEDAL SAFETY SWITCH
	1 Connect an ohmmeter between pins 1 and 2 of the clutch pedal safety switch.
	Operate the clutch pedal up and down, while observing the resistance reading.
	Does the resistance switch between open and closed circuit as the pedal is operated?
	Yes
	GO to H4.
	No South Francisco
	INSTALL a new clutch pedal safety switch. CLEAR the DTC. TEST the system for normal operation.
H4: CHECK T	HE SWITCH ACTION OF THE CLUTCH PEDAL SAFETY SWITCH
	1 Disconnect the ECM electrical connector, EN16.
	2 Reconnect the clutch pedal safety switch electrical connector, PA5.
	3 Connect a voltmeter between ECM electrical connector EN16, pin 31 (B) and GROUND.
	Connect a voluncial between Low electrical connector Livro, pin 31 (b) and GROUND.
	

	Turn the ignition switch to the ON position.
5	Operate the clutch pedal up and down, while observing the voltage reading.
Do	bes the voltage switch between 0 volts and battery voltage as the pedal is operated?
Ye	es s
	INSTALL a new ECM. REFER to Section 303-14A Electronic Engine Controls / 303-14B Electronic
	Engine Controls. Before replacing a ECM, contact Dealer technical support. CLEAR the DTC. TEST
l L.	the system for normal operation.
No	
	GO to H5.
H5: CHECK THE	CLUTCH PEDAL SAFETY SWITCH SIGNAL WIRE FOR CONTINUITY
1	Turn the ignition switch to the OFF position.
2	Disconnect the clutch pedal safety switch electrical connector, PA5.
3	Measure the resistance between clutch pedal safety switch electrical connector PA5, pin 2 (W) and ECM electrical connector EN16, pin 31 (B).
Is	the resistance less than 5 ohms?
Ye	es ·
	No electrical fault in circuit. RECHECK DTCs.
No	
	REPAIR the circuit between clutch pedal safety switch electrical connector PA5, pin 2 (W) and ECM
	electrical connector EN16, pin 31 (B). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

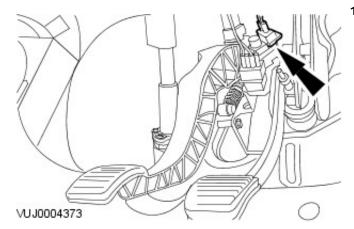
	the DTC. TEST the system for normal operation.
	TEST I : P1571. BRAKE ON/OFF SWITCH / BRAKE CANCEL SWITCH MALFUNCTION
TEST	DETAILS/RESULTS/ACTIONS
CONDITION	
11: CHECK T	HE POWER SUPPLY CIRCUIT TO THE BRAKE ON/OFF SWITCH
	1 Disconnect the brake ON/OFF switch electrical connector, PA3.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between PA3, pin 3 (NR) and GROUND.
	Is the voltage greater than 10 volts?
	Yes
	GO to 12. No
	REPAIR the circuit between the brake ON/OFF switch electrical connector, PA3, pin 3 (NR) and the
	ignition switch. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the
	system for normal operation.
	(This circu t icludes the inertia switch, ign t on relay, and the central junct on fuse box)
12: CHECK T	HE POWER SUPPLY CIRCUIT TO THE BRAKE ON/OFF SWITCH FOR SHORT CIRCUIT TO BATTERY
	1 Turn the ignition switch to the OFF position.
	2 Measure the voltage between PA3, pin 3 (NR) and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	Repair the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST
	the system for normal operation.
	GO to 13.
13. CHECK T	HE BRAKE ON/OFF SWITCH SIGNAL WIRE FOR CONTINUITY
13. CHLCK I	1 Disconnect the ECM electrical connector, EN16.
	2 Measure the resistance between the ECM electrical connector, EN16, pin 8 (GO) and brake ON/OFF
	switch electrical connector PA3, pin 1 (GW).
	Is the resistance less than 5 ohms?
	Yes
	GO to 14.
	No No
	REPAIR the circuit between the ECM electrical connector, EN16, pin 8 (GO) and brake ON/OFF
	switch electrical connector PA3, pin 1 (GW). For additional information, refer to wiring diagrams.
	CLEAR the DTC. TEST the system for normal operation.
14: CHECK T	HE SWITCH ACTION OF THE BRAKE ON/OFF SWITCH
	1 Measure the resistance between pins 1 and 3 of the brake ON/OFF switch, with the brake pedal at
	rest.
	Is the switch open circuit?
	Yes
	GO to 15. No
	INSTALL a new brake ON/OFF Switch. CLEAR the DTC. TEST the system for normal operation.
IS: CHECK T	HE SWITCH ACTION OF THE BRAKE ON/OFF SWITCH
I J. CITECK I	THE SWITTER ACTION OF THE DRAILE ON/OFF SWITTER

[1 Measure the resistance between pins 1 and 3 of the brake ON/OFF switch, with the brake pedal
	depressed.
	Is the resistance less than 5 ohms? Yes
	INSTALL a new ECM. REFER to Section <u>303-14A Electronic Engine Controls</u> / <u>303-14B Electronic Engine Controls</u> . Before replacing a ECM, contact Dealer technical support. CLEAR the DTC. TEST
	the system for normal operation. No
	INSTALL a new brake ON/OFF switch. CLEAR the DTC. TEST the system for normal operation.
16: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE BRAKE CANCEL SWITCH
	1 Disconnect the brake cancel switch electrical connector, PA2.
	2 Turn the ignition switch to the ON position.
	3 Measure the voltage between PA2, pin 2 (NR) and GROUND.
	Is the voltage greater than 10 volts?
	Yes
	GO to 17.
	No REPAIR the circuit between the brake cancel switch electrical connector, PA2, pin 2 (NR) and the
	Ignition Switch. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the
	system for normal operation.
	(This circut includes the inertia switch, ignt on relay, and the central junct on fuse box)
17: CHECK TH	HE POWER SUPPLY CIRCUIT TO THE BRAKE CANCEL SWITCH FOR SHORT CIRCUIT TO BATTERY
	1 Disconnect the brake cancel switch electrical connector, PA2.
	2 Turn the ignition switch to the OFF position.
	3 Measure the voltage between PA2, pin 2 (NR) and GROUND.
	Is the voltage greater than 1 volt?
	Yes
	Repair the short circuit. For additional information, refer to wiring diagrams. CLEAR the DTC. TEST
	the system for normal operation.
	No GO to 18.
I 8 · CHECK TH	HE BRAKE CANCEL SWITCH SIGNAL WIRE FOR CONTINUITY
IO. CHECK II	1 Disconnect the ECM electrical connector, EN16.
	2 Measure the resistance between the ECM electrical connector, EN16, pin 9 (U) and brake cancel
	switch electrical connector PA2, pin 1 (U).
	Is the resistance less than 5 ohms?
	Yes
	GO to 19.
	No
	REPAIR the circuit between the ECM electrical connector, EN16, pin 9 (U) and brake cancel switch electrical connector PA2, pin 1 (U). For additional information, refer to wiring diagrams. CLEAR the DTC. TEST the system for normal operation.
19: CHECK TH	HE SWITCH ACTION OF THE BRAKE CANCEL SWITCH
	1 Measure the resistance between pins 1 and 2 of the brake cancel switch, with the brake pedal at rest.
	Is the switch open circuit?
	Yes
	GO to 110.
	No No
	INSTALL a new brake cancel switch. CLEAR the DTC. TEST the system for normal operation.
I 10: CHECK 1	THE SWITCH ACTION OF THE BRAKE CANCEL SWITCH
	1 Measure the resistance between pins 1 and 2 of the brake cancel switch, with the brake pedal depressed.
	Is the resistance less than 5 ohms?
	Yes
	INSTALL a new ECM. REFER to Section 303-14A Electronic Engine Controls / 303-14B Electronic
	Engine Controls. Before replacing a ECM, contact Dealer technical support. CLEAR the DTC. TEST
	the system for normal operation.
	No

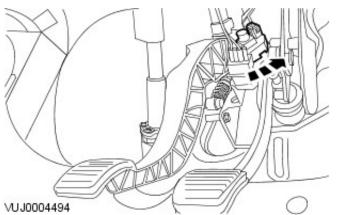
Speed Control - Speed Control Deactivator Switch

Removal and Installation

Removal

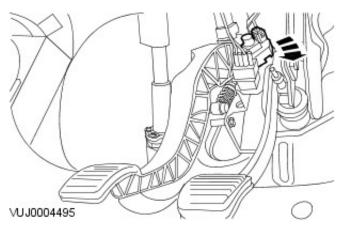


 Disconnect the speed control deactivator switch electrical connector.



- 2. Remove the speed control deactivator switch.
 - Turn the speed control deactivator switch 45 degrees counter clockwise.

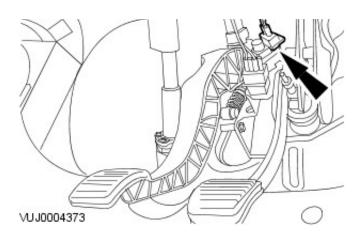
Installation



- **1.** NOTE: Operate the brake pedal to allow the speed control deactivator switch plunger to remain in the fully extended position during installation.
- NOTE: Releasing and then pulling back on the brake pedal until the pedal reaches the stop in the brake booster, will adjust the speed control de-activator switch plunger to the required setting.

Install the speed control deactivator switch.

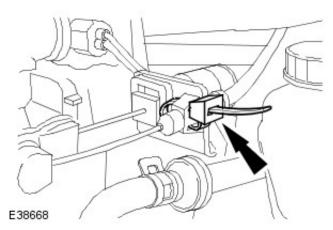
- Turn the speed control deactivator switch 45 degrees clockwise.
- 2. Connect the speed control deactivator switch electrical connector.



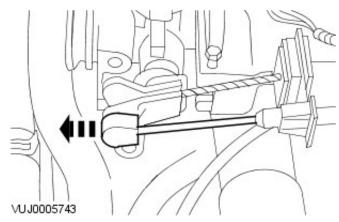
Speed Control - Speed Control Module Removal and Installation

Removal

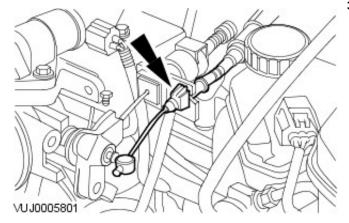
1. Remove the speed control module cable retaining tie strap.



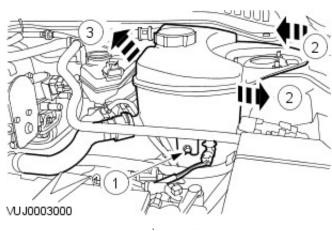
2. Detach the inner cable.

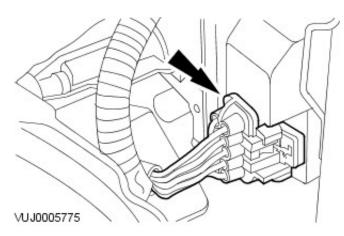


3. Detach the outer cable.

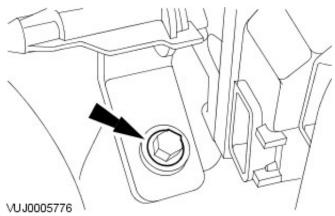


- 4. Detach the coolant expansion tank.
 - 1. Remove the coolant expansion tank retaining bolt.
 - 2. Turn the coolant expansion tank counter clockwise.
 - 3. Detach the coolant expansion tank.

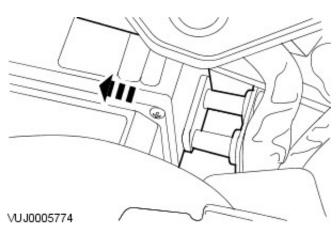




5. Disconnect the electrical connector.



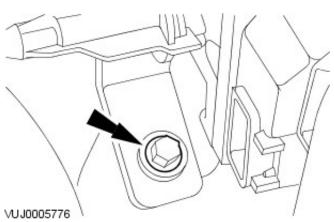
6. Remove the module retaining bolt.



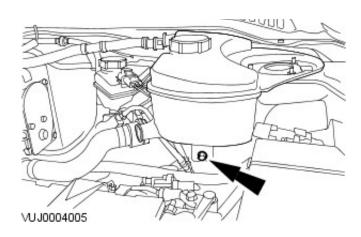
7. Remove the module.

Installation

- **1.** To install, reverse the removal procedure.
- 2. Tighten to 4 Nm.



3. Tighten to 3 Nm.



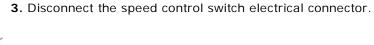
Speed Control - Speed Control Switch Removal and Installation

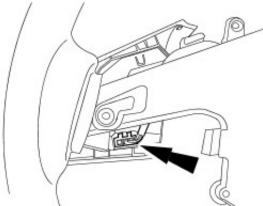
Removal

- 1. Remove the steering wheel. For additional information, refer to: Steering Wheel (211-04 Steering Column, Removal and Installation).
- 2. Remove the steering wheel finisher trim panel.



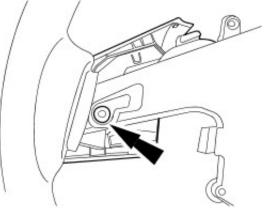
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4. Remove the speed control switch.

Installation

- 1. To install, reverse the removal procedure.
 - Tighten to 4 Nm.

