

Description and Operation

Introduction

Many of the procedures associated with vehicle maintenance and repair involve physical hazards or other risks to health. This subsection lists, alphabetically, some of these hazardous operations and the materials and equipment associated with them. Precautions necessary to avoid these hazards are identified.

The list is not exhaustive and all operations and procedures, and the handling of materials, should be carried out with health and safety in mind.

Before using any product the Materials Safety Data Sheet supplied by the manufacturer or supplier should be consulted.

Acids and Alkalis

See also Battery Acids.

For example caustic soda, sulphuric acid.

Used in batteries and cleaning materials.

Irritant and corrosive to the skin, eyes, nose and throat. Cause burns. Can destroy ordinary protective clothing.

Avoid splashes to the skin, eyes and clothing. Wear suitable protective impervious apron, gloves and goggles. Do not breath mists.

Make sure access to eye wash bottles, shower and soap are readily available for splashing accidents.

Display Eye Hazard sign.

Air Bags

See also Fire, Chemical Materials.

Highly flammable, explosive – observe No Smoking policy.

Used as a safety restraint system mounted in the steering wheel and passenger side of the instrument panel.

The inflator contains a high-energetic propellant which, when ignited, produces a VERY HOT GAS (2500°C).

The gas generant used in air bags is Sodium Azide. This material is hermetically sealed in the module and is completely consumed during deployment. No attempt should be made to open an air bag inflator as this will lead to the risk of exposure to Sodium Azide. If a gas generator is ruptured, full protective clothing should be worn when dealing with the spillage.

After normal deployment, gloves and safety goggles must be worn during the handling process.

Deployed air bags should be disposed of in a plastic bag in accordance with local regulations at an approved chemical waste site.

Following any direct contact with gas generant.

- wash affected areas thoroughly with water.
- seek medical assistance if necessary.

Air Bags - Do's

- Do store modules in an upright position.
- Do keep modules dry.
- Do carry modules with the cover side pointing away from the body.
- Do place modules with their cover side upwards.
- Do carefully inspect modules for damage.
- Do stand to one side when connecting modules.
- Do make sure all test equipment is properly calibrated and maintained.



TIM0101003

Vehicles and replacement components which contain asbestos are identified by this symbol. See Asbestos in this subsection.



TIM0101004

Components or assemblies displaying this symbol give warning that the component contains a corrosive substance. See Acids and Alkalis in this subsection.



TIM0101005

Displaying the caution circle with a deleted lighted match symbol, caution against the use of naked lights or flames within the immediate vicinity due to the presence of highly flammable or explosive liquids or vapors. See Fire in this subsection.



TIM0101006

Displaying this symbol (normally in conjunction with 5 above) warn of the presence of potentially explosive matter within the immediate vicinity.

Description and Operation

Road or roller testing may be carried out for various reasons and a procedure detailing pre-test checks, engine starting and stopping, pre-driving checks, on-test checks and final checks to be completed on completion of the test is given below.

Unless complete vehicle performance is being checked, the full road test procedure need not be carried out. Instead, those items particularly relevant to the system(s) being checked can be extracted.

Pre-Test Checks



WARNING: If the brake system hydraulic fluid level is low, pedal travel is excessive or a hydraulic leak is found, do not attempt to road test the vehicle until the reason for the low fluid level, excessive pedal travel or hydraulic leak is found and rectified.

It is suggested that pre-test checks and functional tests of those systems and circuits which affect the safe and legal operations of the vehicle, such as brakes, lights and steering, should always be carried out before the road or roller test.

With the ignition switched off, check:

- the engine oil level.
- the engine coolant level.
- the tires, for correct pressure, compatible types and tread patterns, and wear within limits.
- that there is sufficient fuel in the tank to complete the test.
- all around the engine, transmission and under the vehicle for oil, coolant, hydraulic and fuel leaks. Make a note of any apparent leaks and wipe off the surrounding areas to make it easier to identify the extent of the leak on completion of the test.

Starting the Engine

• **NOTE:** On initial drive away from cold and within the first 1.5 km (1 mile), do not depress the accelerator pedal beyond half travel until the vehicle has attained a minimum speed of 25 km/h (15 miles/h). Never operate at high engine speed or with the accelerator pedal at full travel whilst the engine is cold.

With the ignition switched off, check:

- that the parking brake is applied.
- that the gear lever is in the neutral position.
- that all instrument gauges (except fuel gauge) read zero.

With the ignition switched on, check:

- that the ignition controlled warning lamps are illuminated.
- that the engine temperature gauge registers a reading compatible with the engine temperature.
- that the fuel gauge registers a reading appropriate to the fuel level in the tank.
- the operation of the parking brake warning lamp and fluid level warning indicator.

Road or Roller Testing



CAUTION: If road testing, check the brake operation while still traveling at low speed before continuing with the test. If the brakes pull to one side, or appear to be otherwise faulty, do not continue with the road test until the fault has been found and rectified.

During the road or roller test, check:

- that the clutch pedal operation is not stiff or heavy.
- that the initial gear engagement is smooth and there is no evidence of clutch drag.
- that the parking brake control operates smoothly and releases quickly and completely.
- that the clutch takes up the drive smoothly, without slip or judder.
- that gear changing is smooth with no abnormal noises or vibrations from the transmission.
- the engine power output is satisfactory, full power is achieved, acceleration is smooth and pedal operation is not stiff or heavy, and engine speed returns to idle correctly.

Removal and Installation

Special Tool(s)

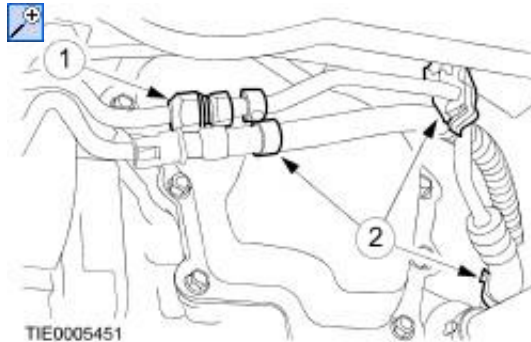
Expander, Teflon Seal

13-015

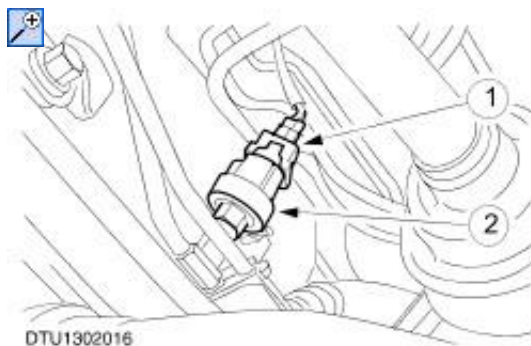


Removal

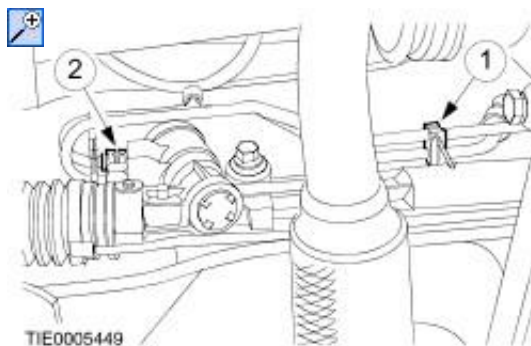
1. Raise and support the vehicle.
2. Disconnect the fluid cooler hose.
 1. Disconnect the union.
 2. Detach the pipe support brackets.
 - Allow the fluid to drain into a suitable container.



3. Remove the power steering pressure (PSP) switch.
 1. Disconnect the PSP switch multiplug.
 2. Remove the PSP switch.



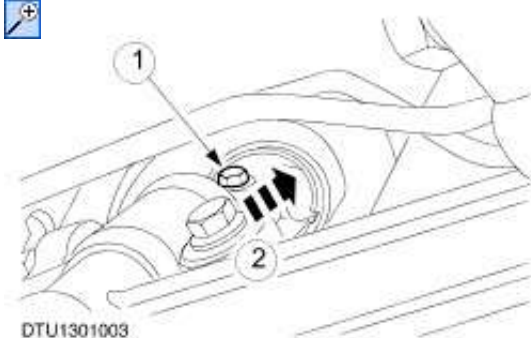
4. Disconnect the steering gear union.
 1. Detach the pipe support bracket.
 2. Disconnect the union.
 - Allow the fluid to drain into a suitable container.



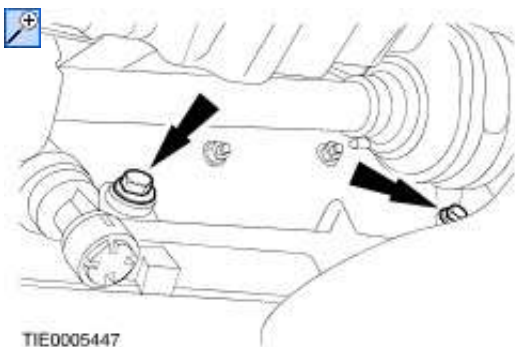
5. Remove the hose.

Installation

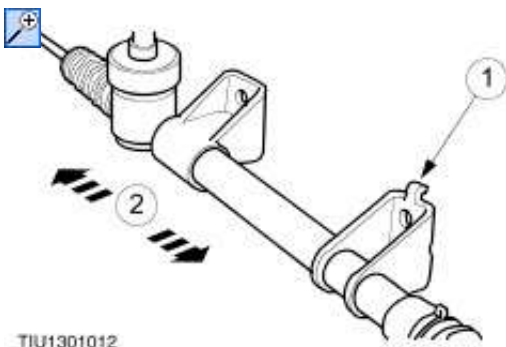
1. Install a new O-ring seal.
 1. Push the O-ring seal onto the tool.
 2. Locate the tool onto the union and push on the O-ring seal.



6. Remove the steering gear retaining bolts.

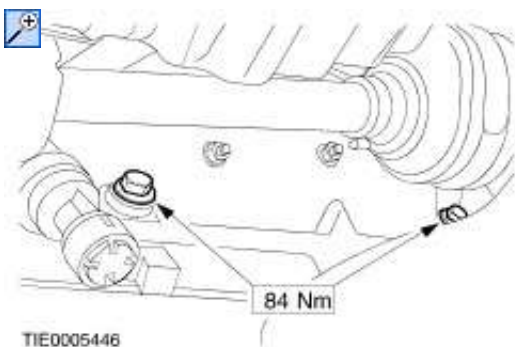


7. Remove the steering gear.
 1. Unhook the steering gear.
 2. Remove the steering gear from the driver side.

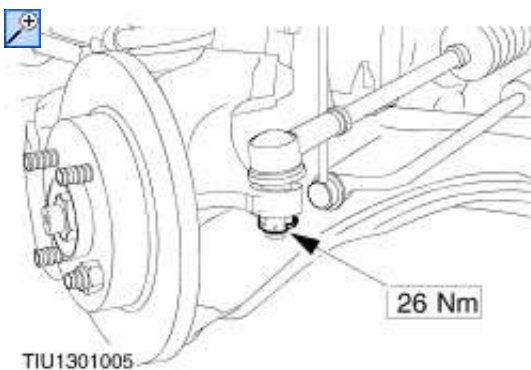


Installation

1. Position the steering gear.
2. Install the steering gear retaining bolts.



3.  **WARNING:** Install new split pins. Failure to follow this instruction may result in personal injury.
 Attach the tie-rod end to the wheel knuckle on both sides.

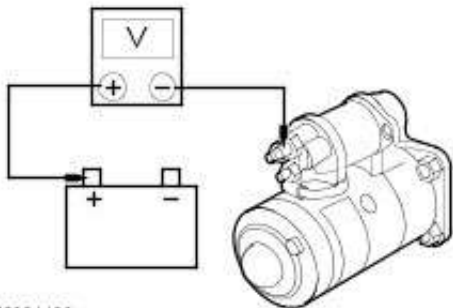


PINPOINT TEST C : THE ENGINE CRANKS SLOWLY

TEST CONDITIONS

DETAILS/RESULTS/ACTIONS

C1: CHECK FOR VOLTAGE DROP



- 1 Start the engine.
- 2 Measure the voltage between the starter motor terminal 30, component side and the battery positive terminal.

Is the voltage less than 0.5 volts?

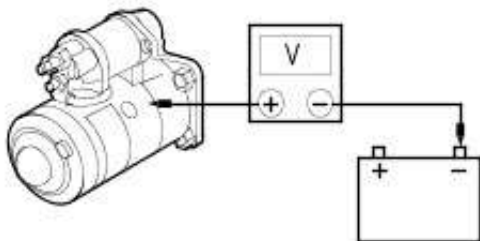
Yes

[GO to C2.](#) .

No

CLEAN and TIGHTEN all battery positive cable connections. TEST the system for normal operation. If the concern persists, INSTALL a new battery to starter motor solenoid cable. REFER to Section [414-01 Battery, Mounting and Cables](#). Test the system for normal operation.

C2: CHECK FOR GROUND CONNECTION



- 1 Start the engine.
- 2 Measure the voltage between the starter motor case and the battery ground terminal.

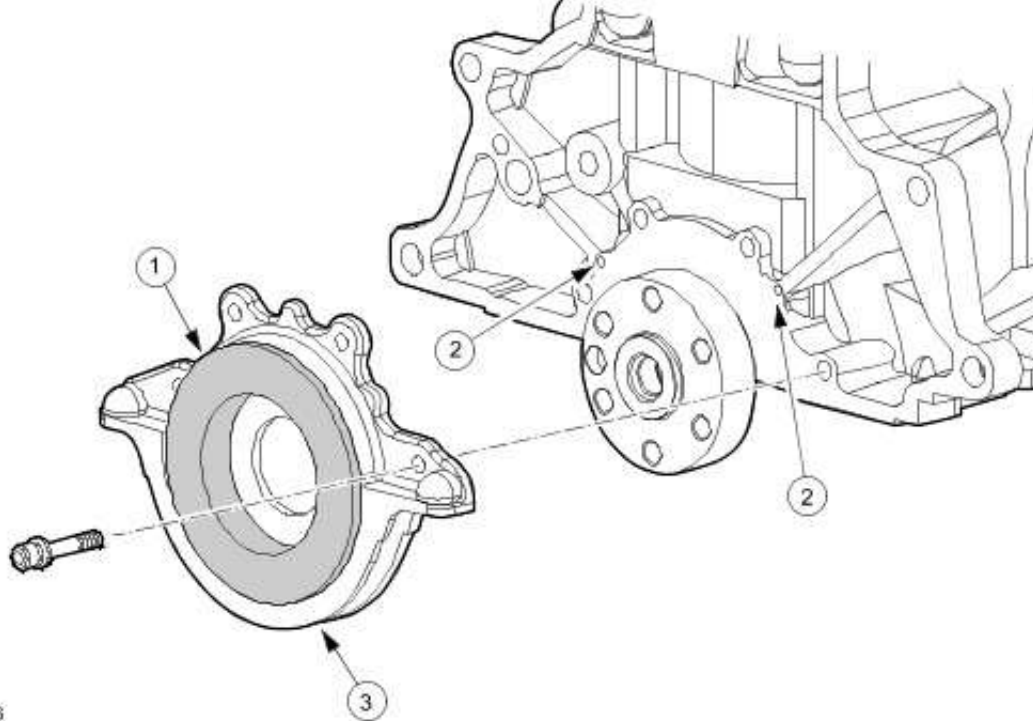
Is the voltage less than 0.5 volts?

Yes

CHECK the battery. REFER to Section [414-00 Charging System - General Information](#). TEST the system for normal operation.

No

CLEAN and TIGHTEN all battery ground cable connections, starter motor mounting and body to ground straps. TEST the system for normal operation. If the concern persists, INSTALL a new battery ground cable. Test the system for normal operation.



E31486

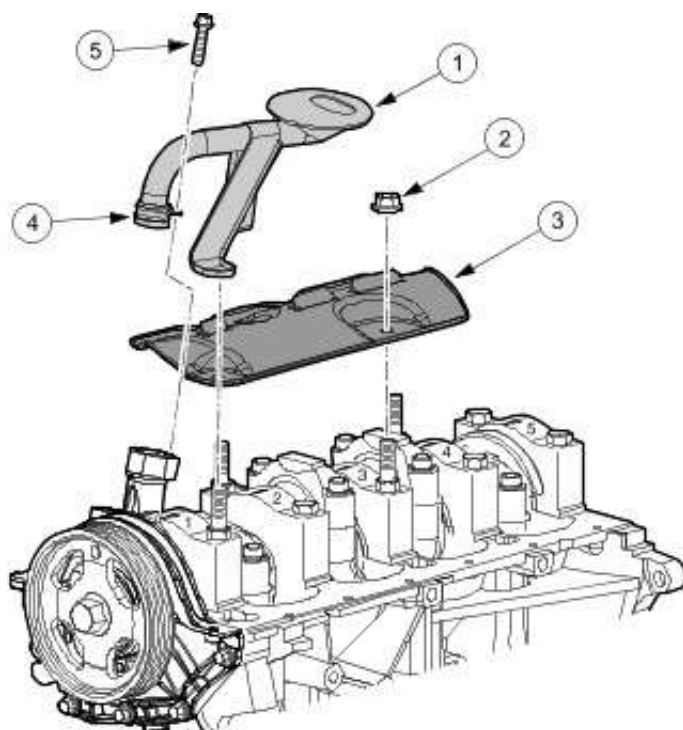
Item	Part Number	Description
1	-	Assembly sleeve
2	-	Guide stud bores
3	-	Oil seal carrier

The assembly sleeve is made of plastic.

The oil seal is integrated into the oil seal carrier. The oil seal is made of polytetrafluoroethylene (PTFE).

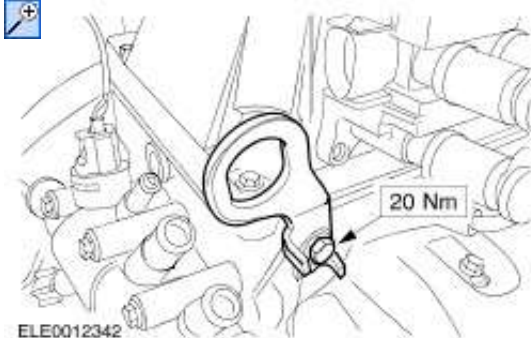
The oil seal carrier is centred with two guide studs and then attached to the cylinder block with four bolts.

Oil baffle plate and oil intake pipe

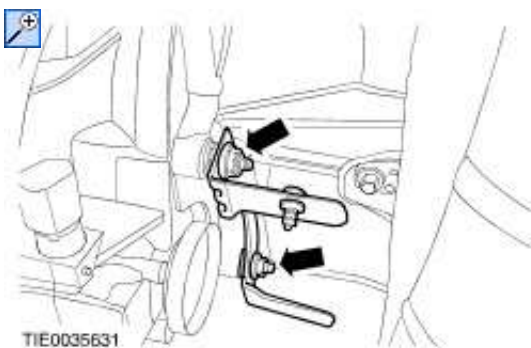


E31487

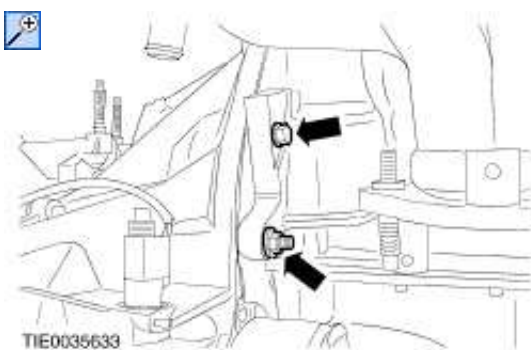
Item	Part Number	Description
1	-	Oil intake pipe
2	-	Retaining nut



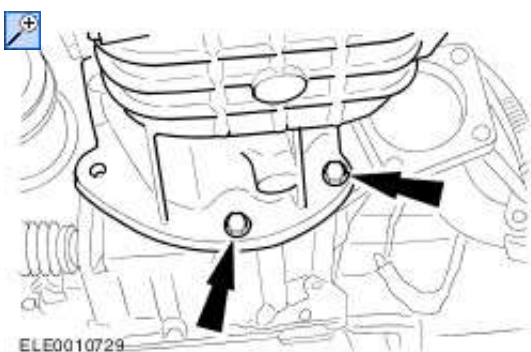
53. Remove the halfshaft heat shield retaining bracket.



54. Remove the transaxle right-hand flange bolts.



55. Remove the transaxle.



In-vehicle Repair

General Equipment

Spatula
Steel straight edge

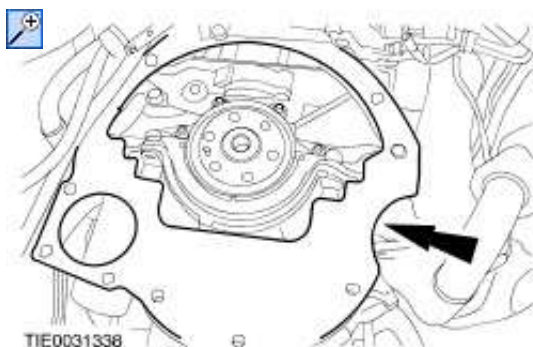
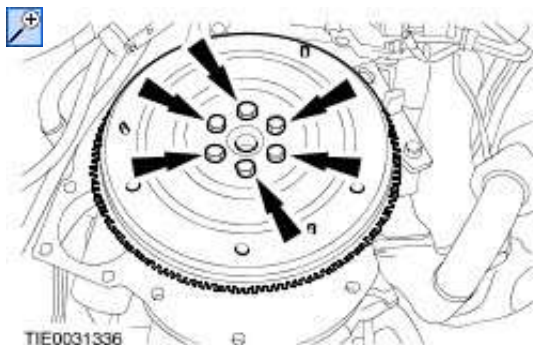
Materials

Name	Specification
Silicone Sealant	WSE-M4G323-A4

Removal

All vehicles

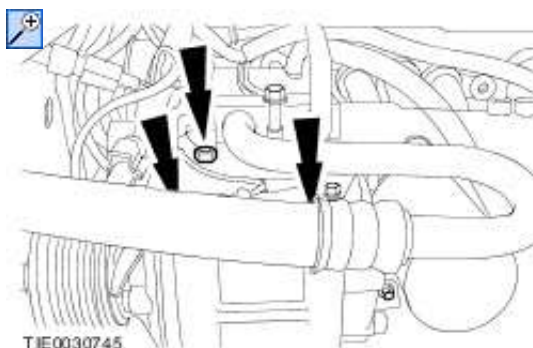
1. Remove the clutch.
For additional information, refer to: Clutch Disc and Pressure Plate (308-01, Removal and Installation).
2. Remove the flywheel.



3. Remove the adapter plate.

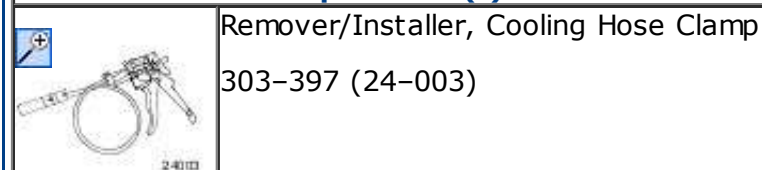
Vehicles with air conditioning

4. Remove the accessory drive belt.
For additional information, refer to: Accessory Drive Belt (303-05, Removal and Installation).
5. Detach the air conditioning (A/C) compressor from the retaining bracket and secure it to one side.



Removal and Installation

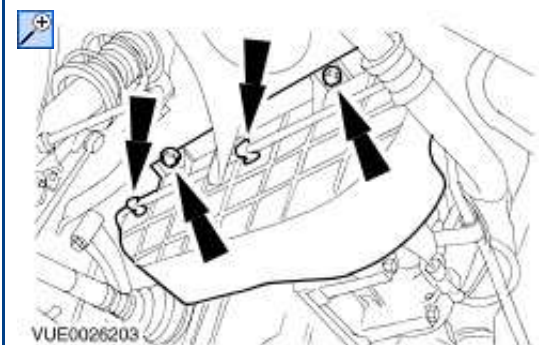
Special Tool(s)



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

Removal

1. Disconnect the battery ground cable. For additional information, refer to Section [414-01 Battery, Mounting and Cables](#).
2. Drain the cooling system.
For additional information, refer to [Cooling System Draining, Filling and Bleeding](#) in this section.
3. Detach the power steering line and remove the crankshaft pulley splash shield.

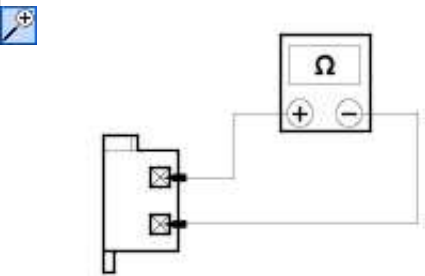


4. Loosen the water pump pulley retaining bolts.



5. Lower the vehicle.
6. Remove the accessory drive belt. For additional information, refer to Section [303-05 Accessory Drive](#).
7. Raise and support the vehicle.
8. Remove the water pump pulley.

B1: CHECK THE CELLULAR PHONE SPEAKER

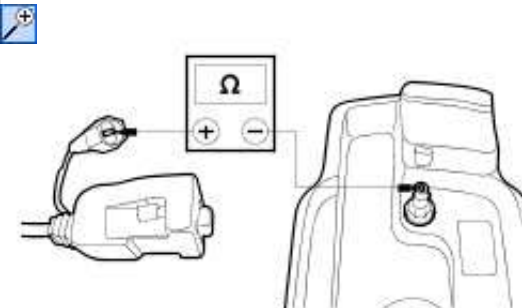
 VUE0032779	1 Disconnect Cellular Phone Speaker. 2 Measure the resistance between the speaker terminals.
	Is the resistance between 3 and 5 ohms? Yes CLEAN the cellular phone handset holder contacts. TEST the system for normal operation. INSTALL a new cellular phone handset holder. TEST the system for normal operation. If the concern persists, INSTALL a new PSE module. TEST the system for normal operation. No INSTALL a new cellular phone speaker. TEST the system for normal operation.

PINPOINT TEST C : NO SVC DISPLAY STAYS ON

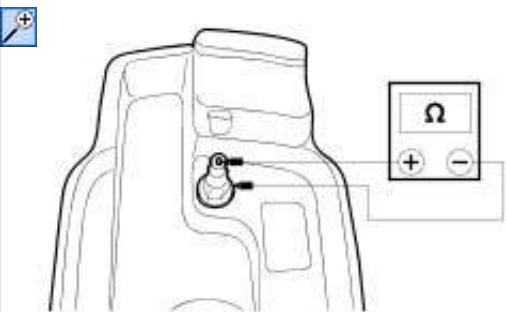
TEST CONDITIONS

DETAILS/RESULTS/ACTIONS

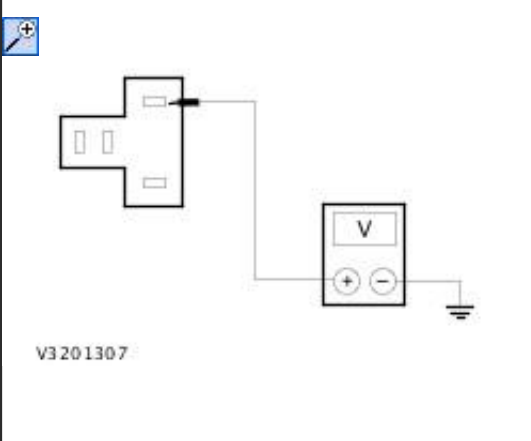
C1: CHECK THE CELLULAR PHONE HANDSET HOLDER ANTENNA CABLE FOR OPEN

 VUE0027521	1 Disconnect Cellular Phone Handset Holder Antenna Cable. 2 Measure the resistance between the center pin of the cellular phone handset holder antenna connection and the center pin of the antenna cable connector.
	Is the resistance less than 1 ohm? Yes GO to C2. No INSTALL a new cellular phone handset holder. TEST the system for normal operation.

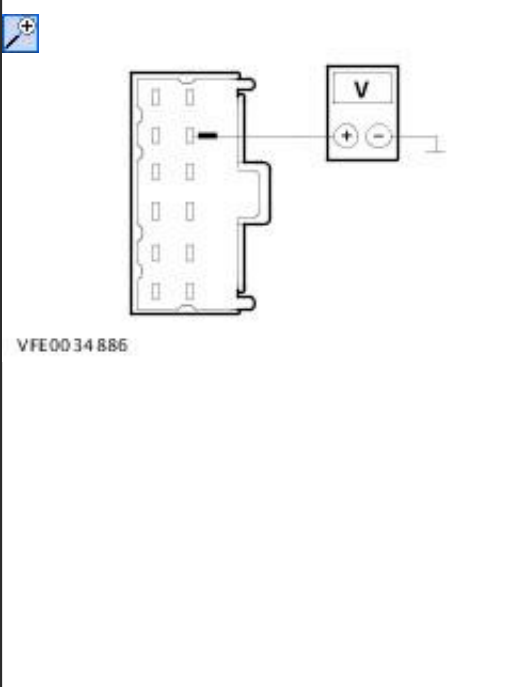
C2: CHECK THE CELLULAR PHONE HANDSET HOLDER ANTENNA CABLE FOR SHORT

 VUE0027522	1 Measure the resistance between the center pin of the cellular phone handset holder antenna connection and the outer contact of the cellular phone handset holder antenna connection.
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D26: CHECK THE CIRCUIT BETWEEN THE A/C RELAY AND THE HEATER CONTROL MODULE FOR SHORT TO VOLTAGE SUPPLY

 V3201307	1 Ignition ON. 2 Measure the voltage between the A/C relay, socket C162, pin 1, circuit 31S-CA66 (BK/RD), wiring harness side and ground.
	Is a voltage measured? Yes LOCATE and REPAIR the short to voltage supply in circuit 31S-CA66 (BK/RD) between the A/C relay and the heater control module using the Wiring Diagrams. CHECK the operation of the system. No GO to D27.

D27: CHECK THE VOLTAGE AT THE HEATER CONTROL MODULE

 VFE0034886	1 Set the blower switch to position 0. 2 Measure the voltage between the heater control module, connector C41, pin 5, circuit 31S-CA25 (BK/GN), wiring harness side and ground.
	Does the meter display battery voltage? Yes GO to D28. No LOCATE and REPAIR the break in circuit 31S-CA25 (BK/GN) between the heater control module and the blower switch using the Wiring Diagrams. CHECK the operation of the system.

D28: CHECK THE A/C RELAY

	1 Ignition OFF.
	2 Check the A/C relay according to the component test at the end of this section.
	Is the A/C relay OK? Yes CHECK the heater control module and RENEW as necessary. CHECK

- If all the listed components are disconnected: [GO to H7](#).

H7: TEST THE ISO 9141 BUS FOR A SHORT TO VOLTAGE

• WARNINGS:



The backup power supply must be depleted to prevent the risk of accidental airbag deployment. After disconnecting the battery, wait at least 1 minute before starting work on the supplemental restraint system (SRS). Failure to observe this instruction can lead to injury.



Do not perform keycode storage when working on the supplemental restraint system in order to prevent accidental deployment. Failure to observe this instruction can lead to injury.



Never use terminal probes to test any connectors of the airbag systems or of any other supplemental restraint systems. Failure to observe this instruction can lead to injury.

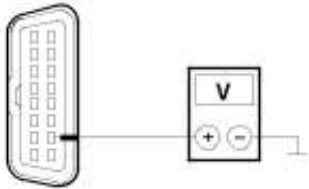
1 Disconnect Battery ground cable.

2 Disconnect Connector C1233 from restraints control module (RCM).

3 Connect Battery ground cable.

4 Ignition ON.

5 Measure the voltage between the DLC, connector C172, pin 7, circuit 4-EC1 (GY/RD), wiring harness side and ground.



E0029118

Is a voltage measured?

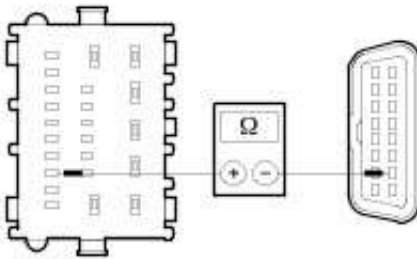
Yes

LOCATE and RECTIFY the short to voltage supply in the circuits connected to soldered connection S146 with the aid of the Wiring Diagrams. CHECK the operation of the system.

No

[GO to H8](#).

H8: CHECK FOR OPEN CIRCUIT BETWEEN RESTRAINTS CONTROL MODULE (RCM) AND THE DLC



VFE0031844

1 Measure the resistance between the restraints control module (RCM), connector C1233, pin 7 circuit 4-JA7 (GY/RD), wiring harness side and the DLC, connector C172, pin 7, circuit 4-EC1 (GY/RD), wiring harness side.

Is a resistance of less than 2 Ohms registered?

Yes

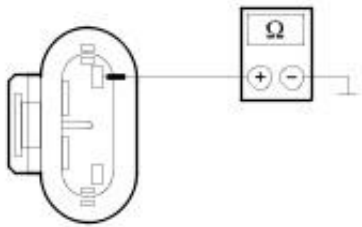
[GO to H9](#).

No

LOCATE and REPAIR the open circuit between soldered connection S146 and DLC using the Wiring Diagrams. CHECK the operation of the system.

H9: CHECK THE ISO 9141 BUS FOR A SHORT TO GROUND

1 Ignition OFF.



VFE0037105

Is less than 2 Ohm measured?

Yes

LOCATE and RECTIFY the break in circuit 14S-LD17 (VT/WH), between soldered connection S82 and the right-hand front fog lamp using the Wiring Diagrams. If necessary CHECK and INSTALL A NEW front fog lamp. CHECK the operation of the system.

No

LOCATE and RECTIFY the break in the circuit between the right-hand front fog lamp and soldered connection S142 using the Wiring Diagrams. If necessary CHECK and INSTALL A NEW front fog lamp. CHECK the operation of the system.

B4: CHECK THE GROUND CONNECTION OF THE LEFT-HAND REAR FOG LAMP

1 Ignition OFF.

2 Disconnect left-hand rear fog lamp from connector C546.



VFE0022920

3 Measure the resistance between the left-hand rear fog lamp, connector C546, pin 2, circuit 31-LD6A (BK), wiring harness side and ground.

Is less than 2 Ohm measured?

Yes

LOCATE and RECTIFY the break in circuit 14S-LD6A (VT/YE), between soldered connection S163 and the left-hand rear fog lamp using the Wiring Diagrams. If necessary CHECK and RENEW the left-hand rear fog lamp. CHECK the operation of the system.

No

LOCATE and RECTIFY the break in the circuit between the left-hand rear fog lamp and soldered connection S162 using the Wiring Diagrams. If necessary CHECK and RENEW the left-hand rear fog lamp. CHECK the operation of the system.

B5: CHECK THE GROUND CONNECTION OF THE RIGHT-HAND REAR FOG LAMP

1 Ignition OFF.

2 Disconnect right-hand rear fog lamp from connector C547.

3 Measure the resistance between right-hand rear fog lamp, connector C547, pin 2, circuit 31-LD6B (BK), wiring harness side and ground.

the steering column multifunction switch. CHECK the operation of the system.

E2: ELIMINATE THE STEERING COLUMN MULTIFUNCTION SWITCH AS THE CAUSE FOR THE SHORT TO BATTERY VOLTAGE

- 1** Ignition OFF.
- 2** Disconnect Fuse F13 (15 A) (CJB).
- 3** Disconnect Fuse F15 (20 A) (CJB).
- 4** Disconnect Fuse F16 (15 A/20 A) (CJB).
- 5** Disconnect Fuse F22 (10 A) (CJB).
- 6** Disconnect Fuse F23 (20 A) (CJB).
- 7** Ignition ON.
- 8** CHECK the turn signal lamps.

Are the turn signal lamps lit continuously on one side?

Yes

[GO to E3.](#)

No

RENEW the steering column multifunction switch. CHECK the operation of the system.

E3: ELIMINATE THE INSTRUMENT CLUSTER AS THE CAUSE FOR THE SHORT TO BATTERY VOLTAGE

- 1** Ignition OFF.
- 2** Connect Fuse F13 (15 A) (CJB).
- 3** Connect Fuse F15 (20 A) (CJB).
- 4** Connect Fuse F16 (15 A/20 A) (CJB).
- 5** Connect Fuse F22 (10 A) (CJB).
- 6** Connect Fuse F23 (20 A) (CJB).
- 7** Disconnect Fuse F2 (10 A) (CJB), 1.3 L/1.6 L Duratec 8V.
- 8** Disconnect Fuse F6 (10 A) (CJB).
- 9** Disconnect Fuse F10 (10 A) (CJB).
- 10** Disconnect Fuse F17 (15 A) (CJB).
- 11** Disconnect Fuse F35 (10 A) (CJB).
- 12** Ignition ON.
- 13** CHECK the turn signal lamps.

Do the turn signal lamps illuminate continuously?

Yes

- Vehicles without door locking module, left-hand turn signal lamps are lit continuously: LOCATE and RECTIFY the short to battery voltage in the circuits connected to soldered connection S17 using the Wiring Diagrams. CHECK the operation of the system.
- Vehicles without door locking module, right-hand turn signal lamps are lit continuously: LOCATE and RECTIFY the short to battery voltage in the circuits connected to soldered connection S11 using the Wiring Diagrams. CHECK the operation of the system.
- Vehicles with door locking module, left-hand turn signal lamps are lit continuously: [GO to E4.](#)
- Vehicles with door locking module, right-hand turn signal lamps are lit continuously: [GO to E5.](#)

No

CHECK and if necessary RENEW the instrument cluster. CHECK the operation of the system.

E4: CHECK THE LEFT-HAND TURN SIGNAL RELAY

- 1** Ignition OFF.
- 2** Connect Fuse F2 (10 A) (CJB), 1.3 L/1.6 L Duratec 8V.
- 3** Connect Fuse F6 (10 A) (CJB).
- 4** Connect Fuse F10 (10 A) (CJB).
- 5** Connect Fuse F17 (15 A) (CJB).
- 6** Connect Fuse F35 (10 A) (CJB).
- 7** Disconnect left-hand turn signal relay from socket C1261.
- 8** Ignition ON.
- 9** CHECK the turn signal lamps.

Do the left-hand turn signal lamps illuminate continuously?

Yes

LOCATE and RECTIFY the short to battery voltage in the circuits connected to soldered