PUBLISHED: 31-JUL-2012
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

SPECIFICATIONS

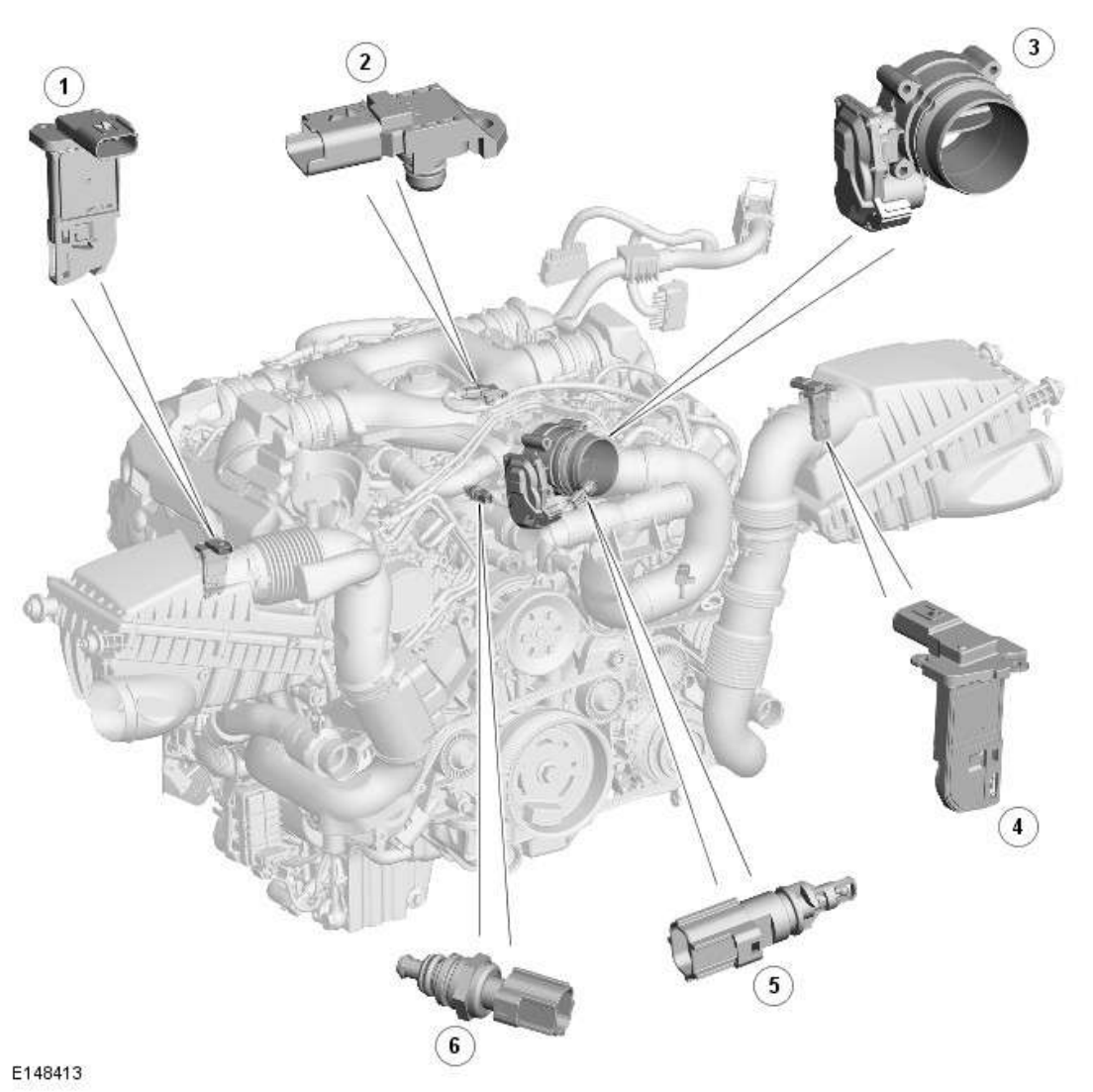
Torque Specifications

ITEM	NM	LB-FT	LB-IN
Camshaft position (CMP) sensor bolt	10	7	-
Crankshaft position (CKP) sensor bolt	5	-	44
Engine control module (ECM) support bracket to body nut	9	-	80
ECM to cooling fan bracket bolts	9	-	80
Engine oil pressure (EOP) sensor	14	10	-
Automatic transmission splash shield bolts	10	7	-
Pre catalytic temperature sensor wiring connector heat shield to transmission bolts	10	7	-
Pre catalytic temperature sensor	35	26	-
Post catalytic temperature sensor	35	26	-
Post diesel particulate filter (DPF) exhaust gas temperature sensor	35	26	-
Exhaust gas temperature sensor LH	35	26	-
RH turbocharger heat shield bolts	10	7	-
RH turbocharger support bracket bolts	23	17	-

PUBLISHED: 08-JAN-2016
2015.0 RANGE ROVER (LG), 303-14

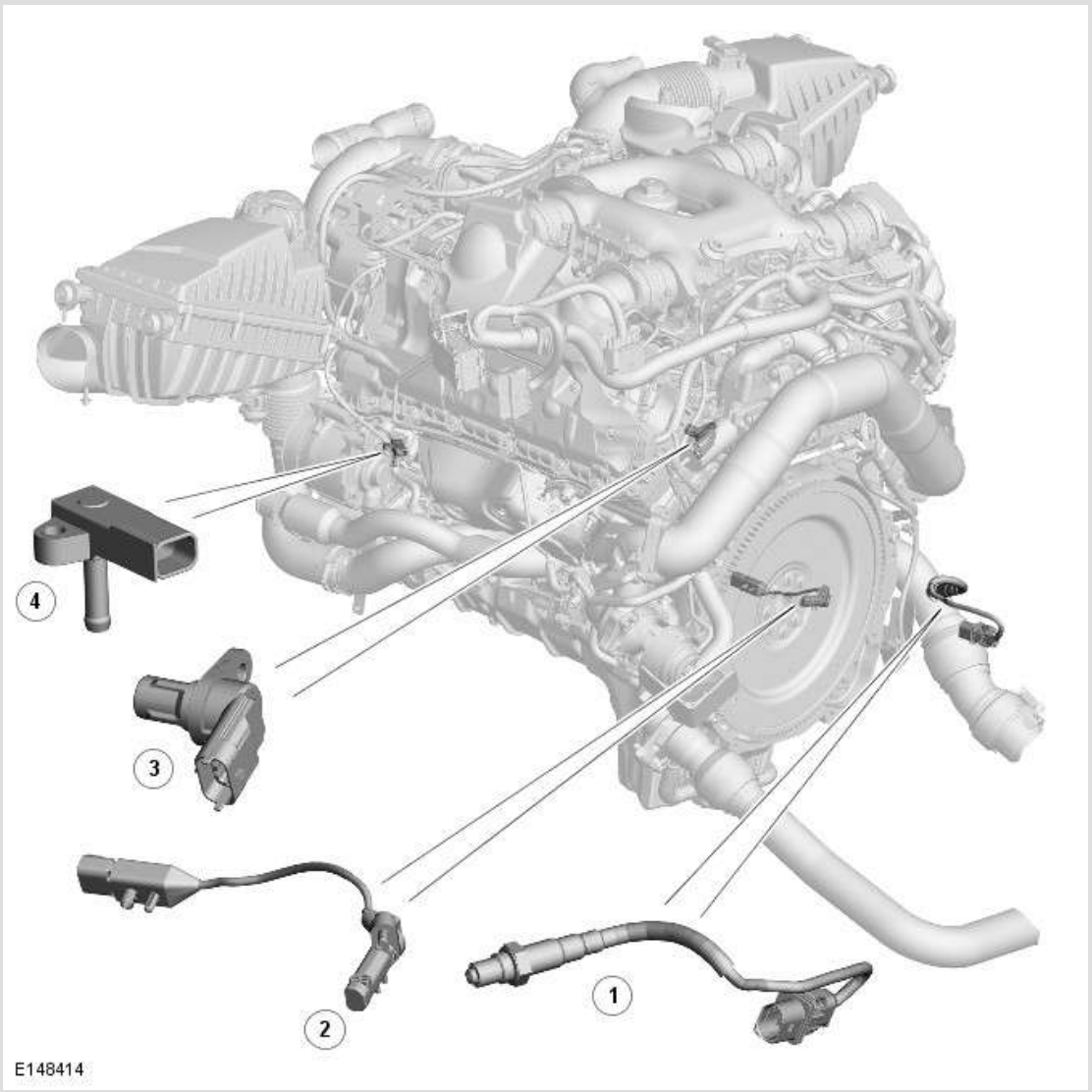
ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

COMPONENT LOCATION - 1 OF 4



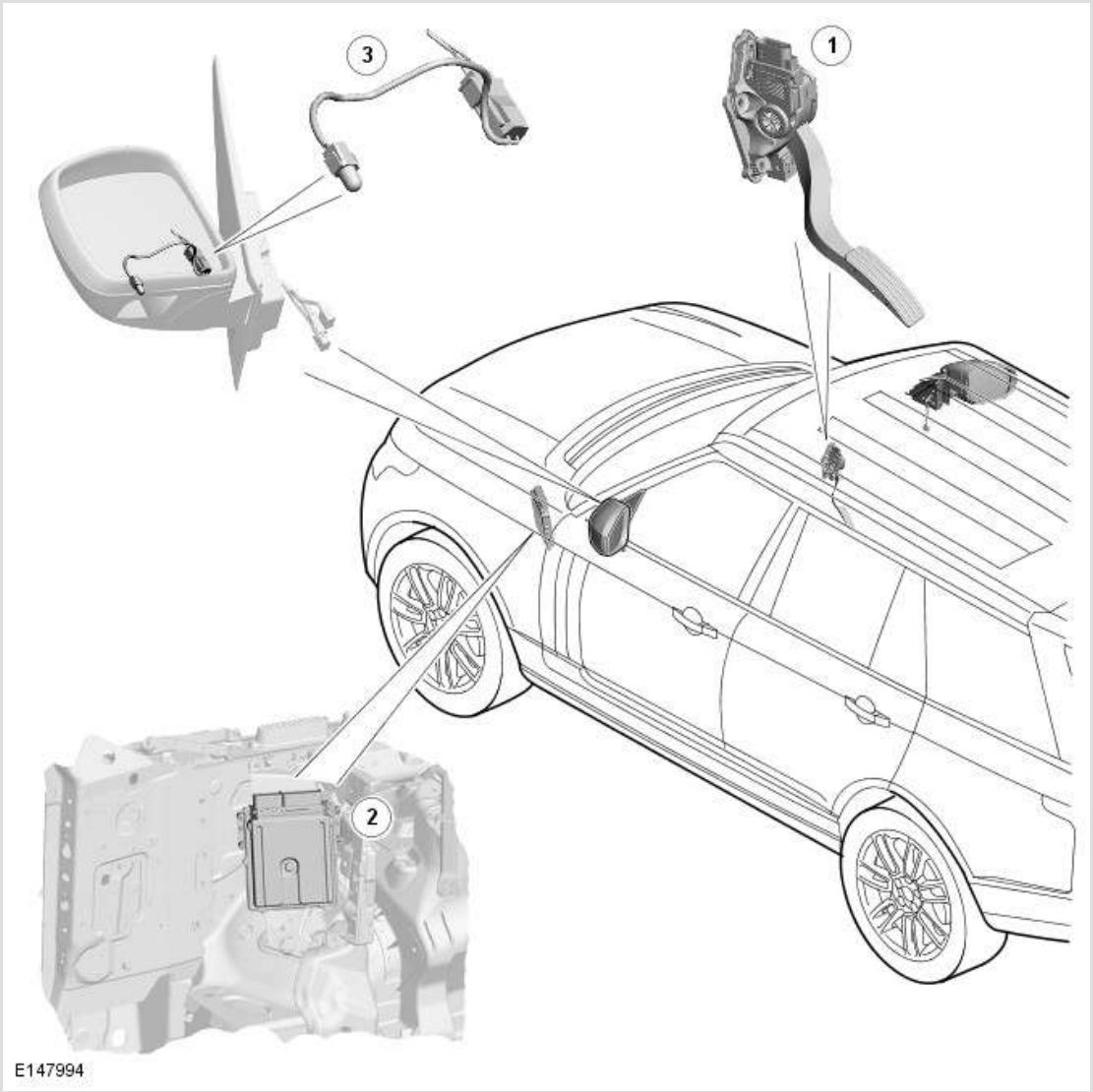
ITEM	DESCRIPTION
1	Mass Air Flow and Temperature (MAFT) sensor
2	Manifold Absolute Pressure (MAP) sensor
3	Electric throttle
4	Mass Air Flow (MAF) sensor
5	Charge air temperature sensor
6	Engine Coolant Temperature (ECT) sensor

COMPONENT LOCATION - 2 OF 4



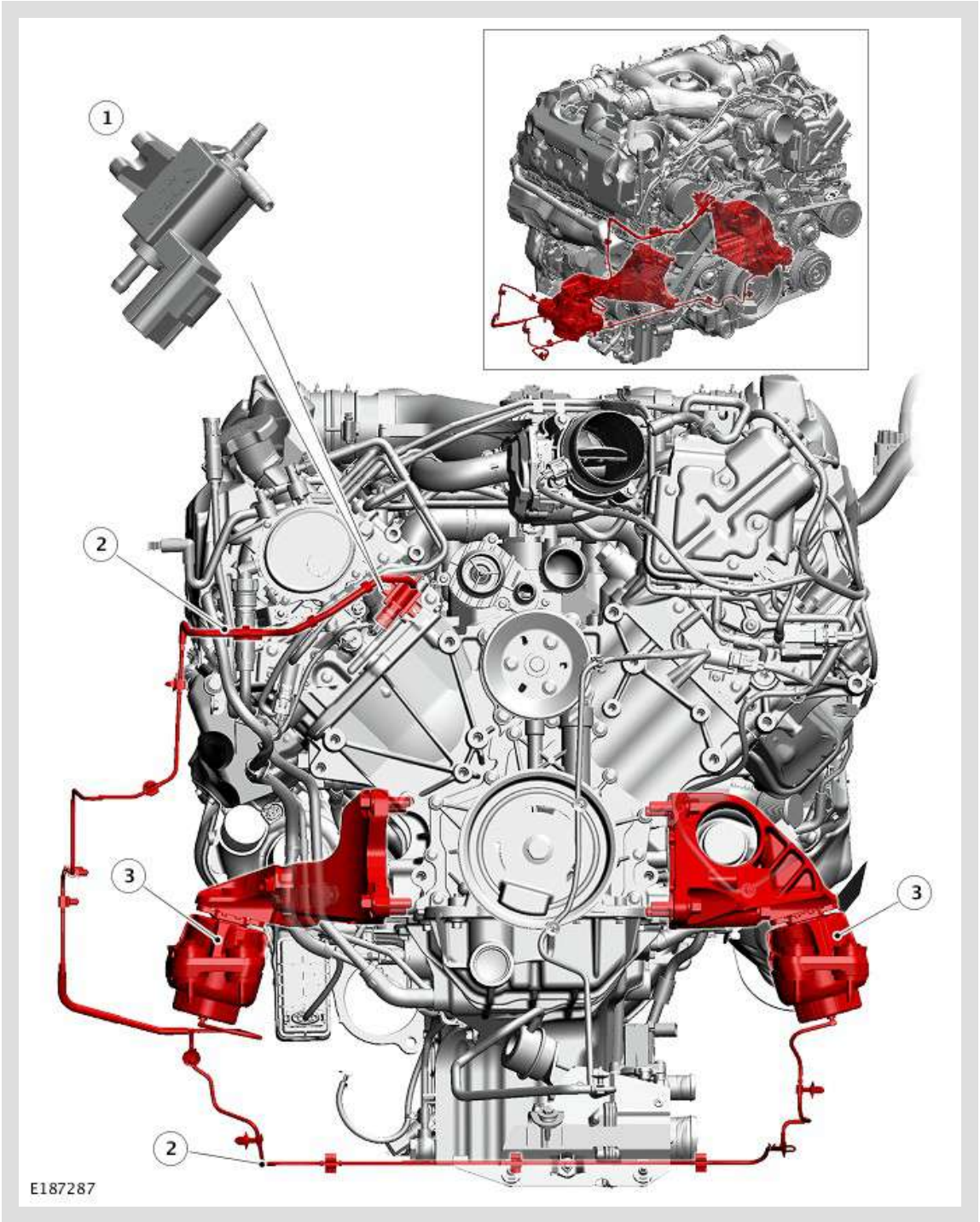
ITEM	DESCRIPTION
1	Heated Oxygen Sensor (HO2S)
2	Crankshaft Position (CKP) sensor
3	Camshaft Position (CMP) sensor
4	Charge air pressure sensor

COMPONENT LOCATION - 3 OF 4



ITEM	DESCRIPTION
1	Accelerator Pedal Position (APP) sensor
2	Engine Control Module (ECM)
3	Ambient Air Temperature (AAT) sensor

COMPONENT LOCATION - 4 OF 4



ITEM	DESCRIPTION
1	Active Engine Mount Solenoid

2	Hoses
3	Active Engine Mount

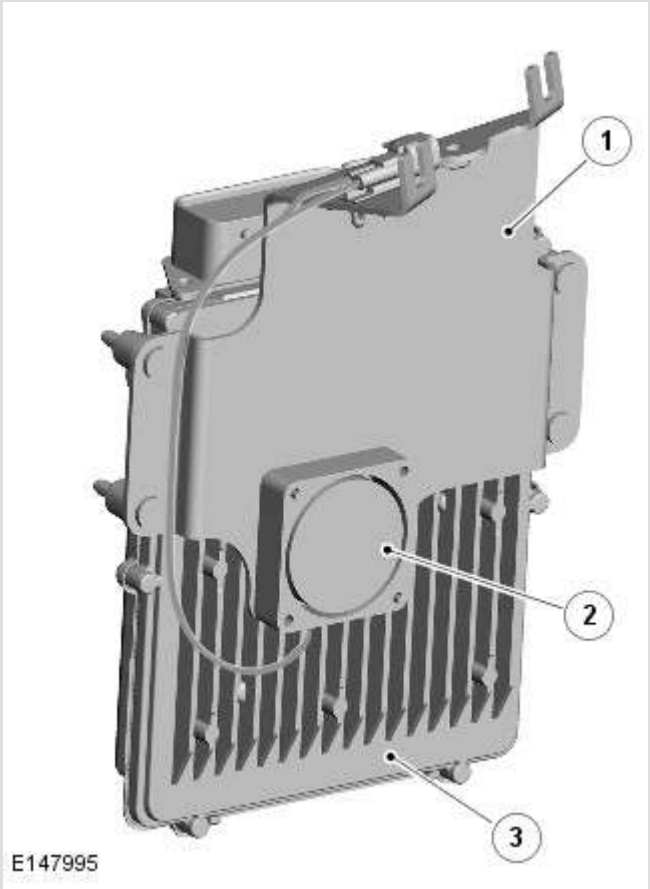
OVERVIEW

The TDV8 4.4L diesel engine has an engine management system controlled by an ECM (engine control module) and is able to monitor, adapt and precisely control the fuel injection. The ECM uses multiple sensor inputs and precision control of actuators to achieve optimum performance during all driving conditions.

Active engine mounts are fitted to reduce Noise, Vibration and Harshness (NVH). The active engine mounts are controlled by the Engine Control Module (ECM).

DESCRIPTION

ENGINE CONTROL MODULE



ITEM	DESCRIPTION
1	Upper bracket
2	Cooling fan

3	Engine Control Module (ECM)

The ECM is installed in the rear left corner of the engine compartment, behind the secondary bulkhead panel. The ECM is attached to brackets on the wheel housing and the fender outer support panel.

In some markets, an electric cooling fan is attached to the upper bracket to prevent the ECM from overheating. The ECM controls the operation of the cooling fan using an internal temperature sensor. While the ignition is on, the cooling fan receives a power supply from the ECM relay in the EJB (engine junction box) . When cooling is required, the ECM connects the cooling fan to ground.

The ECM is connected to the vehicle harnesses via 2 connectors. The ECM contains data processors and memory microchips. The output signals to the actuators are in the form of ground paths provided by driver circuits within the ECM . Some sensors receive a regulated voltage supplied by the ECM . This avoids incorrect signals caused by voltage drop during cranking.

The ECM performs self diagnostic routines and stores fault codes in its memory. These fault codes and diagnostics can be accessed using Land Rover approved diagnostic equipment. If the ECM is to be replaced, the new ECM is supplied 'blank' and must be configured to the vehicle using the Land Rover approved diagnostic equipment. A 'flash' EEPROM (electrically erasable programmable read only memory) allows the ECM to be externally configured, using Land Rover approved diagnostic equipment, with market specific or new tune information. The current engine tune data can be accessed and read using Land Rover approved diagnostic equipment.

When a new ECM is fitted, it must also be synchronized to other system control modules using Land Rover approved diagnostic equipment. ECM 's cannot be 'swapped' between vehicles as they must be 'matched' with security information to other system modules.

The ECM is connected to the engine sensors which allow it to monitor the engine operating conditions. The ECM processes these signals and decides the actions necessary to maintain optimum engine performance in terms of driveability, fuel efficiency and exhaust emissions. The memory of the ECM is programmed with instructions for how to control the engine. The memory also contains data in the form of maps which the ECM uses as a basis for fueling and emission control. By comparing the information from the sensors to the data in the maps, the ECM is able to calculate the various output requirements. The ECM contains an adaptive strategy which updates the system when components vary due to production tolerances or ageing.

The ECM is connected to other system control modules and receives data from these modules on the high speed CAN (controller area network) bus to enable precise engine control under all vehicle operating conditions.

The ECM receives and processes information from the following input sources:

- CKP (crankshaft position) sensor.
- CMP (camshaft position) sensor.
- MAF (mass air flow) sensor.
- MAFT (mass air flow and temperature) sensor.
- MAP (manifold absolute pressure) sensor.
- TP (throttle position) sensor.
- ECT (engine coolant temperature) sensor.
- APP (accelerator pedal position) sensor.
- Charge air temperature sensor.
- Charge air pressure sensor.
- Ambient air temperature sensor.
- HO2S (heated oxygen sensor) .
- The following brake system components:
  - ABS (anti-lock brake system) control module.
  - Brake pedal switch.
  - For additional information, refer to: Braking Control System (206-11 Brake Controls, Description and Operation).
- Oil level and temperature sensor.
  For additional information, refer to: Engine (303-01E Engine - TDV8 4.4L Diesel, Description and Operation).
- The following fuel system components:
  - FRP (fuel rail pressure) sensor.
  - Fuel temperature sensor.
  - For additional information, refer to: Fuel Charging and Controls (303-04F Fuel Charging and Controls - TDV8 4.4L Diesel, Description and Operation).
- The following turbocharger system components:
  - VGT vane position sensor.
  - Turbine intake valve position sensor.
  - Turbine temperature sensor.
  - For additional information, refer to: Turbocharger (303-04G Fuel Charging and Controls - Turbocharger - TDV8 4.4L Diesel, Description and Operation).

- EGR (exhaust gas recirculation) valve position sensors.
  For additional information, refer to: Engine Emission Control (303-08E Engine Emission Control - TDV8 4.4L Diesel, Description and Operation).
- TCS (transmission control switch) .
- Terrain Response® switchpack.
  For additional information, refer to: Ride and Handling Optimization (204-06 Ride and Handling Optimization, Description and Operation).
- The following catalytic converter and DPF (diesel particulate filter) system components (where fitted).
  - Turbine outlet temperature sensor.
  - Pre and post catalytic converter exhaust gas temperature sensors.
  - DPF outlet temperature sensor.
  - DPF differential pressure sensor.
  - For additional information, refer to: Diesel Particulate Filter (309-00D Exhaust System - TDV8 4.4L Diesel, Description and Operation).
- Water in fuel sensor.
  For additional information, refer to: Fuel Tank and Lines (310-01D Fuel Tank and Lines - TDV8 4.4L Diesel, Description and Operation).
- ATCM (automatic temperature control module)
  For additional information, refer to: Control Components (412-01A Climate Control, Description and Operation).
- RCM (restraints control module) .
  For additional information, refer to: Airbag and Safety Belt Pretensioner Supplemental Restraint System (501-20B Supplementary Restraint System, Description and Operation).

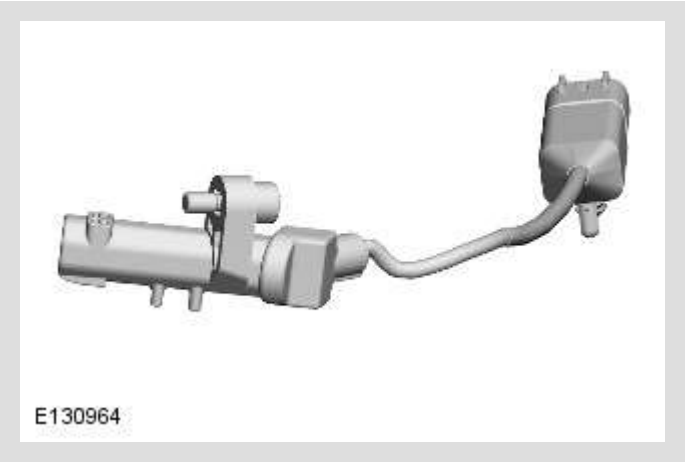
The ECM outputs controlling signals to the following sensors and actuators:

- Electric throttle actuator.
- ECM cooling fan (where fitted).
- ABS control module.
  For additional information, refer to: Braking Control System (206-11 Brake Controls, Description and Operation).
- Active engine mount solenoid.
- The engine cooling fans.
  For additional information, refer to: Engine Cooling (303-03F Engine Cooling - TDV8 4.4L Diesel, Description and Operation).
- The following fuel system components:
  - Fuel injectors.

- Fuel pressure control valve.
- Fuel volume control valve.
- For additional information, refer to: Fuel Charging and Controls (303-04F Fuel Charging and Controls - TDV8 4.4L Diesel, Description and Operation).

- The following turbocharger system components:
  - Charge air recirculation solenoid.
  - Charge air solenoid.
  - Turbine intake shut-off valve solenoid.
  - Variable geometry turbine vane actuator.
  - For additional information, refer to: Turbocharger (303-04G Fuel Charging and Controls - Turbocharger - TDV8 4.4L Diesel, Description and Operation).
- Starter motor.
  For additional information, refer to: Starting System (303-06D Starting System - TDV8 4.4L Diesel, Description and Operation).
- Glow plug control module.
  For additional information, refer to: Glow Plug System (303-07D Glow Plug System - TDV8 4.4L Diesel, Description and Operation).
- The following EGR system components:
  - EGR cooler bypass valve solenoid.
  - EGR valve motors.
  - For additional information, refer to: Engine Emission Control (303-08E Engine Emission Control - TDV8 4.4L Diesel, Description and Operation).
- TCM (transmission control module) .
  For additional information, refer to: Transmission Description (307-01A Automatic Transmission/Transaxle - Vehicles With: 8HP45 8-Speed Automatic Transmission AWD, Description and Operation).
- ATCM (automatic temperature control module)
  For additional information, refer to: Control Components (412-01A Climate Control, Description and Operation).
- Instrument cluster.
  For additional information, refer to: Instrument Cluster (413-01 Instrument Cluster, Description and Operation).

CRANKSHAFT POSITION SENSOR



The CKP sensor is located on the right side of the crankshaft rear oil seal. The sensor lead passes through a cover in the side of the cylinder block. The sensor tip is aligned with a reluctor ring on the rear flange of the crankshaft. The sensor produces a square wave signal, the frequency of which is proportional to engine speed.

The ECM monitors the CKP sensor signal and can detect engine over-speed. The ECM counteracts engine over-speed by gradually fading out speed synchronized functions. The CKP is a Hall effect sensor. The sensor measures the magnetic field variation induced by the reluctor ring.

The reluctor ring has a 60 minus 2 pole pattern. The missing poles provide a reference point for the angular position of the crankshaft. When the space with the two missing poles passes the sensor tip, a gap in the signal is produced which the ECM uses to determine the crankshaft position.

The ECM uses the signal from the CKP sensor for the following functions:

- Synchronization.
- Determine fuel injection timing.
- Enable the fuel pump relay circuit (after the priming period).
- Produce an engine speed signal which is broadcast on the high speed CAN bus for use by other systems.

CAMSHAFT POSITION SENSOR

The CMP sensor is located on the rear face of the left cylinder head. The sensor tip protrudes through the face to pick up on the reluctor ring behind the camshaft pulley. The CMP sensor is a Hall effect type sensor.

The CMP sensor is a Hall effect sensor which is used by the ECM at engine start-up to synchronize the ECM with the CKP sensor signal. The ECM does this by using the CMP sensor signal to identify the stroke of the piston in No. 1 cylinder to ensure the correct injector timing. Once the ECM has established the injector timing, the CMP sensor signal is no longer used.

The CMP sensor receives a 5V supply from the ECM . Two further connections to the ECM provide ground and signal output.

If a fault occurs, an error is registered in the ECM . Two types of failure can occur; camshaft signal frequency too high or total failure of the camshaft signal. The error recorded by the ECM can also relate to a total failure of the crankshaft signal or crankshaft signal dynamically implausible. Both components should be checked to determine the cause of the fault.

If a fault occurs with the CMP sensor when the engine is running, the engine will continue to run but the ECM will deactivate charge air pressure control. Once the engine is switched off, the engine will crank but will not restart while the fault is present.

MASS AIR FLOW / MASS AIR FLOW AND TEMPERATURE SENSOR

Identical MAFT sensors are installed in the air cleaner outlets, but only the MAFT sensor in the right air cleaner provides both MAF and temperature signals for the ECM . The engine harness connection with MAFT sensor attached of the left air cleaner is wired so that only the MAF signal is connected to the ECM .

The MAF sensors work on the hot film principle. The MAF sensor output is a digital signal proportional to the mass of the incoming air. The ECM uses this data, in conjunction with signals from other sensors and information from stored fueling maps, to determine the precise fuel quantity to be injected into the cylinders. The signals are also used as a feedback for the EGR system.

The temperature sensor in the right MAFT sensor is a NTC (negative temperature coefficient) thermistor in a voltage divider circuit. Using the voltage output from the temperature sensor, the ECM can correct the fueling map for intake air temperature.

The MAFT sensors receive a 12V supply from the ECM relay in the EJB and a ground connection via the ECM . Separate connections to the ECM are provided for the two MAF signals and the temperature signal.

The ECM checks the calculated air mass against the engine speed. If the calculated air mass is not plausible, the ECM uses a default air mass figure which is derived from the average engine speed compared to a stored characteristic map. The air mass value will be corrected using values for charge air pressure, ambient air pressure and ambient air temperature.

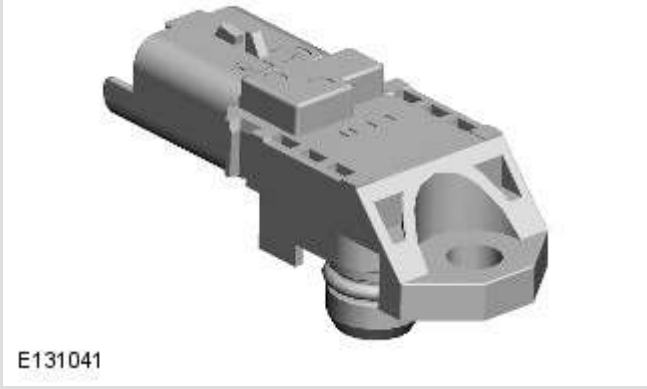
If one of the MAF sensors fails the ECM implements the default strategy based on engine speed. In the event of a MAF sensor signal failure, the following symptoms may be observed:

- Difficult starting.
- Engine stalls after starting.
- Delayed engine response.
- Emission control inoperative.
- Idle speed control inoperative.
- Reduced engine performance.

If the temperature sensor fails the ECM uses a default intake air temperature of -5° Celsius (23°F). In the event of a temperature sensor failure, any of the following symptoms may be observed:

- Over fueling, resulting in black smoke from the exhaust.
- Idle speed control inoperative.

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR



The MAP sensor is installed in the charge air manifold, to measure the pressure of the air entering the intake manifolds. The sensor is a semi-conductor type sensor which responds to pressure acting on a membrane within the sensor, altering the output voltage.

The MAP sensor has a 3 pin connector which is connected to the ECM and provides a 5V reference voltage from the ECM , a signal input to the ECM and a ground connection.

The ECM uses the MAP sensor signal for the following functions:

- Maintain manifold charge air pressure.
- Reduce exhaust smoke emissions when driving at high altitude.

- Control of the EGR system.

If the MAP sensor fails, the ECM uses a default pressure of 1013 mbar (14 lbf/in²). In the event of a MAP sensor failure, the following symptoms may be observed:

- Altitude compensation inoperative (black smoke emitted from the exhaust).
- Active boost control inoperative.

ELECTRIC THROTTLE

The electric throttle is installed at the front of the engine, between the cylinder heads. The throttle plate is operated by a DC (direct current) electric motor attached to the throttle body. The motor is controlled by the ECM , which operates the motor in response to driver inputs from the APP sensor and other engine related sensors to provide the correct air flow to the intake manifolds.

The ECM has 5 connections with the electric throttle motor:

- A ground and two 12V feeds to operate the motor in each direction to open or close the throttle plate.
- A 5V reference connection and a signal connection with the TP sensor in the motor, for closed loop control.

ENGINE COOLANT TEMPERATURE SENSOR

The ECT is located in the thermostat housing. The ECM uses the temperature information for the following functions:

- fueling calculations.
- Limit engine operation if engine coolant temperature becomes too high.
- Cooling fan operation.
- Glow plug activation time.

The instrument cluster uses the temperature information for generation of engine temperature messages. The engine coolant temperature signal is also transmitted on the MS (medium speed) CAN comfort bus, or the HS (high speed) CAN powertrain bus by the instrument cluster for use by other systems.

The ECT sensor circuit consists of an internal voltage divider circuit which incorporates an NTC thermistor. The ECM compares the signal voltage to stored values and adjusts fuel delivery to ensure optimum driveability at all times.

The input to the sensor is a 5V reference voltage supplied from the voltage divider circuit within the ECM . The ground from the sensor is also connected to the ECM which measures the returned current and calculates a resistance figure for the sensor which relates to the coolant temperature.

If the ECT sensor fails, the following symptoms may be observed:

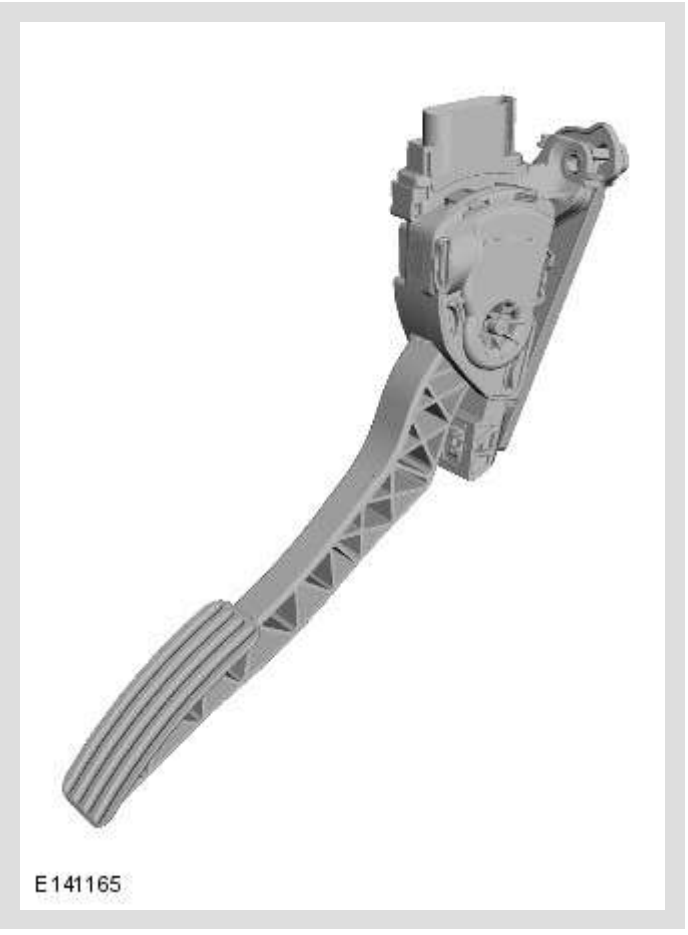
- Difficult cold start.
- Difficult hot start.
- Engine performance compromised.
- Temperature gauge inoperative or inaccurate reading.

In the event of ECT sensor signal failure, the ECM applies a default value of 80°C (176° F) coolant temperature for fueling purposes. The ECM will also permanently operate the cooling fan at all times when the ignition is switched on, to protect the engine from overheating.

ACCELERATOR PEDAL POSITION SENSOR

NOTE:

LHD (left-hand drive) pedal shown.



The APP sensor allows the ECM to determine the driver requests for vehicle speed, acceleration and deceleration. The ECM uses this information to determine the torque demand from the engine via injection control.

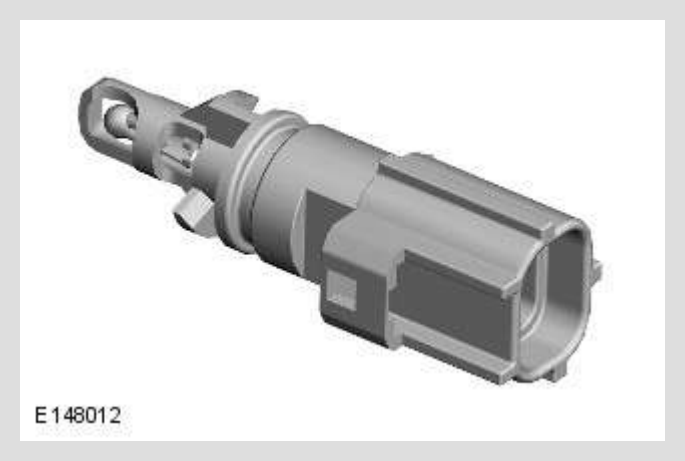
The APP sensor consists of a twin track rotary potentiometer integrated into the mounting bracket of the accelerator pedal. The APP sensor receives two separate

electrical supplies and generates two different outputs. Both tracks are analogue output signals connected to the ECM . Both signals contain the same positional information, but the secondary track has half the voltage output of the primary track.

If there is a fault with the primary track, the secondary track is used and the vehicle /engine response to pedal demand will be sluggish. If both analogue signals have a fault, the engine adopts a constant high speed of 1300 rev/min to allow the vehicle to move. Torque application and reduction of engine speed back to normal idle speed can be subsequently controlled via brake pedal switch operation.

The ECM constantly checks the range and plausibility of the two signals and stores a fault code if it detects a fault.

CHARGE AIR TEMPERATURE SENSOR



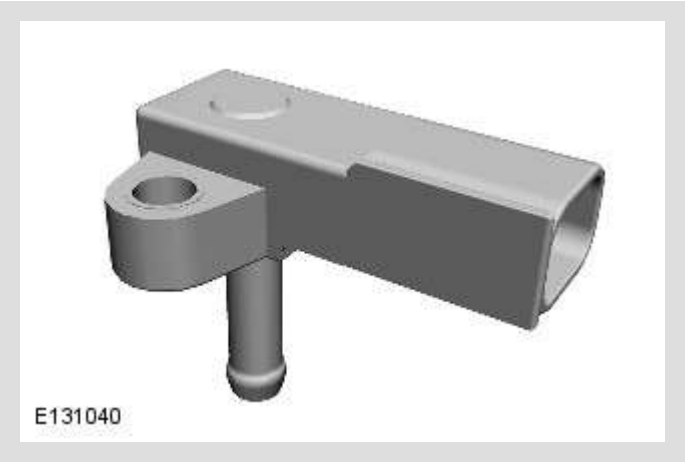
The charge air temperature sensor is located in the charge air duct connection with the electric throttle. The sensor is used to measure the intake air temperature from the turbochargers in order to calculate the required amount of fueling.

The charge air temperature sensor incorporates a NTC thermistor in a voltage divider circuit. The sensor receives a 3.3V reference voltage from the ECM . Using the voltage output from the charge air temperature sensor, the ECM can correct the fueling map for charge air temperature.

If the charge air temperature sensor fails the ECM uses a default charge air temperature of -5°C (23°F). In the event of a charge air temperature sensor failure, any of the following symptoms may be observed:

- Over fueling, resulting in black smoke emitting from the exhaust.
- Idle speed control inoperative.

CHARGE AIR PRESSURE SENSOR



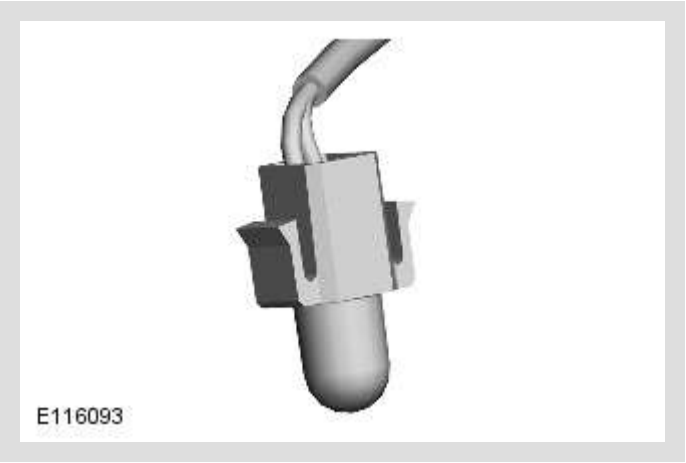
The charge air pressure sensor is attached to the rear suspension bracket of the dynamic response hydraulic pump. The sensor is connected via a hose to the charge air outlet pipe from the fixed vane turbocharger compressor.

The charge air pressure sensor provides a voltage signal to the ECM relative to the output charge air pressure from the fixed vane turbocharger. The sensor has a 3 pin connector which is connected to the ECM and provides a 5V reference supply from the ECM , a signal input to the ECM and a ground for the sensor.

The charge air pressure sensor uses a diaphragm transducer to measure pressure. The ECM uses the sensor signal for the following functions:

- Maintain manifold charge air pressure.
- Reduce exhaust smoke emissions when driving at high altitude.
- Control of the EGR system.
- To help smooth the transition between mono turbocharger and bi-turbocharger operation.
- To aid the air path diagnostics.

AMBIENT AIR TEMPERATURE SENSOR



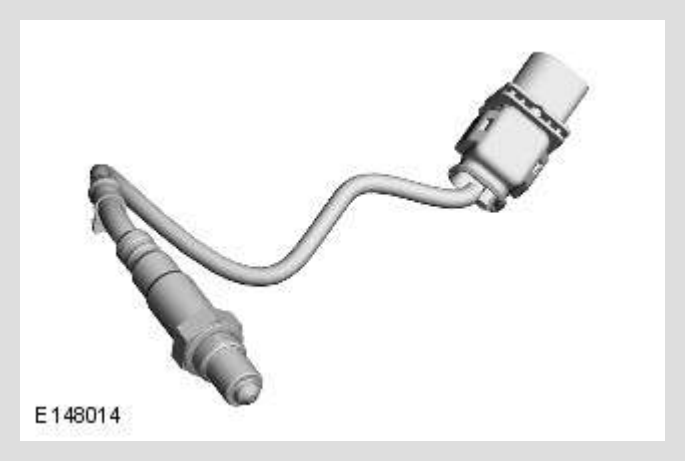
The AAT (ambient air temperature) sensor is a NTC thermistor that allows the ECM to monitor the temperature of the air around the vehicle. The ECM uses the AAT input for a number of functions, including engine cooling fan control. The ECM also transmits the ambient temperature on the HS (high speed) CAN powertrain bus for use by other control modules.

The AAT sensor is installed in the left exterior mirror, with the bulb of the sensor positioned over a hole in the bottom of the mirror casing.

The ECM supplies the sensor with a 5 V reference voltage and a ground, and translates the return signal voltage into a temperature.

If there is a fault with the AAT sensor, the ECM calculates the AAT from the temperature inputs of the MAFT sensor. If the AAT sensor and the temperature input of the MAFT sensor are both faulty, the ECM adopts a default ambient temperature of 20 ° C (68 °F).

HEATED OXYGEN SENSOR



The HO2S is a wide band type oxygen sensor that allows the ECM to provide closed loop control of the air:fuel mixture. The sensor is installed in the right downpipe of the exhaust system, immediately after the connection with the VGT (variable geometry turbine) turbocharger outlet.

Power for the heater element of the HO2S is provided by a battery voltage supply from the ECM relay in the EJB . The circuit through the heater element is completed by a connection with the ECM . The ECM regulates the current flow through the heater element to control the heating of the sensor. The heater element is operated immediately after each engine start and during low load conditions when the temperature of the exhaust gases is insufficient to maintain the required sensor temperature.

The HO2S has four further connections with the ECM , two for the Nernst (oxygen measuring) cell and two for the pump cell. The ECM adjusts the current of the pump cell circuit as necessary to maintain a constant signal from the oxygen measuring cell. The ECM then relates the current of the pump cell circuit to the lambda value of the exhaust gases.

If a HO2S fails the ECM defaults to open loop fueling and the emissions content of the exhaust gases increases. With a failed HO2S , the engine will suffer from unstable operation and reduced performance.

ACTIVE ENGINE MOUNT

The active engine mounts are controlled by the Engine Control Module (ECM) to help reduce Noise, Vibration and Harshness (NVH).The ECM uses engine inputs to determine when to operate the active engine mount solenoid.

The engine mounts are manufactured of steel and rubber to absorb the weight of engine and vibrations from the engine, controlled by solenoids and the ECM.

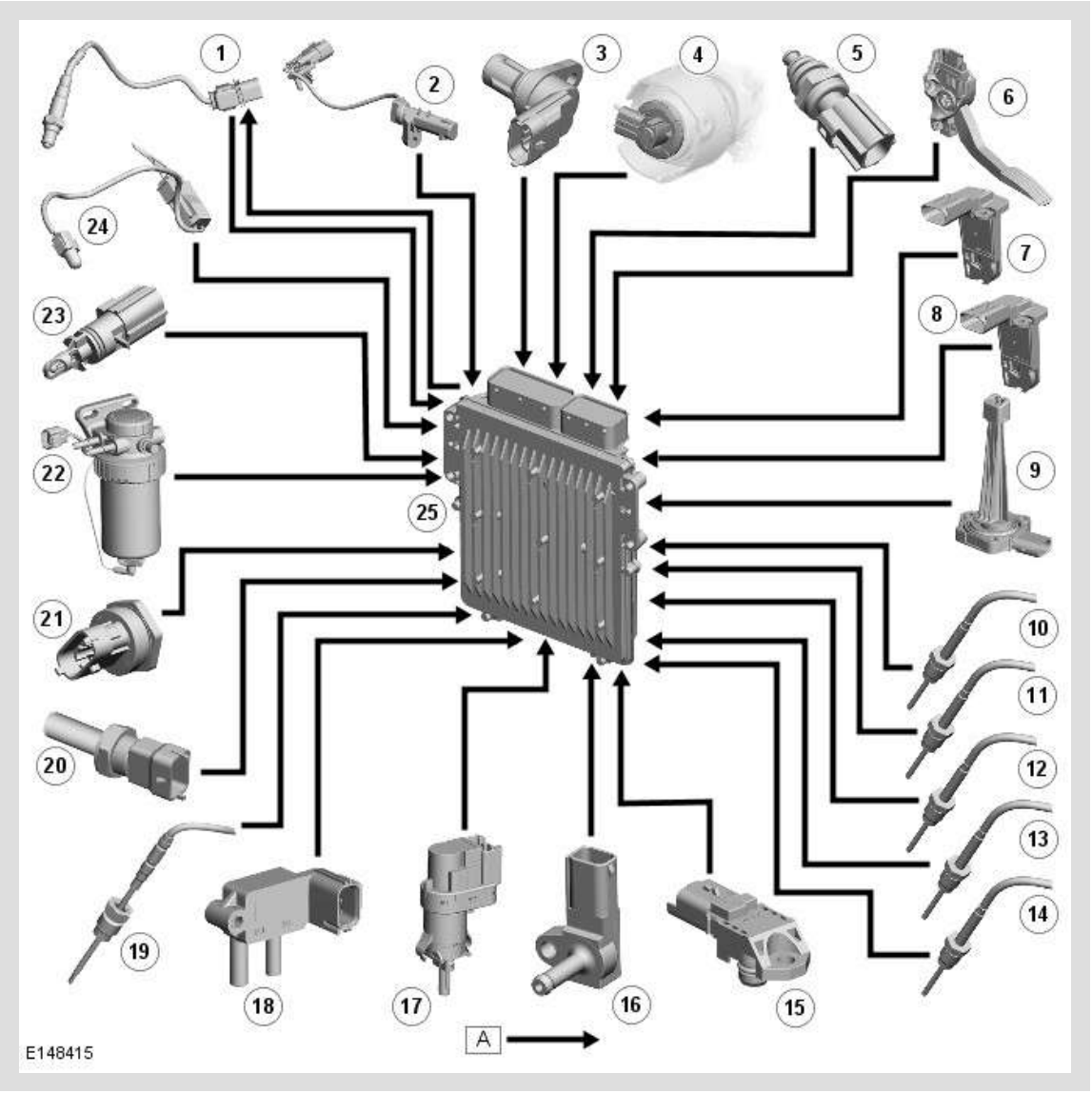
OPERATION

The TDV8 4.4L diesel engine management system is controlled by the ECM and is able to monitor, adapt and precisely control the fuel injection and electric throttle. The ECM uses multiple sensor inputs and precision control of actuators to achieve optimum performance during all driving conditions.

The ECM controls fuel delivery to all eight cylinders via a common rail injection system. The common rail system uses a fuel rail to accumulate highly pressurized fuel and feed the eight, electronically controlled injectors. The fuel rail is located in close proximity to the injectors, which assists in maintaining full system pressure at each injector at all times.

The ECM uses the drive by wire principle for acceleration control. There are no control cables or physical connections between the accelerator pedal and the engine. Accelerator pedal demand is communicated to the ECM by two potentiometers located in the APP sensor. The ECM uses the two signals to determine the position, rate of movement and direction of movement of the pedal. The ECM then uses this data, along with other engine information from other sensors, to achieve the optimum engine response.

CONTROL DIAGRAM - 1 OF 2

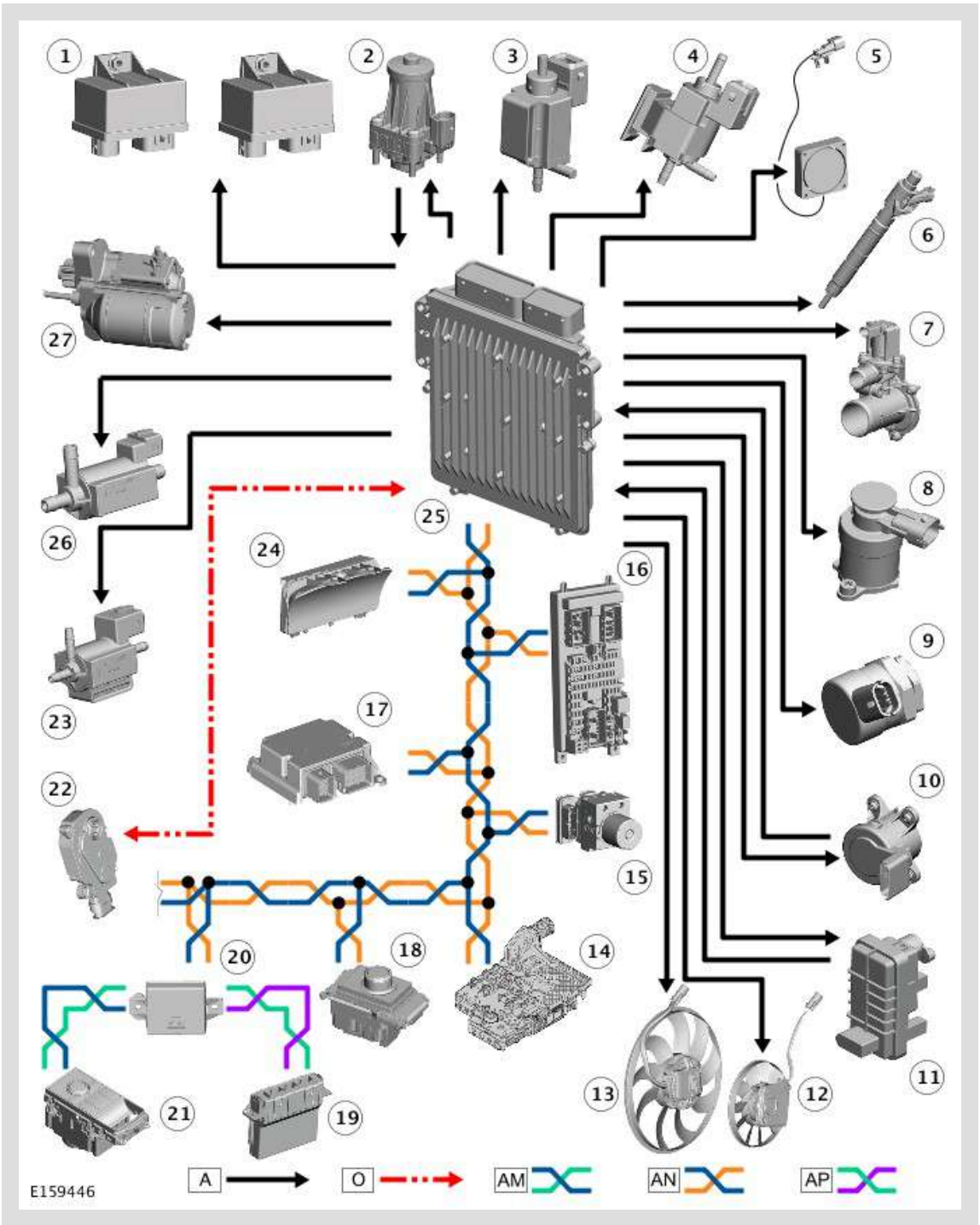


A = HARDWIRED.

ITEM	DESCRIPTION
1	Heated Oxygen Sensor (HO2S)
2	Crankshaft Position (CKP) sensor
3	Camshaft Position (CMP) sensor

4	Turbine intake valve position sensor
5	Engine Coolant Temperature (ECT) sensor
6	Accelerator Pedal Position (APP) sensor
7	Mass Air Flow and Temperature (MAFT) sensor
8	Mass Air Flow (MAF) sensor
9	Oil level and temperature sensor
10	Turbine temperature sensor (where fitted)
11	Pre catalytic converter exhaust gas temperature sensor (where fitted)
12	Post catalytic converter exhaust gas temperature sensor (where fitted)
13	Post diesel particulate filter exhaust gas temperature sensor (where fitted)
14	Exhaust Gas Recirculation (EGR) cooler outlet temperature sensor
15	Manifold Absolute Pressure (MAP) sensor
16	Charge air pressure sensor
17	Brake pedal switch
18	Differential pressure sensor
19	Exhaust Gas Recirculation (EGR) cooler inlet temperature sensor
20	Fuel temperature sensor
21	Fuel rail pressure sensor
22	Water in Fuel (WIF) sensor
23	Charge air temperature sensor
24	Ambient Air Temperature (AAT) sensor
25	Engine Control Module (ECM)

CONTROL DIAGRAM - 2 OF 2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A = HARDWIRED; O = LIN (LOCAL INTERCONNECT NETWORK) BUS; AM = HS (HIGH SPEED) CAN CHASSIS BUS; AN = HS CAN POWERTRAIN BUS; AP = MS (MEDIUM SPEED) CAN COMFORT BUS.

ITEM	DESCRIPTION
1	Glow plug control modules
2	Exhaust Gas Recirculation (EGR) valve
3	EGR cooler bypass valve solenoid
4	Engine mount solenoid
5	Engine Control Module (ECM) cooling fan (where fitted)
6	Fuel injector (8 off)
7	Charge air recirculation solenoid
8	Fuel metering valve
9	Fuel pressure control valve
10	Electric throttle motor
11	Variable geometry turbine vane actuator
12	Engine cooling fan 2
13	Engine cooling fan 1
14	Transmission Control Module (TCM)
15	Anti-lock Brake System (ABS) control module
16	Central Junction Box (CJB)
17	Restraints Control Module (RCM)
18	Transmission Control Switch (TCS)
19	Automatic Temperature Control Module (ATCM)
20	Gateway Module (GWM)
21	Terrain Response® switchpack
22	Active grille air shutter actuator (where fitted)
23	Turbine intake shut-off valve solenoid
24	Instrument Cluster (IC)
25	Engine Control Module (ECM)
26	Charge air solenoid
27	Starter motor

PUBLISHED: 11-DEC-2013
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

BRAKE PEDAL POSITION SWITCH ADJUSTMENT (G1395342)

CHECK

1. Remove the brake pedal rubber.

2. **NOTE:**

   Make sure that the dial test indicator (DTI) gauge is in line with the brake pedal movement.

Position the DTI gauge on a suitable mounting block, as illustrated.

3. With the aid of another technician, gently press the brake pedal until the stop lamps illuminate.

4. **NOTE:**

   The specification is that the stop lamps should illuminate at between 5.5 mm and 8.5mm brake pedal travel.

Note the measurement of the brake pedal travel from rest position until the stop lamps illuminated.

ADJUST

NOTE:

The Brake Pedal Position Switch is self adjusting when removed and installed.

1. Remove and install Brake Pedal Position Switch.
   For additional information, refer to: Stoplamp Switch (417-01 Exterior Lighting, Removal and Installation).

2. Check the adjustment of the stop lamp switch by following the **Check** procedure in this procedure and carry out the **Adjust** procedure if required.

PUBLISHED: 07-JUN-2017
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

CAMSHAFT POSITION SENSOR (G1509570)

REMOVAL AND INSTALLATION

18.30.24	SENSOR - CAMSHAFT POSITION (CMP) - RENEW	4400 CC, TDV8	0.7	USED WITHINS	

REMOVAL

CAUTION:

Before disconnecting any components, make sure the area is clean and free from foreign material. When disconnected all openings must be sealed.

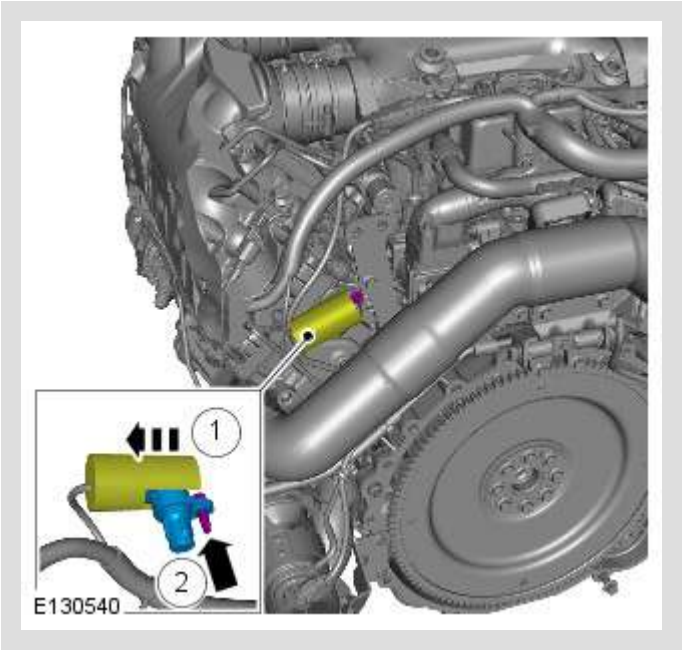
NOTE:

Removal steps in this procedure may contain installation details.

1. Refer to: Engine Cover - 4.4L V8 - TdV8 (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. Refer to: Secondary Bulkhead Centre Panel - TDV8 4.4L Diesel (501-02 Front End Body Panels, Removal and Installation).

3.

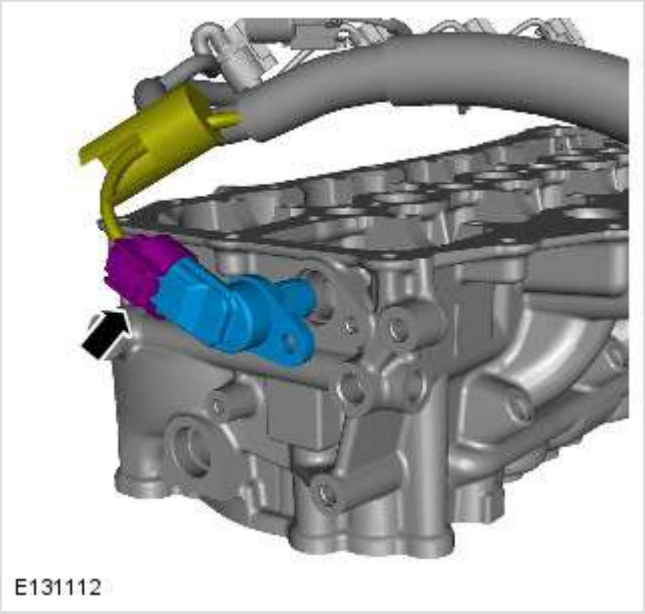


Torque: **10 Nm**

4.

CAUTION:

Be prepared to collect escaping oil.



INSTALLATION

1.

CAUTION:

Make sure the protection shield is correctly aligned onto the camshaft position sensor.

To install, reverse the removal procedure.

PUBLISHED: 27-JUN-2017
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

CHARGE AIR PRESSURE SENSOR (G2164972)

18.31.01	SENSOR - CHARGE AIR PRESSURE - RENEW	4400 CC, TDV8	2	USED WITHINS	

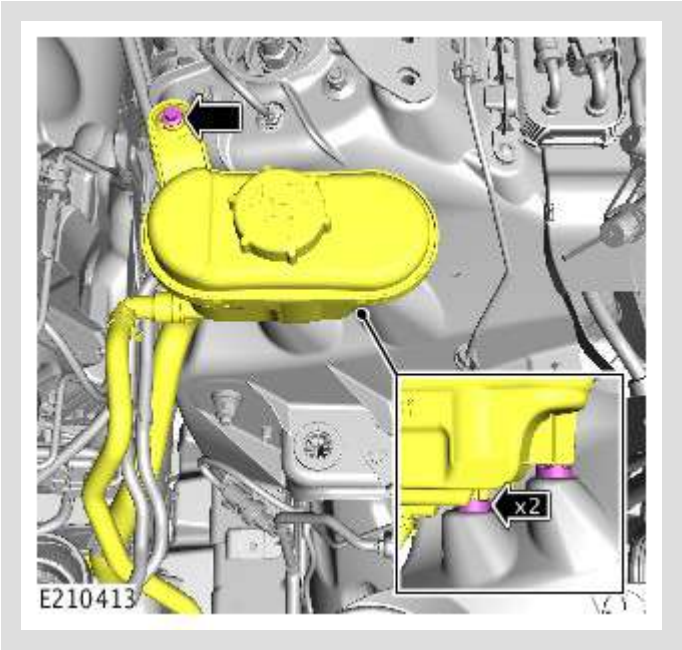
REMOVAL

NOTE:

- This procedure contains some variation in the illustrations depending on the vehicle specification, but the essential information is always correct.
- This procedure contains illustrations showing certain components removed to provide extra clarity.

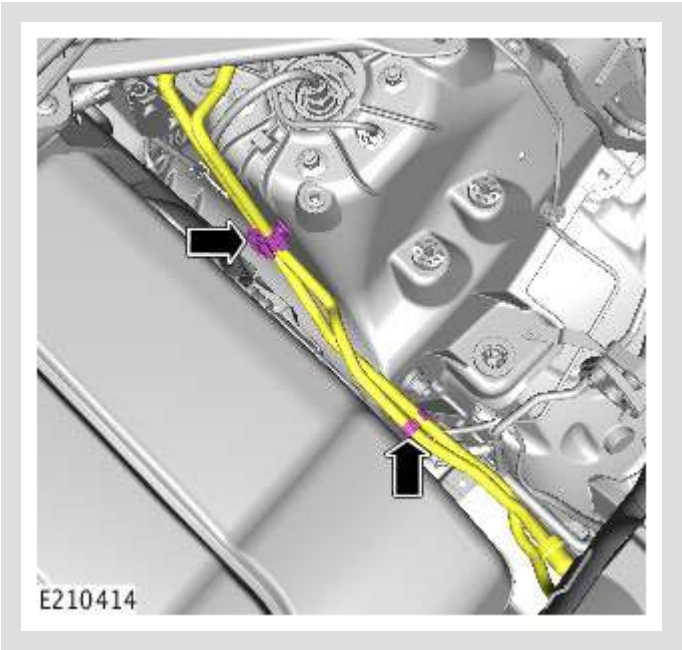
1. Remove the left air filter assembly.
   Refer to: Left Air Cleaner (303-12, Removal and Installation).

2.



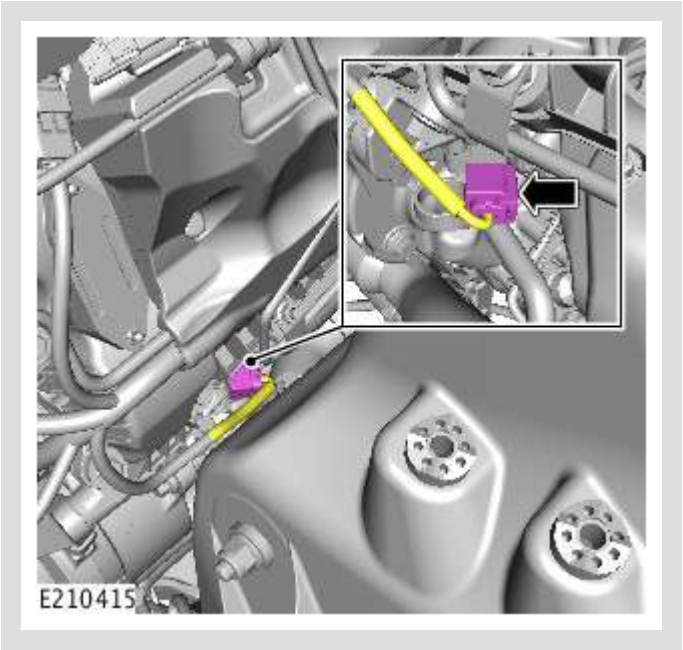
Position the dynamic response fluid reservoir away from the engine.

3.



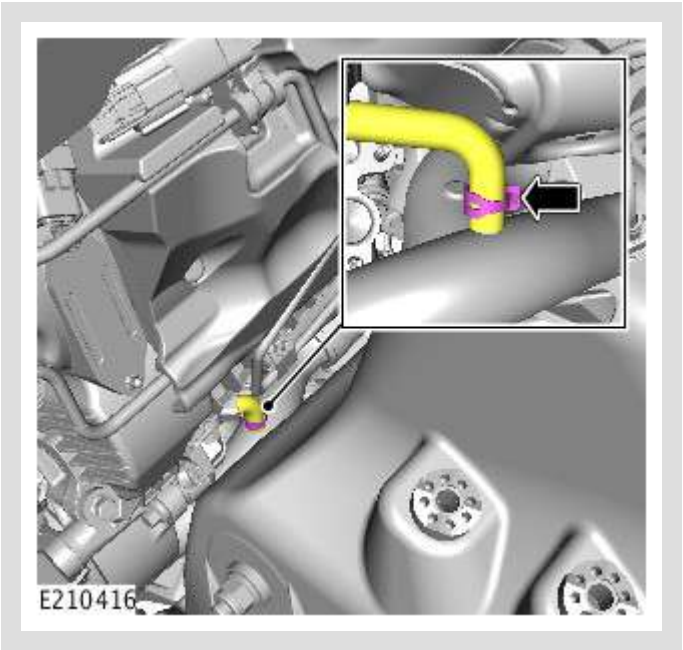
Release the 2 clips and position the 2 coolant hoses away from the engine.

4.



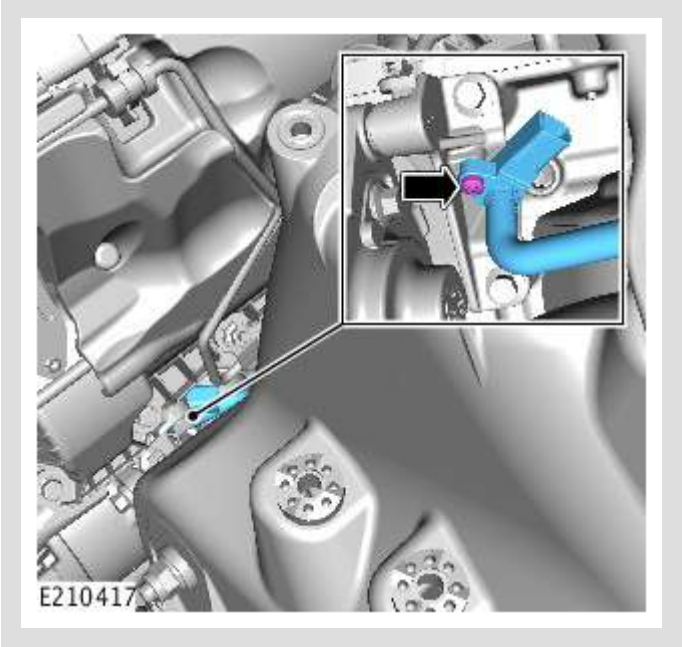
Disconnect the electrical connector.

5.



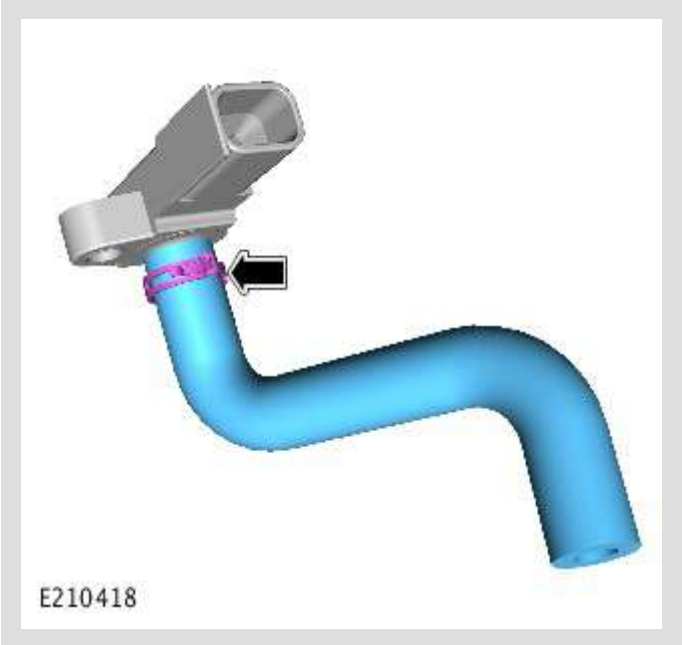
Disconnect the charge air pressure sensor hose from the turbocharger outlet pipe.

6.



Remove the charge air pressure sensor.

7.



Remove the charge air pressure sensor hose.

INSTALLATION

1. Install the charge air pressure sensor hose.

2. Install the charge air pressure sensor.

3. Connect the charge air pressure sensor hose to the turbocharger outlet pipe.

4. Connect the electrical connector.

5. Secure the 2 coolant hoses.

6. Secure the dynamic response fluid reservoir.
   Torque:
   Bolt **5 Nm**

7. Install the left air filter assembly.
   Refer to: Left Air Cleaner (303-12, Removal and Installation).

PUBLISHED: 08-AUG-2016
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

CRANKSHAFT POSITION SENSOR (G1509571)

REMOVAL AND INSTALLATION

18.30.12	SENSOR - CRANKSHAFT POSITION (CKP) - RENEW	4400 CC, TDV8	1.3	USED WITHINS	

REMOVAL

WARNING:

Observe due care when working near a hot exhaust system.

NOTES:

- Exhaust system shown removed for clarity.
- Removal steps in this procedure may contain installation details.

1.

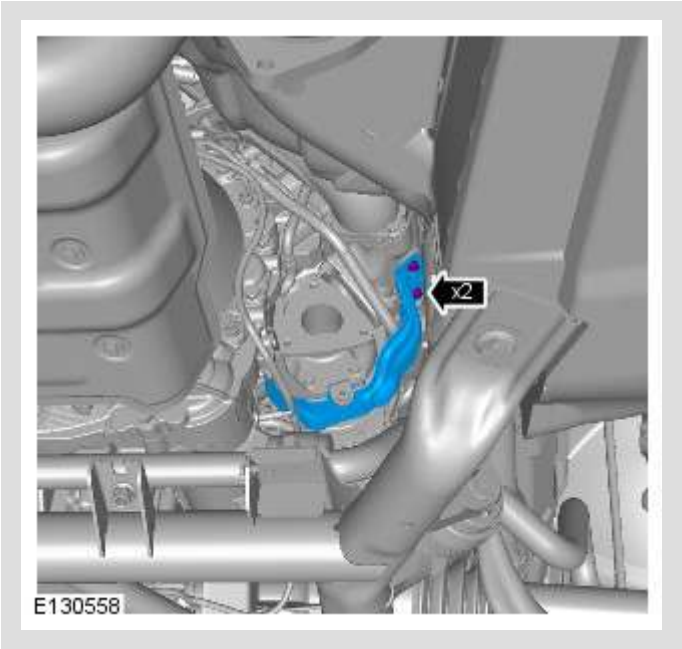
WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

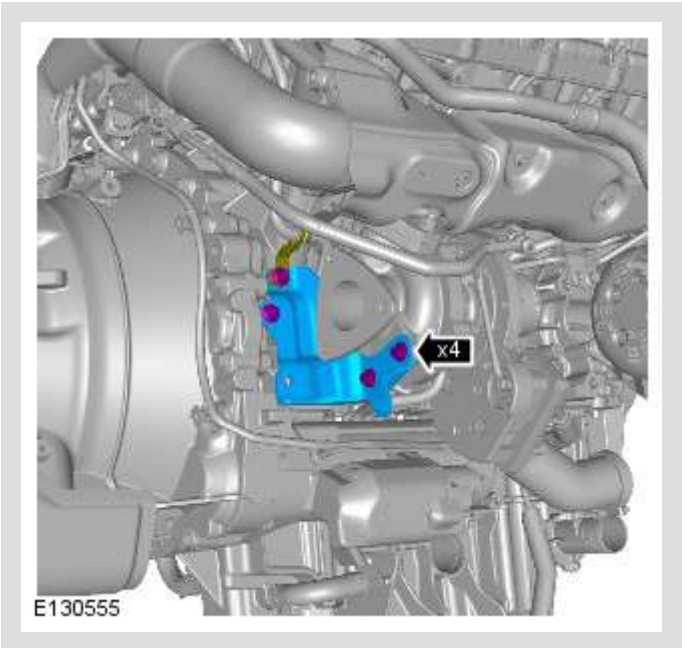
2. Refer to: Starter Motor (303-06D Starting System - TDV8 4.4L Diesel, Removal and Installation).

3.



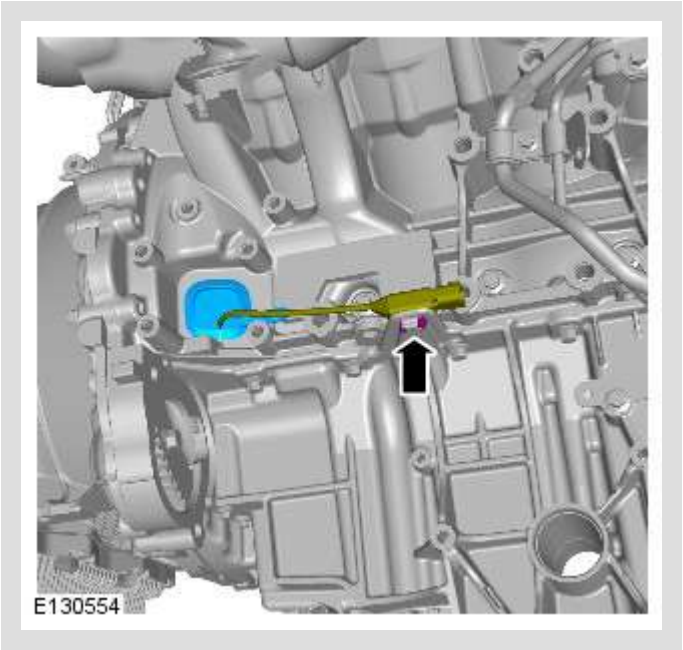
Torque: **10 Nm**

4.



Torque: **23 Nm**

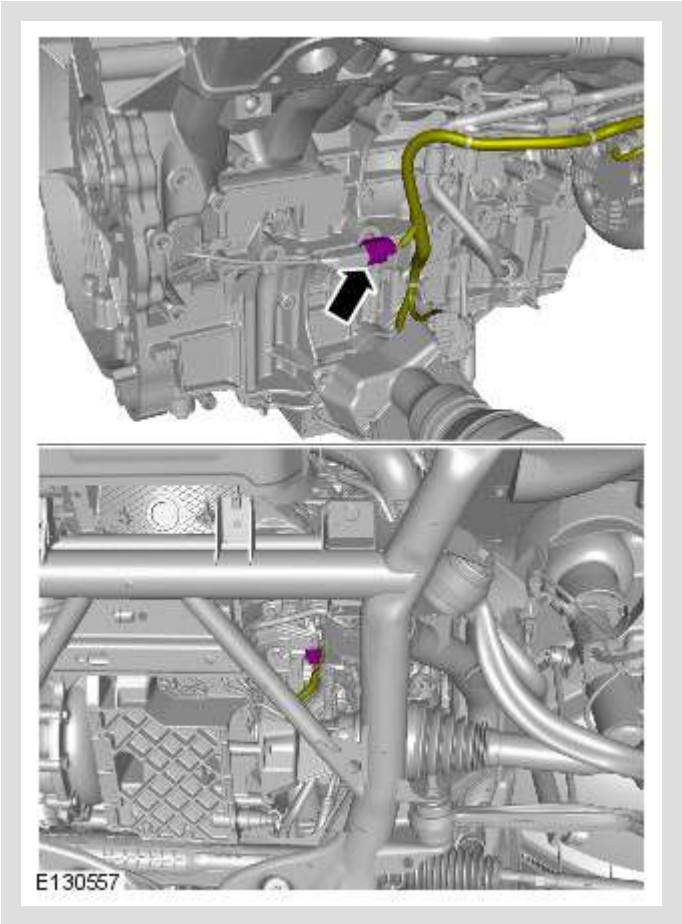
5.



6.

CAUTION:

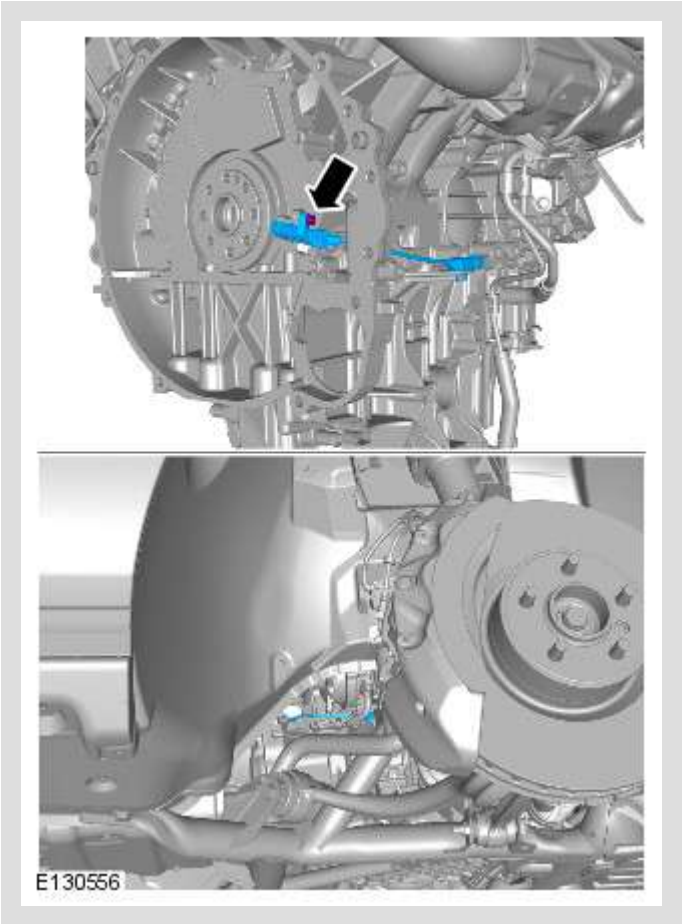
Before the disconnection or removal of any components, make sure the area around joint faces and connections are clean. Plug any open connections to prevent contamination.



7.

NOTE:

The CKP sensor retaining bolt should not be removed from the CKP sensor.



Torque: **5 Nm**

INSTALLATION

1.

CAUTIONS:

- Install the CKP sensor correctly into the housing. Failure to follow this instruction may result in damage to the CKP sensor.
- Make sure that the mating faces are clean and free of foreign material.

- Make sure that the component is clean, free of foreign material and lubricant.

To install, reverse the removal procedure.

PUBLISHED: 31-AUG-2012
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

CRANKSHAFT POSITION SENSOR RING (G1509572)

REMOVAL AND INSTALLATION

18.30.14	GEAR(S) - TOOTHED - CRANKSHAFT SENSOR - RENEW	4400 CC, TDV8, WITH PARTICULATE FILTER	6.9	USED WITHINS

REMOVAL

NOTES:

- Removal steps in this procedure may contain installation details.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. Disconnect the battery ground cable.
   Refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

2. **WARNING:**

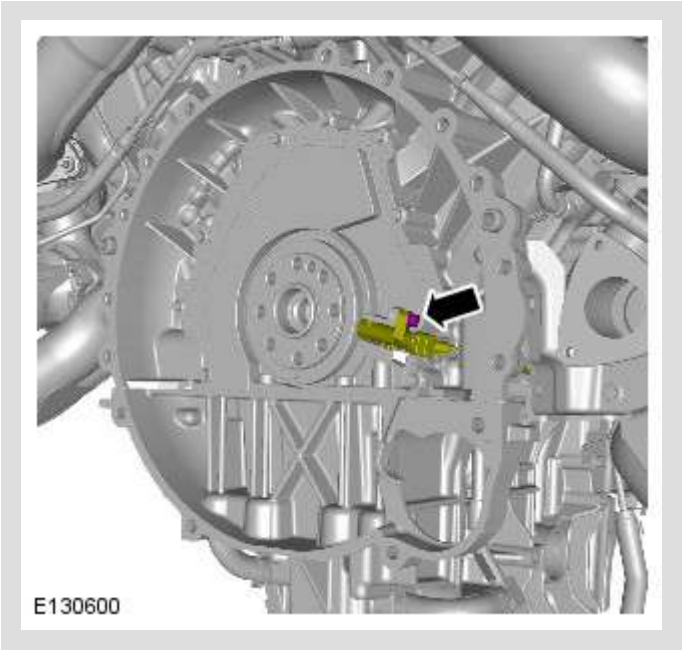
   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

3. Refer to: Flexplate (303-01E Engine - TDV8 4.4L Diesel, Removal and Installation).

4. **NOTE:**

   The CKP sensor bolt should not be removed from the CKP sensor.

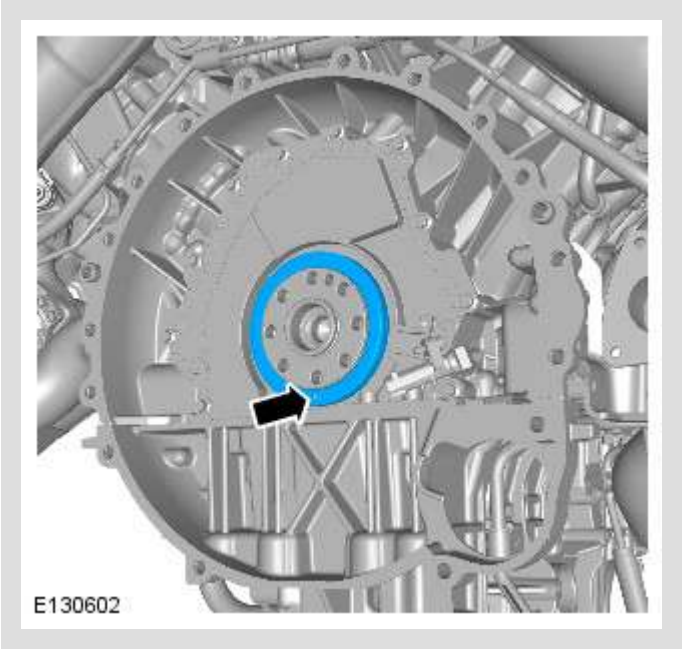


Torque: **5 Nm**

5.

NOTE:

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



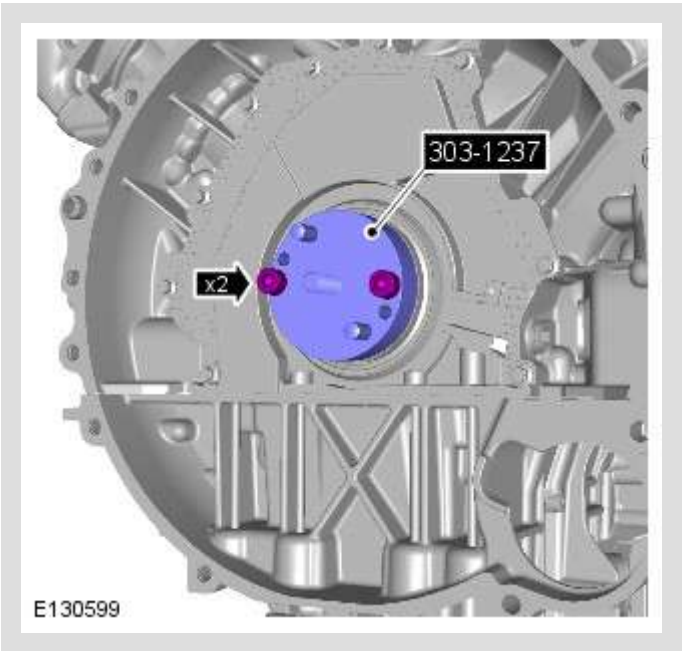
INSTALLATION

1.

CAUTION:

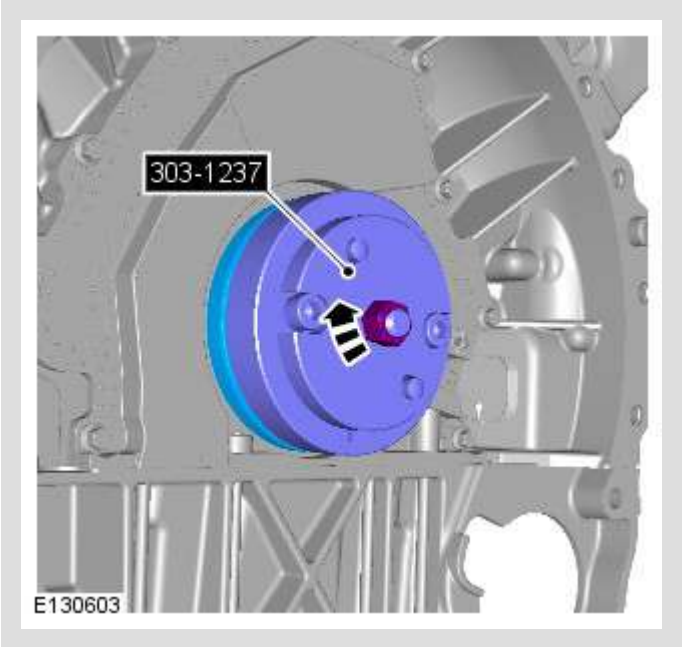
Make sure that the CKP sensor ring is aligned correctly with the special tool pip and that both mating surfaces are fully seated.

2.

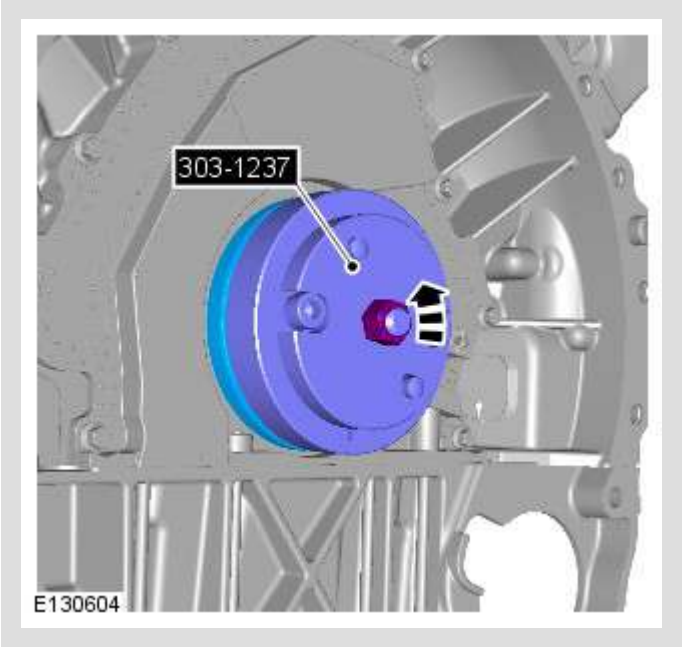


Install the special tool.

3.



4.



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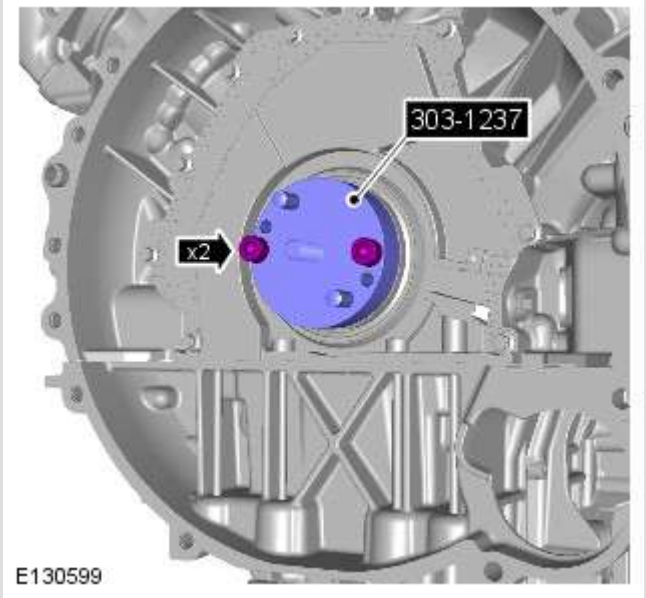
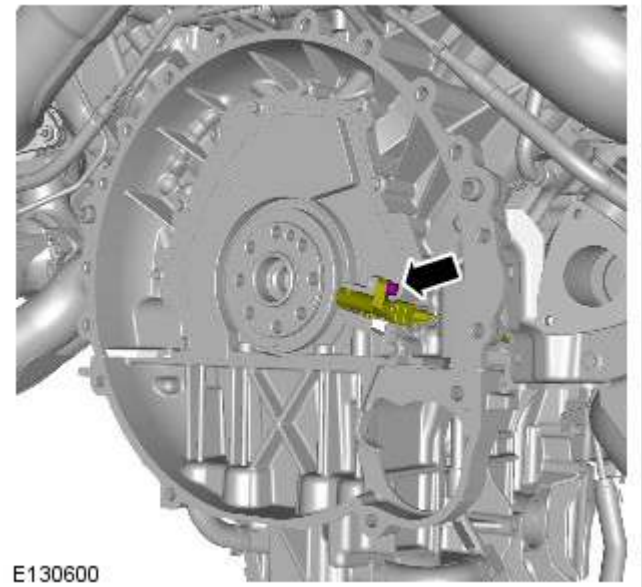


Remove the special tool.

6.

CAUTION:

Install the CKP sensor correctly into the housing. Failure to follow this instruction may result in damage to the CKP sensor.



Torque: **5 Nm**

7. To install, reverse the removal procedure.

PUBLISHED: 08-AUG-2012
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

DIESEL PARTICULATE FILTER DIFFERENTIAL PRESSURE SENSOR (G1518049)

REMOVAL AND INSTALLATION

17.50.23	SENSOR - DIFFERENTIAL PRESSURE - PARTICULATE FILTER - RENEW	4400 CC, TDV8	0.4	USED WITHINS

REMOVAL

WARNING:

Observe due care when working near a hot exhaust system.

NOTE:

Removal steps in this procedure may contain installation details.

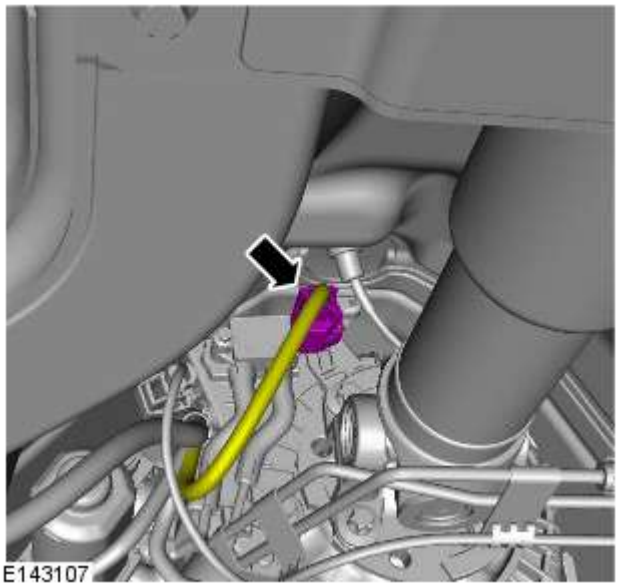
1.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2.



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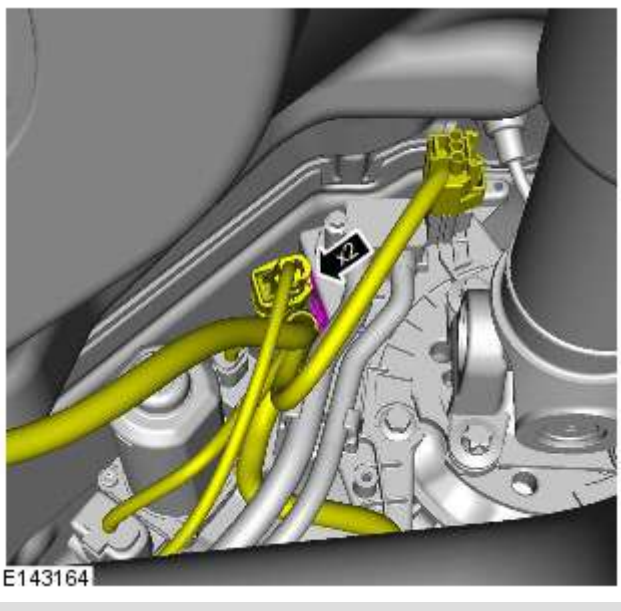

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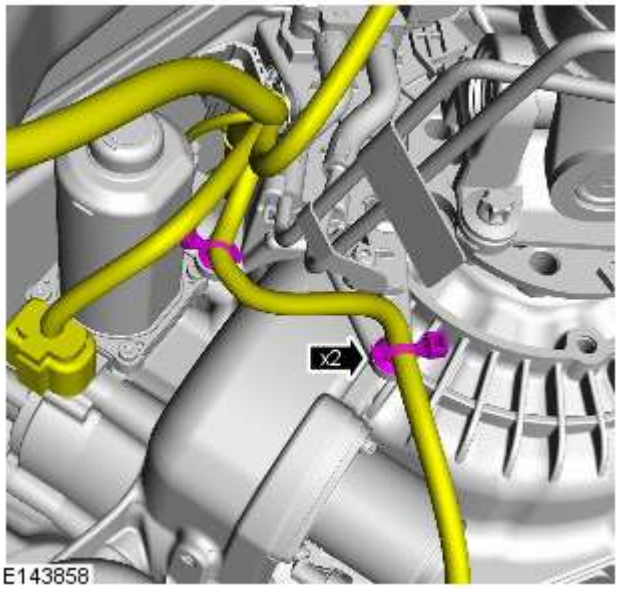

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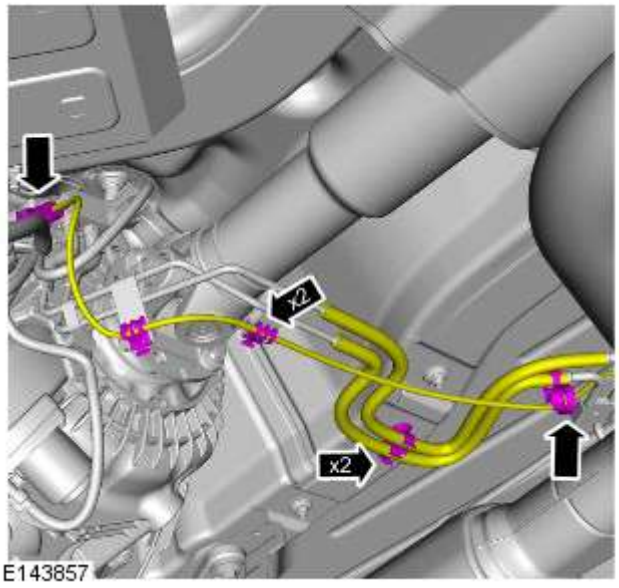

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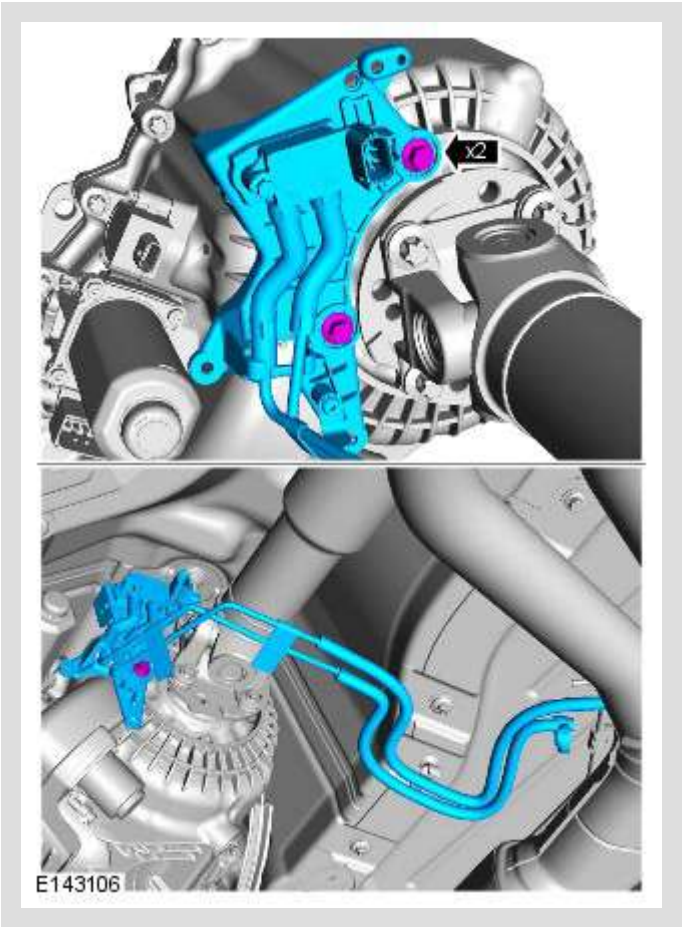


Torque: **20 Nm**

INSTALLATION

1. To install, reverse the removal procedure.

2. If a new unit is installed, configure using the approved diagnostic tool.

PUBLISHED: 24-AUG-2012
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

ENGINE CONTROL MODULE (G1509573)

18.30.03	ELECTRONIC CONTROL UNIT - FUEL - RENEW	4400 CC, TDV8	0.2	USED WITHINS

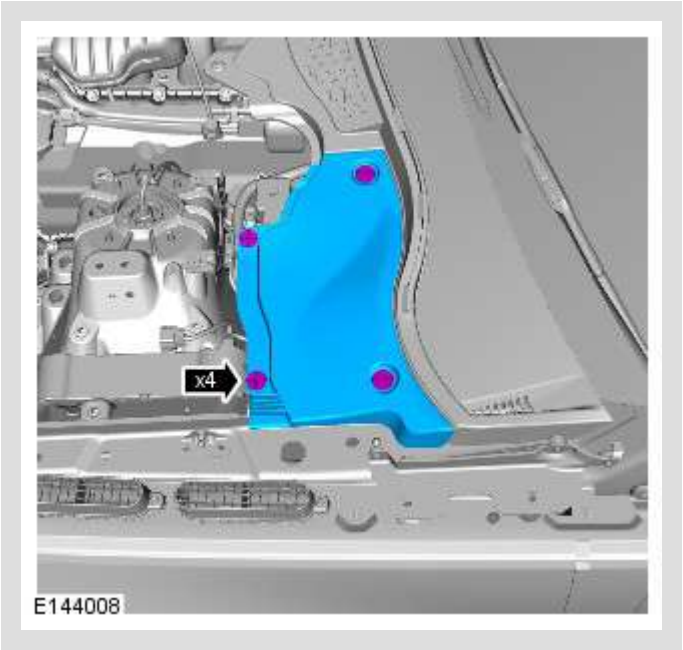
REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
   Refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

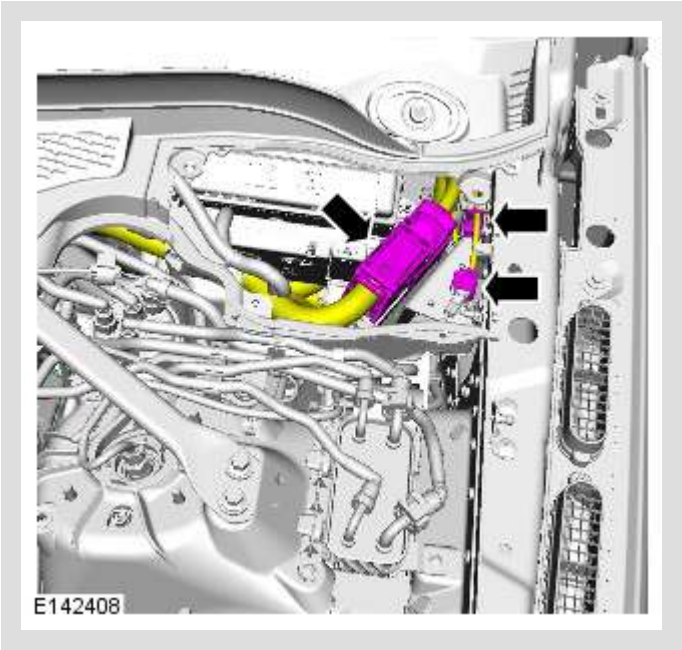
2.



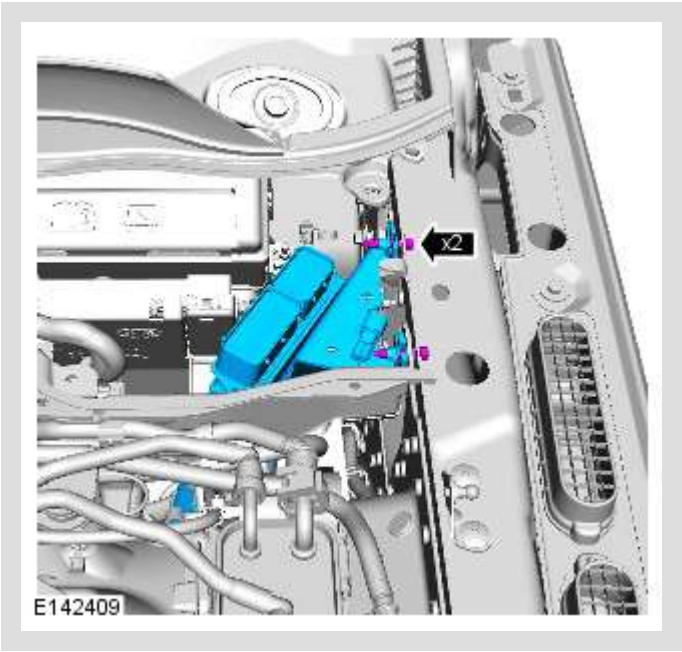
3.

CAUTION:

Before the disconnection or removal of any components, make sure the area around joint faces and connections are clean. Plug any open connections to prevent contamination.



4.



Torque: **9 Nm**

5.

Torque: **9 Nm**

INSTALLATION

1. To install, reverse the removal procedure.

2. If a new unit is installed, configure using the approved diagnostic tool.

PUBLISHED: 08-DEC-2014
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

ENGINE COOLANT TEMPERATURE SENSOR (G1509574)

REMOVAL AND INSTALLATION

18.30.10	SENSOR - COOLANT TEMPERATURE (ECT SENSOR) - RENEW	4400 CC, TDV8	1	USED WITHINS	

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
   Refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

2. **WARNING:**

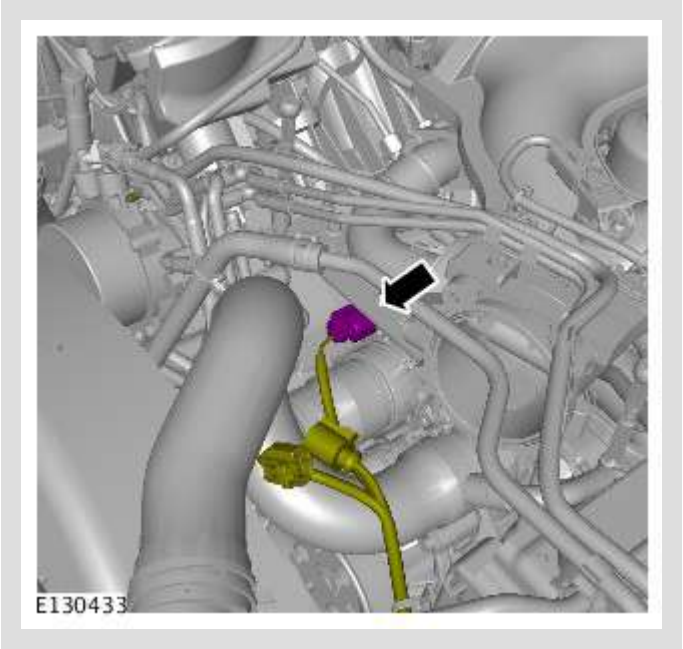
   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

3. Refer to: Throttle Body (303-04F Fuel Charging and Controls - TDV8 4.4L Diesel, Removal and Installation).

4. Refer to: Cooling System Partial Draining and Vacuum Filling (303-03A Engine Cooling - TDV6 3.0L Diesel - Gen 2/TDV6 3.0L Diesel - Gen 1.5, General Procedures).

5.



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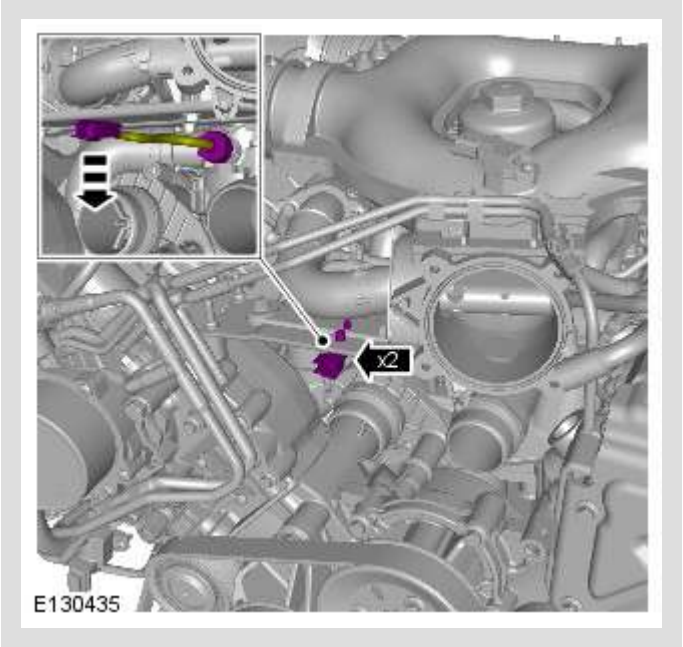
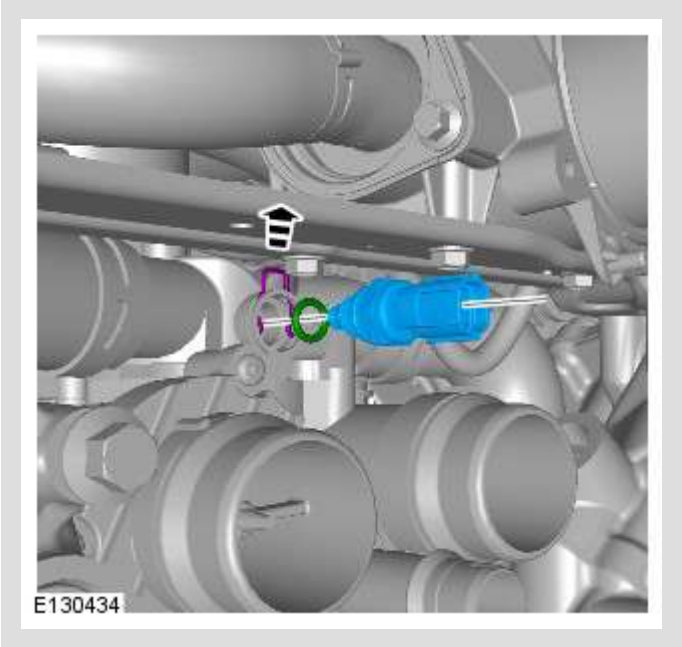


7.

CAUTION:

Be prepared to collect escaping fluids.



INSTALLATION

1. To install, reverse the removal procedure.

PUBLISHED: 16-AUG-2012
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

LEFT EXHAUST GAS TEMPERATURE SENSOR (G1509575)

18.31.59	EXHAUST GAS TEMPERATURE SENSOR - LH - RENEW	4400 CC, TDV8	0.1	USED WITHINS

REMOVAL

WARNING:

Observe due care when working near a hot exhaust system.

NOTE:

Removal steps in this procedure may contain installation details.

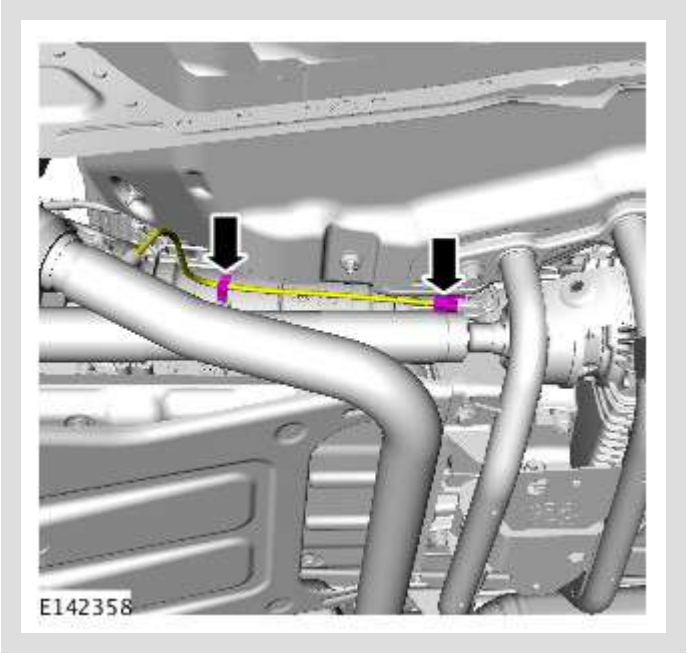
1.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

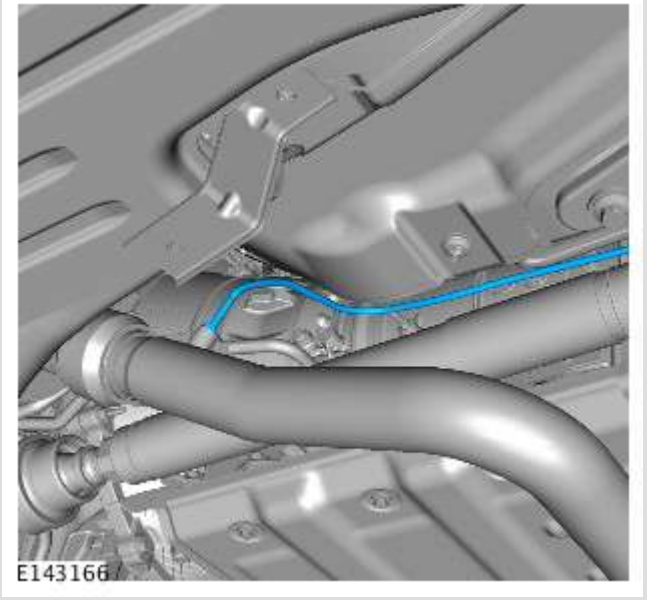
2.



3.

CAUTION:

Make sure that the mating faces are clean and free of foreign material.



Torque: **35 Nm**

INSTALLATION

1.

CAUTION:

If accidentally dropped or knocked install a new sensor.

NOTE:

If the original sensor is to be installed, apply lubricant meeting specification ESE-M12A4-A to the thread of the sensor.

To install, reverse the removal procedure.

PUBLISHED: 07-JUN-2017
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

EXHAUST MANIFOLD TEMPERATURE SENSOR (G1509576)

REMOVAL AND INSTALLATION

18.31.60	SENSOR - EXHAUST MANIFOLD TEMPERATURE - RENEW	4400 CC, TDV8	0.3	USED WITHINS

SPECIAL TOOL(S)


E131753

JLR-303-1573

Remover, Exhaust Manifold Temperature Sensor

REMOVAL

NOTE:

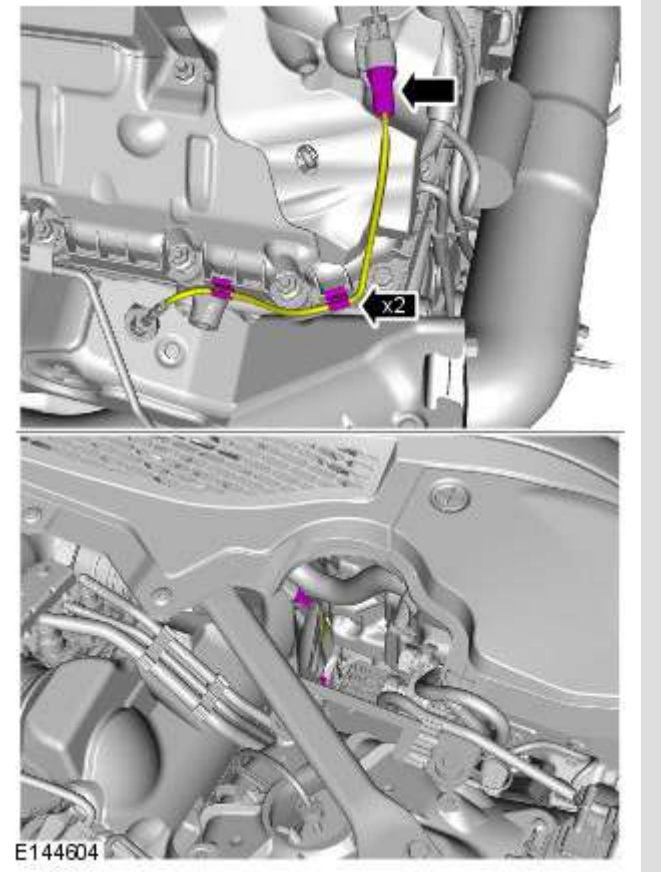
Removal steps in this procedure may contain installation details.

1. Refer to: Engine Cover - 4.4L V8 - TdV8 (501-05 Interior Trim and Ornamentation, Removal and Installation).

2.

Refer to: Fuel Filter Element (310-01D Fuel Tank and Lines - TDV8 4.4L Diesel, Removal and Installation).

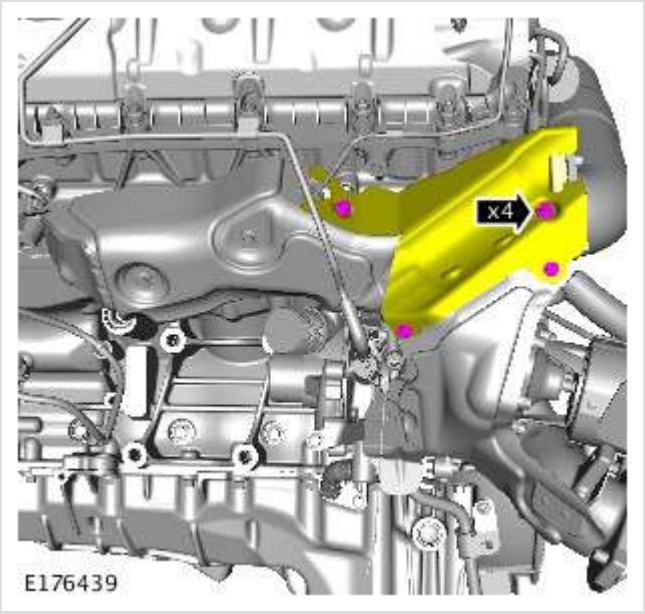
3.



4.

NOTE:

If required move aside the exhaust heat shield.

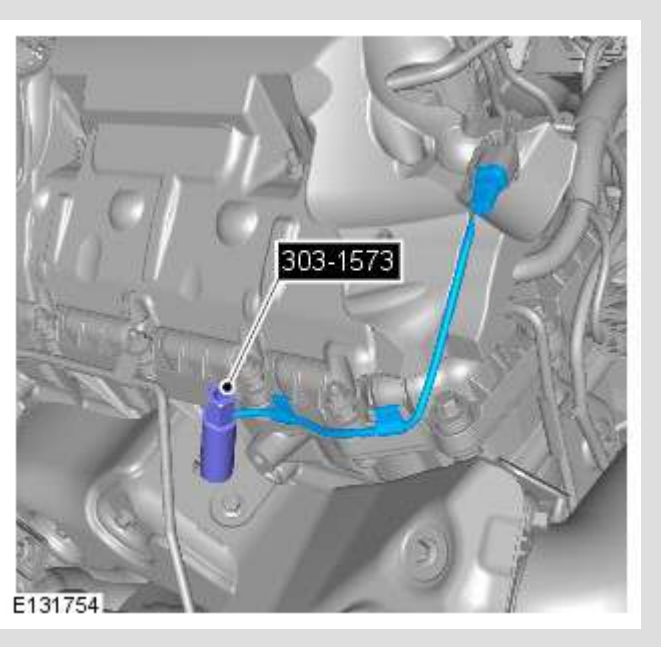


Torque: **9 Nm**

5.

CAUTION:

Before disconnecting any components, make sure the area is clean and free from foreign material. When disconnected all openings must be sealed.



- *Special Tool(s):* JLR-303-1573
  Torque: **32 Nm**

INSTALLATION

1.

CAUTION:

If accidentally dropped or knocked install a new sensor.

NOTE:

If the original sensor is to be installed, apply lubricant meeting specification ESE-M12A4-A to the thread of the sensor.

To install, reverse the removal procedure.

PUBLISHED: 07-JUN-2017
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

ENGINE OIL PRESSURE SENSOR (G1509577)

REMOVAL AND INSTALLATION

12.60.50	SWITCH - OIL PRESSURE - RENEW	4400 CC, TDV8	0.1	USED WITHINS	

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

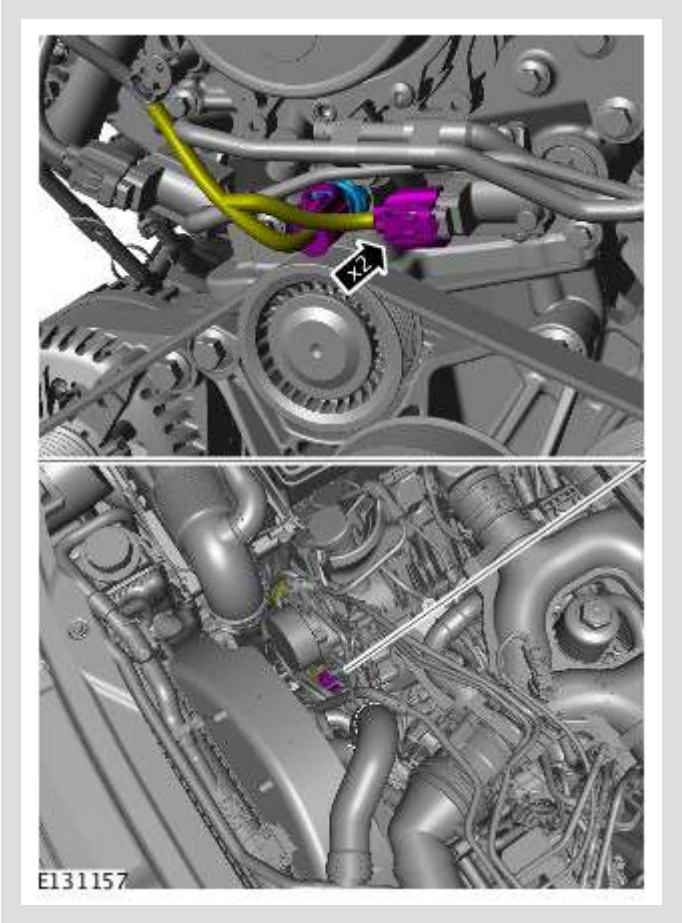
1. Refer to: Engine Cover - 4.4L V8 - TdV8 (501-05 Interior Trim and Ornamentation, Removal and Installation).

2. **CAUTIONS:**

- Before disconnecting any components, make sure the area is clean and free from foreign material. When disconnected all openings must be sealed.
- Be prepared to collect escaping oil.

NOTE:

Note the position of the wiring harness.



Torque: **14 Nm**

INSTALLATION

1.

CAUTION:

Make sure the wiring harness is installed to its original position.

To install, reverse the removal procedure.

PUBLISHED: 28-APR-2017
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

FUEL RAIL PRESSURE SENSOR (G1509578)

REMOVAL AND INSTALLATION

19.22.33	SENSOR - FUEL PRESSURE - RENEW	4400 CC, TDV8	1.7	USED WITHINS	

PART(S)

STEP	REPLACE PART / RENEW PART	PART NAME	
Installation Step 3	Renew Part	Fuel rail LH supply pipe	1

REMOVAL

CAUTION:

The use of an electronic torque and angle gauge is recommended during the high pressure fuel pipe tightening procedure.

NOTE:

Removal steps in this procedure may contain installation details.

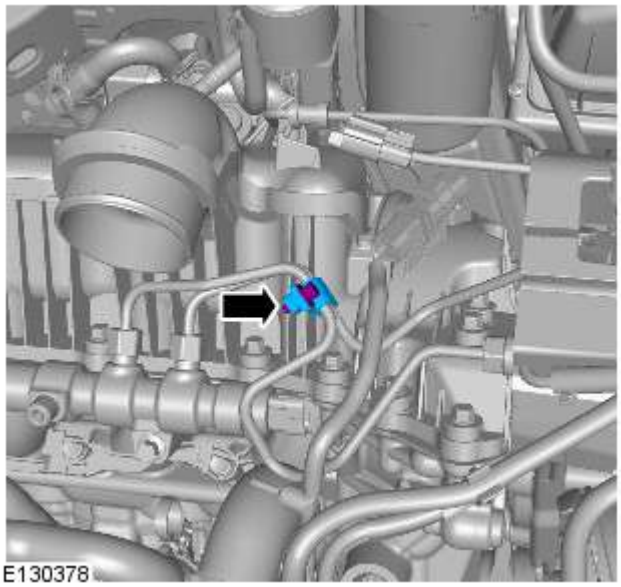
1. Disconnect the battery ground cable.
   Refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

2. Refer to: Diesel Fuel System Health and Safety Precautions (100-00 General Information, Description and Operation).

3. Refer to: Fuel Injection Component Cleaning (303-04F Fuel Charging and Controls - TDV8 4.4L Diesel, General Procedures).

4. Refer to: Intake Manifold Plenum Chamber (303-01E Engine - TDV8 4.4L Diesel, Removal and Installation).

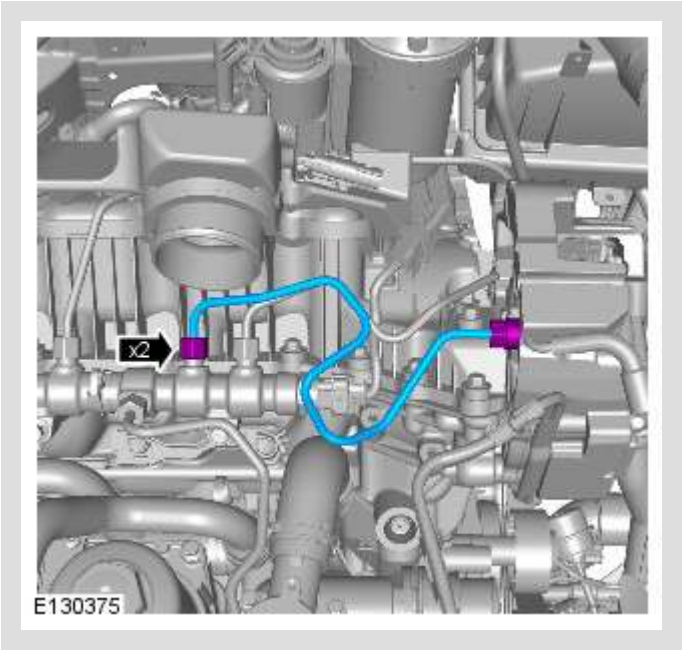
5.



6.

CAUTION:

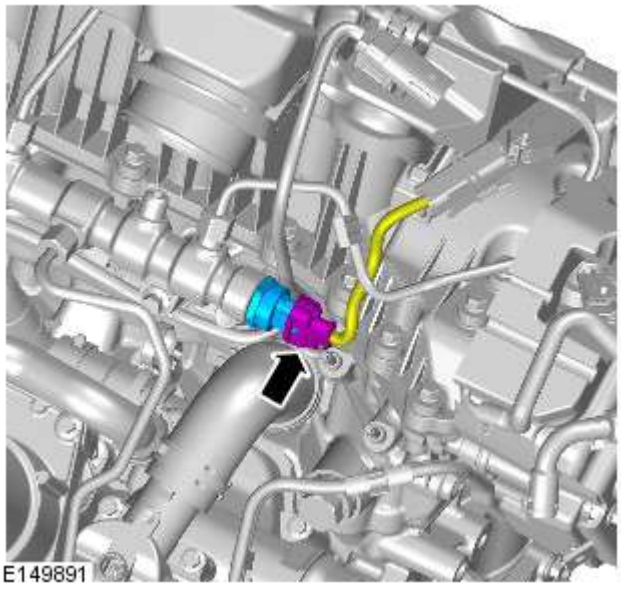
Discard the fuel pipes.



7.

CAUTION:

Before disconnecting or removing the components, make sure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

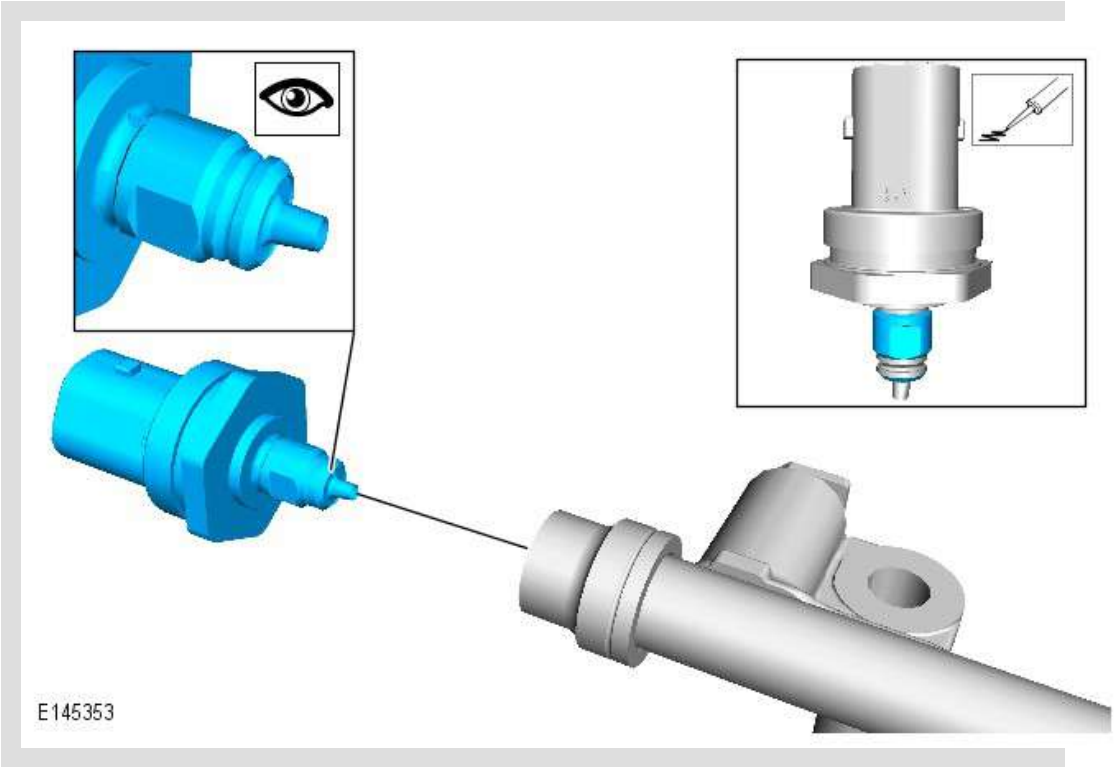


INSTALLATION

1.

NOTES:

- During lubrication, keep the component vertically as shown.
- Install the component finger tight at this stage.

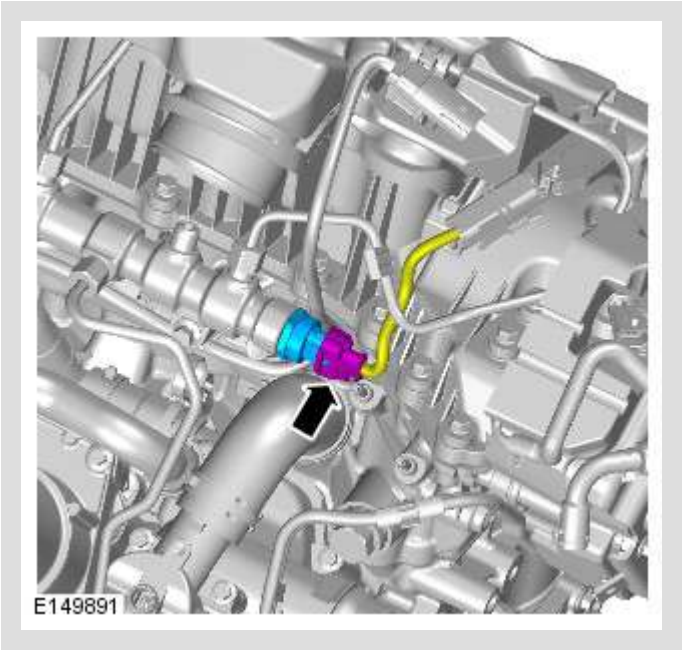


Lubricate with Ft1v27 as shown.

2.

CAUTION:

Make sure that the wiring harness is not twisted or damaged on installation. Failure to follow this instruction may result in damage to the vehicle.

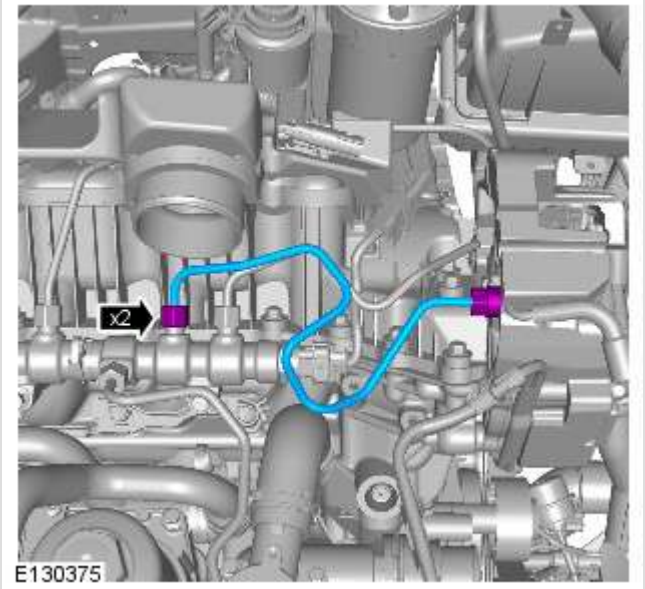


Torque: **70 Nm**

3.

CAUTIONS:

- Install new fuel pipes.
- Only tighten the unions finger-tight at this stage.

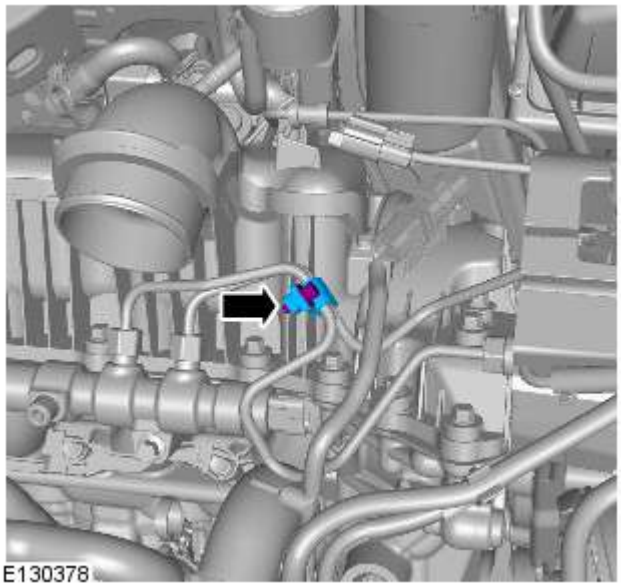


Renew Part: Fuel rail LH supply pipe : 1 .

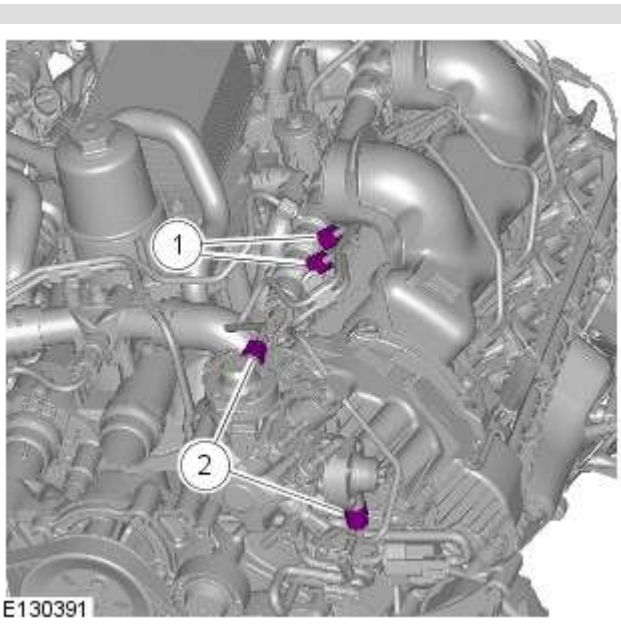
4.

CAUTION:

Only tighten the bolt finger-tight at this stage.



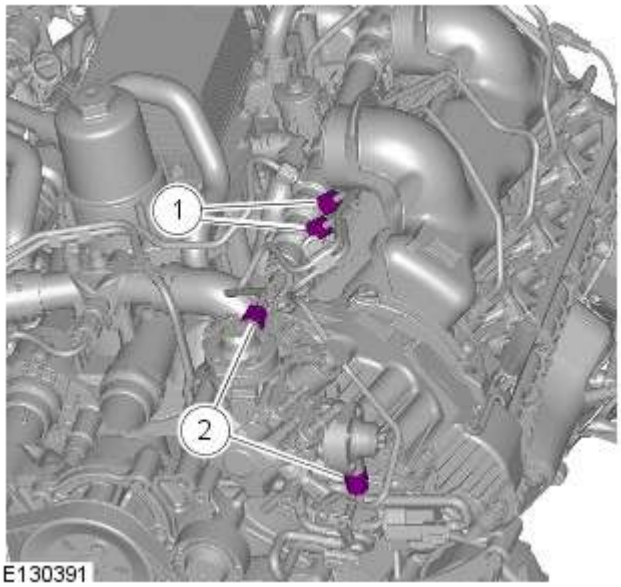
5.



Tighten all.

Torque: **10 Nm**

6.

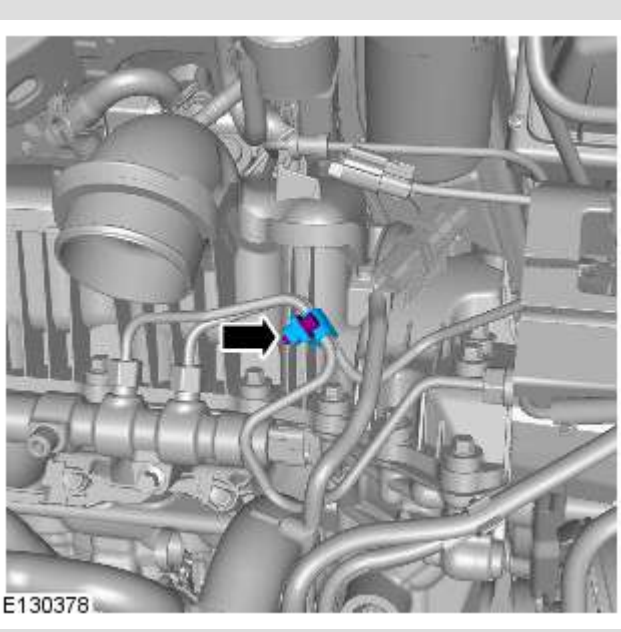


Torque:

1 **73°**

2 **80°**

7.



Torque: **10 Nm**

8. Refer to: Intake Manifold Plenum Chamber (303-01E Engine - TDV8 4.4L Diesel, Removal and Installation).

9. Refer to: High-Pressure Fuel System Bleeding (310-00 Fuel System - General Information, General Procedures).

10. Connect the battery ground cable.
Refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

PUBLISHED: 31-JUL-2012
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

HEATED OXYGEN SENSOR (G1518050)

REMOVAL AND INSTALLATION

19.22.16	SENSOR - HEATED OXYGEN (HO2S) - FRONT /LEFT /EACH - RENEW	4400 CC, TDV8	0.6	USED WITHINS	

SPECIAL TOOL(S)

310-121

Wrench, H02S

REMOVAL

WARNING:

Observe due care when working near a hot exhaust system.

NOTE:

Removal steps in this procedure may contain installation details.

1.

WARNING:

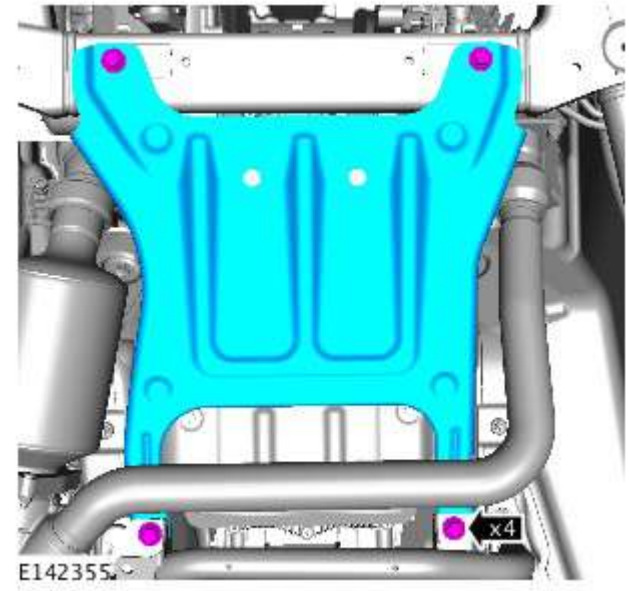
Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2.

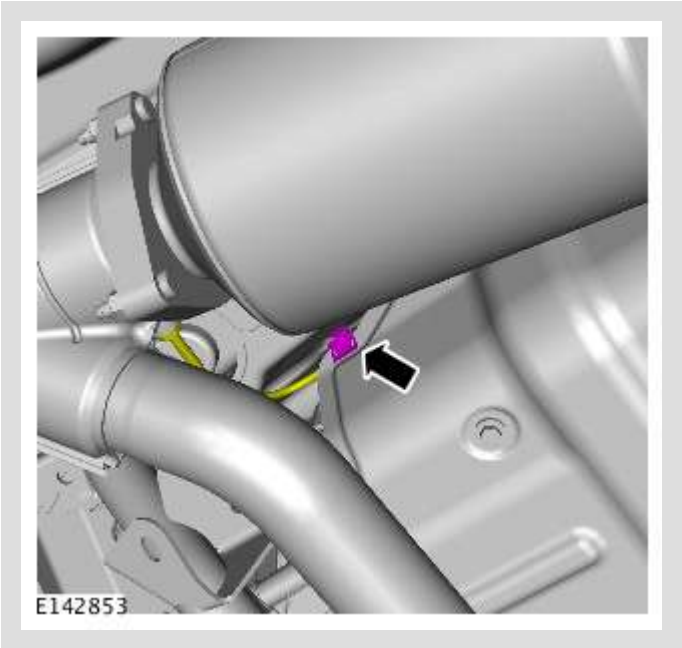
Refer to: Catalytic Converter (309-00D Exhaust System - TDV8 4.4L Diesel, Removal and Installation).

3.

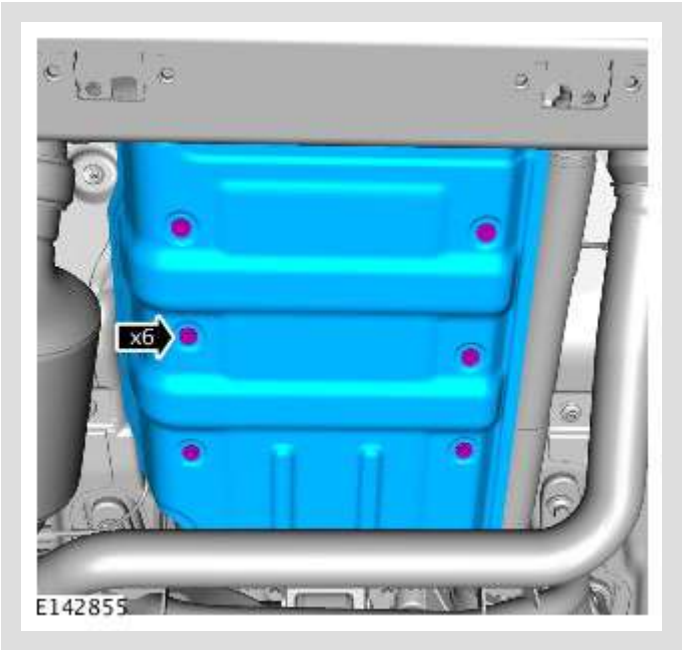


Torque: **60 Nm**

4.

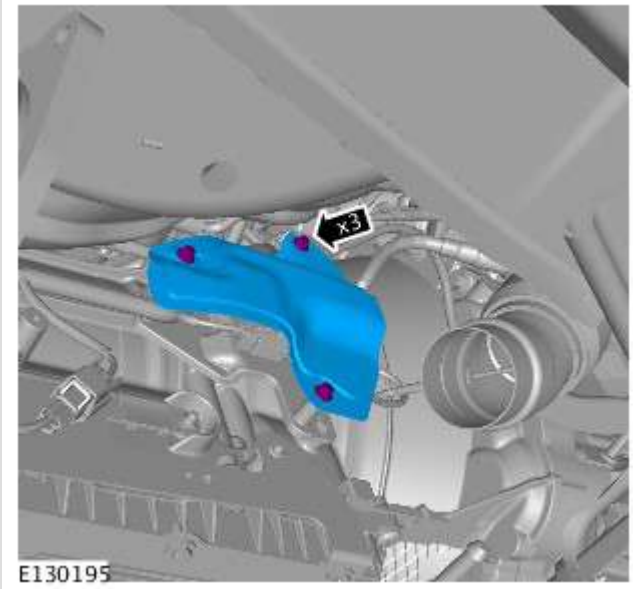


5.



Torque: **10 Nm**

6.

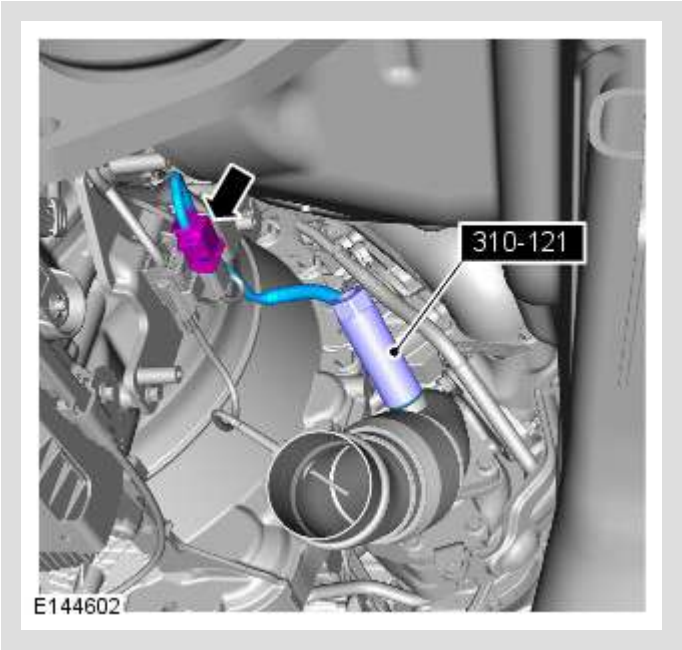


Torque: **10 Nm**

7.

CAUTION:

Make sure that the mating faces are clean and free of foreign material.



Special Tool(s): 310-121
Torque: **48 Nm**

INSTALLATION

1.

CAUTION:

If accidentally dropped or knocked install a new sensor.

NOTE:

If the original sensor is to be installed, apply lubricant meeting specification ESE-M12A4-A to the thread of the sensor.

To install, reverse the removal procedure.

PUBLISHED: 31-JUL-2012
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

MANIFOLD ABSOLUTE PRESSURE AND TEMPERATURE SENSOR (G1509579)

REMOVAL AND INSTALLATION

18.30.56	SENSOR - MANIFOLD AIR PRESSURE - RENEW	4400 CC, TDV8	0.1	USED WITHINS	

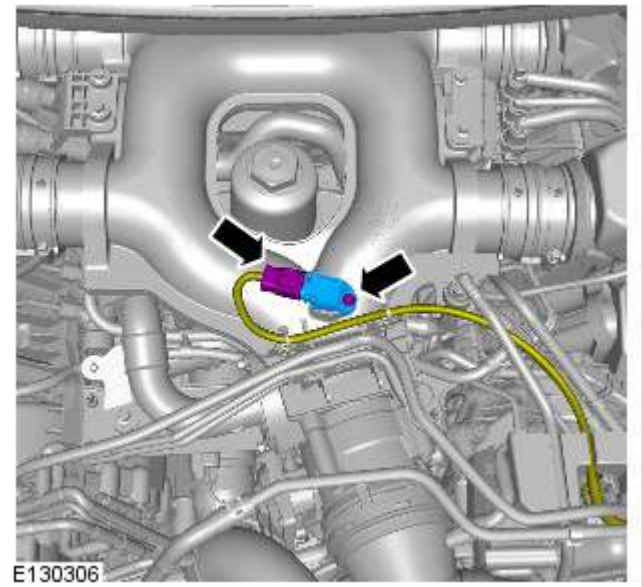
REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. Refer to: Engine Cover - 4.4L V8 - TdV8 (501-05 Interior Trim and Ornamentation, Removal and Installation).

2.



Torque: **3 Nm**

INSTALLATION

1. To install, reverse the removal procedure.

2. Using the approved diagnostic equipment, clear the powertrain control module (PCM) adaptions.

PUBLISHED: 06-AUG-2012
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

MASS AIR FLOW SENSOR (G1509580)

REMOVAL AND INSTALLATION

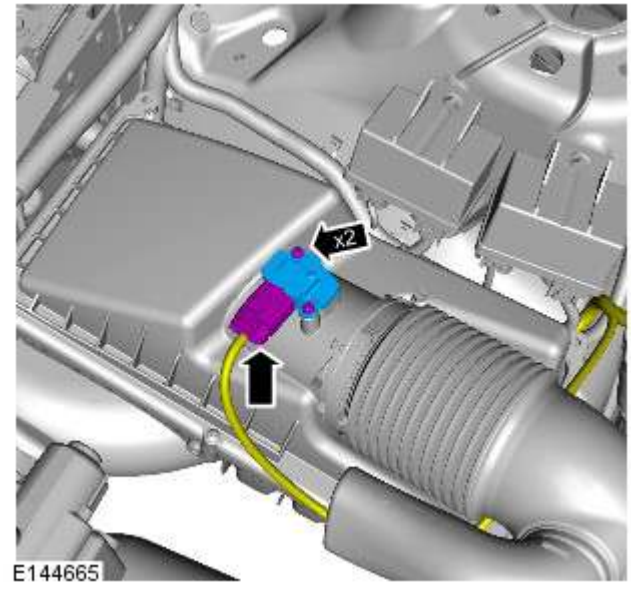
19.22.25	SENSOR - MASS AIR FLOW (MAFS) - RENEW	4400 CC, TDV8	0.1	USED WITHINS	

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1.



Torque: **1.6 Nm**

INSTALLATION

1. To install, reverse the removal procedure.

PUBLISHED: 31-JUL-2012
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

PRE CATALYTIC CONVERTER TEMPERATURE SENSOR (G1509581)

REMOVAL AND INSTALLATION

18.31.55	CATALYST PRE TEMPERATURE SENSOR - RENEW	4400 CC, TDV8	0.7	USED WITHINS

REMOVAL

WARNING:

Observe due care when working near a hot exhaust system.

NOTE:

Removal steps in this procedure may contain installation details.

1.

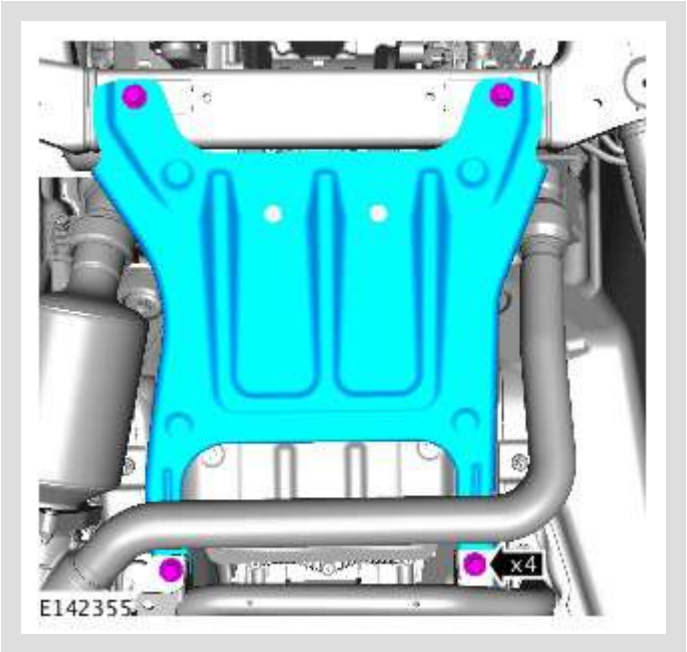
WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

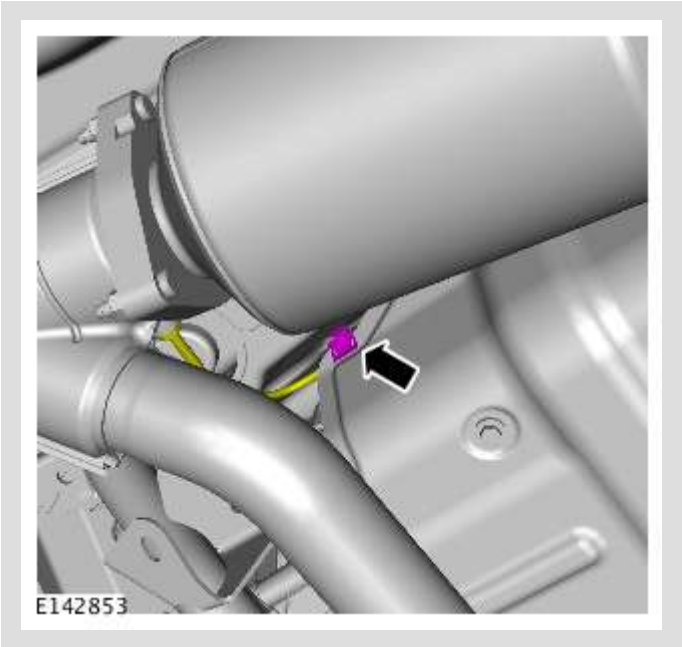
2. Refer to: Catalytic Converter (309-00D Exhaust System - TDV8 4.4L Diesel, Removal and Installation).

3.

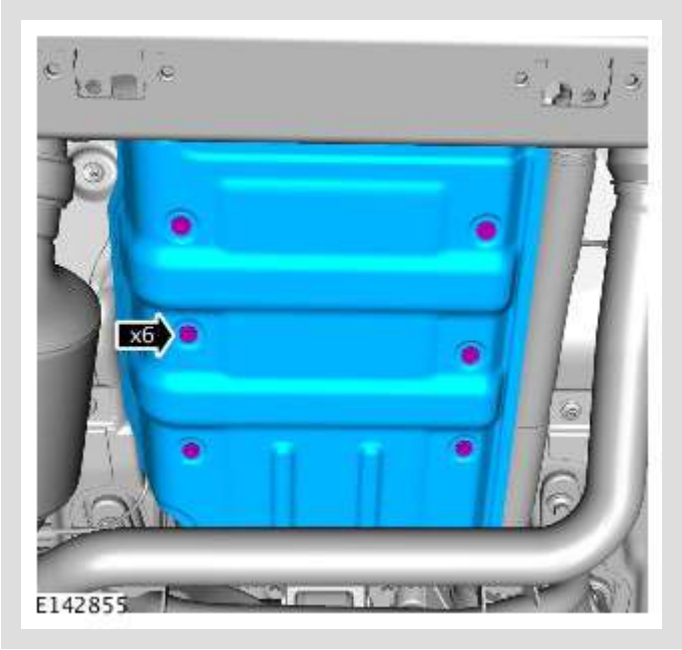


Torque: **60 Nm**

4.

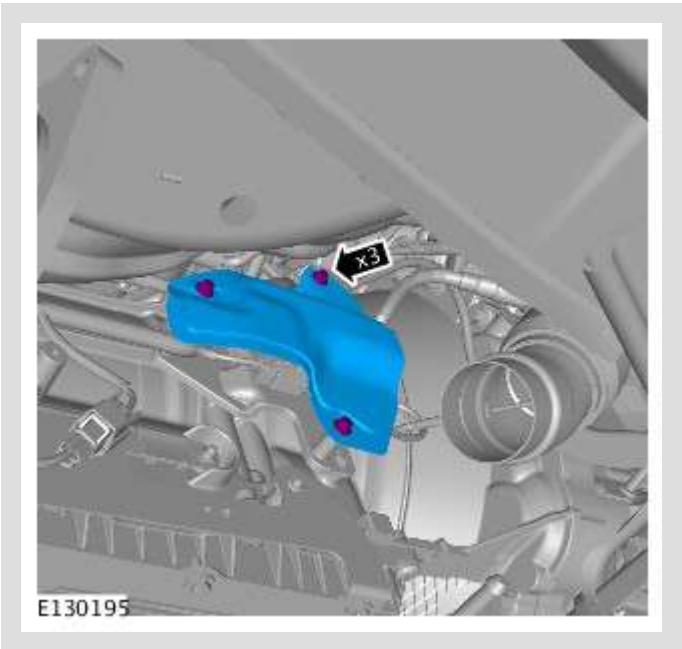


5.



Torque: **10 Nm**

6.

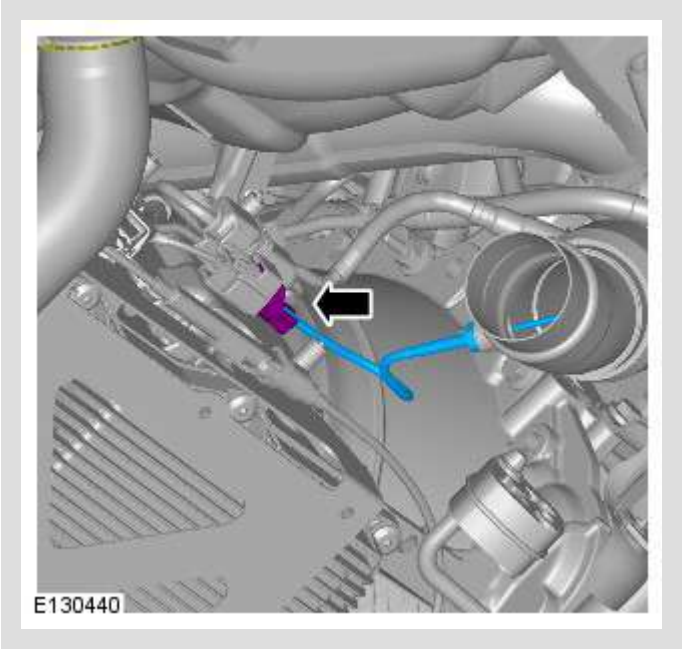


Torque: **10 Nm**

7.

CAUTION:

Make sure that the mating faces are clean and free of foreign material.



Torque: **35 Nm**

INSTALLATION

1.

CAUTION:

If accidentally dropped or knocked install a new sensor.

NOTE:

If the original sensor is to be installed, apply lubricant meeting specification ESE-M12A4-A to the thread of the sensor.

To install, reverse the removal procedure.

PUBLISHED: 31-JUL-2012
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

POST CATALYTIC CONVERTER TEMPERATURE SENSOR (G1509582)

18.31.56	CATALYST POST TEMPERATURE SENSOR - RENEW	4400 CC, TDV8	0.3	USED WITHINS

REMOVAL

WARNING:

Observe due care when working near a hot exhaust system.

NOTE:

Removal steps in this procedure may contain installation details.

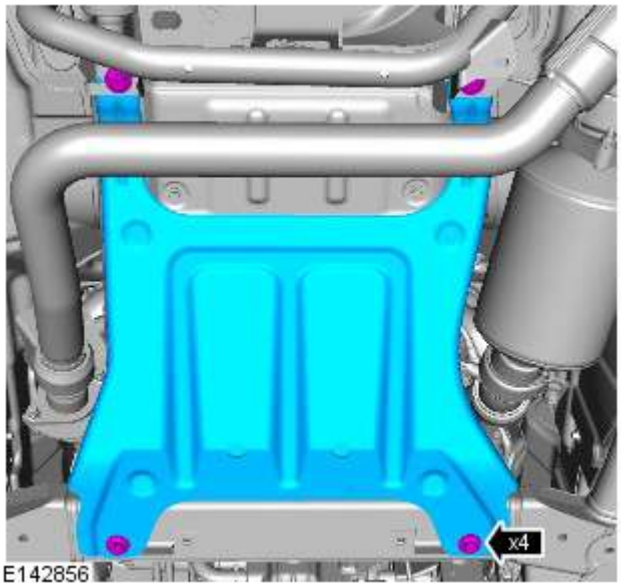
1.

WARNING:

Make sure to support the vehicle with axle stands.

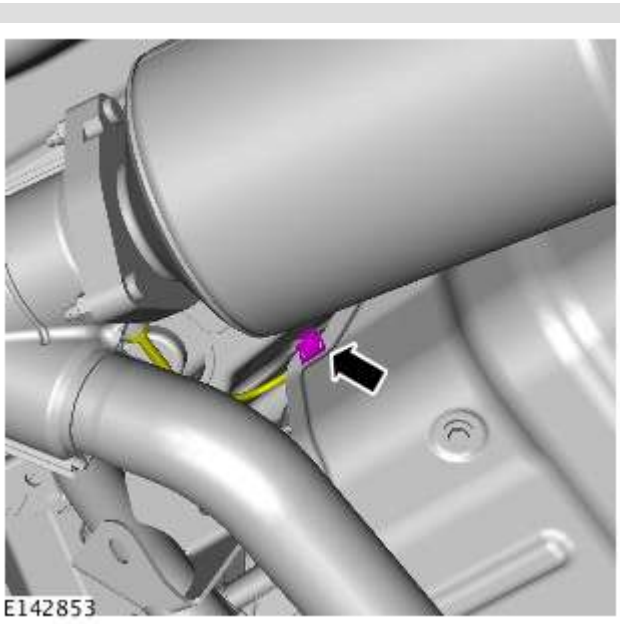
Raise and support the vehicle.

2.

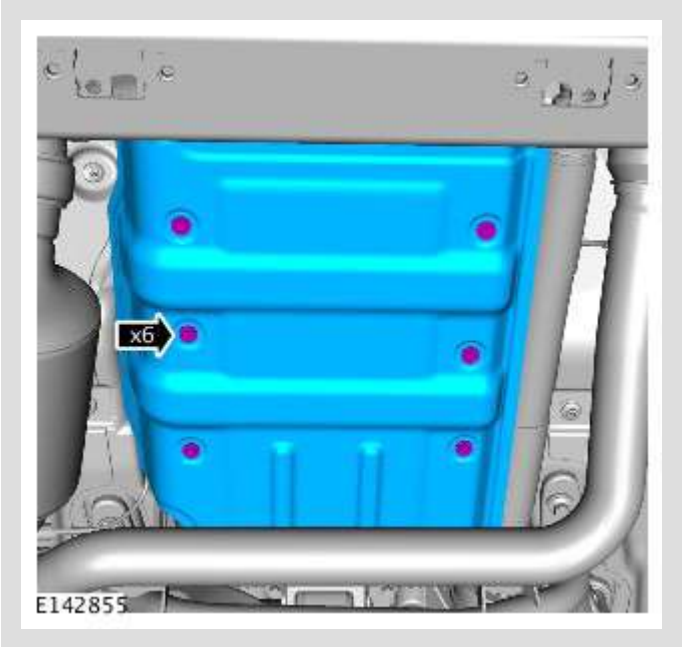


Torque: **60 Nm**

3.



4.

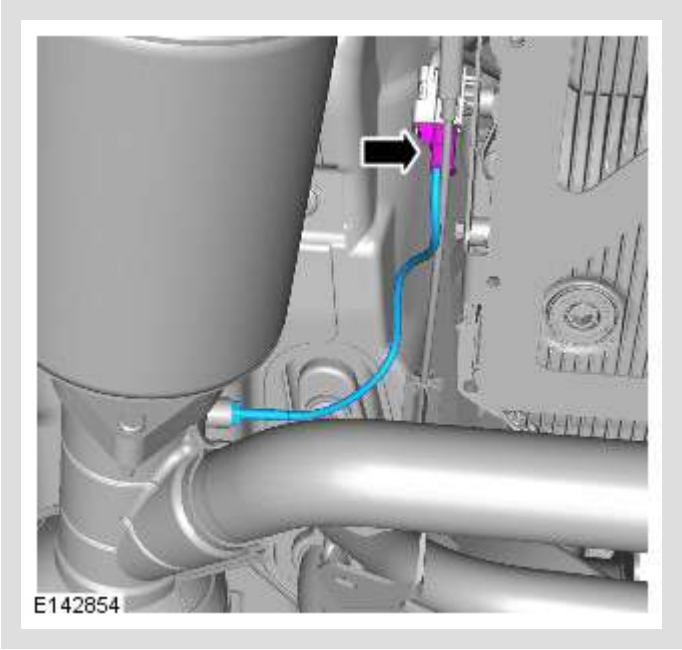


Torque: **10 Nm**

5.

CAUTION:

Make sure that the mating faces are clean and free of foreign material.



Torque: **35 Nm**

INSTALLATION

1.

CAUTION:

If accidentally dropped or knocked install a new sensor.

NOTE:

If the original sensor is to be installed, apply lubricant meeting specification ESE-M12A4-A to the thread of the sensor.

To install, reverse the removal procedure.

PUBLISHED: 01-JUL-2016
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

POST DPF EXHAUST GAS TEMPERATURE SENSOR (G1509583)

REMOVAL

WARNING:

Observe due care when working near a hot exhaust system.

NOTE:

Removal steps in this procedure may contain installation details.

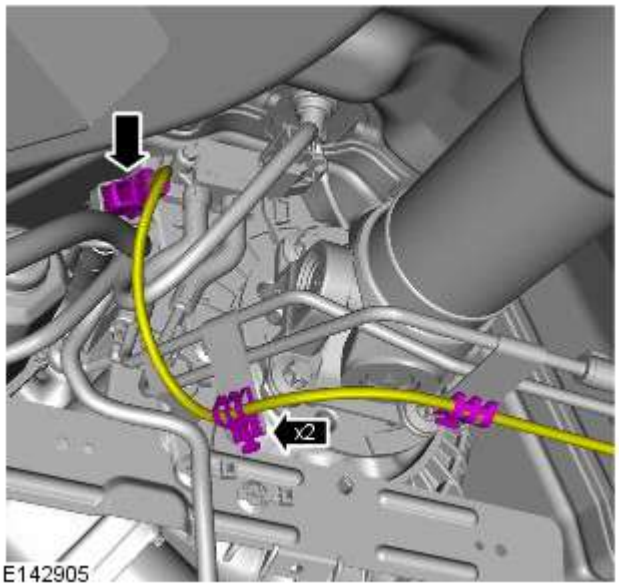
1.

WARNING:

Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2.



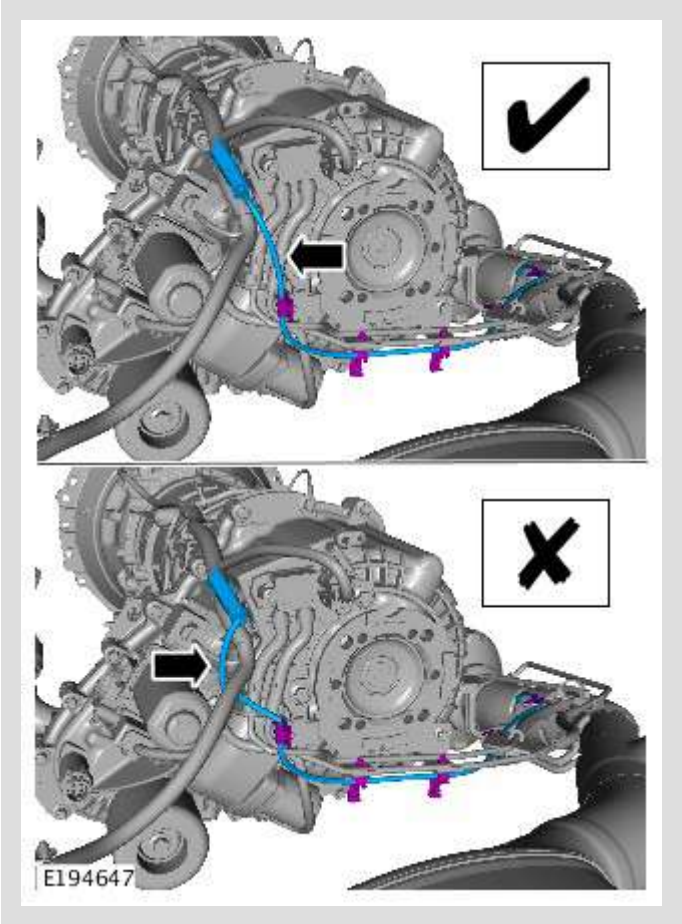
3.

CAUTIONS:

- Make sure that the wiring harness is routed correctly.
- Make sure that the electrical harness is not trapped during the installation.

NOTE:

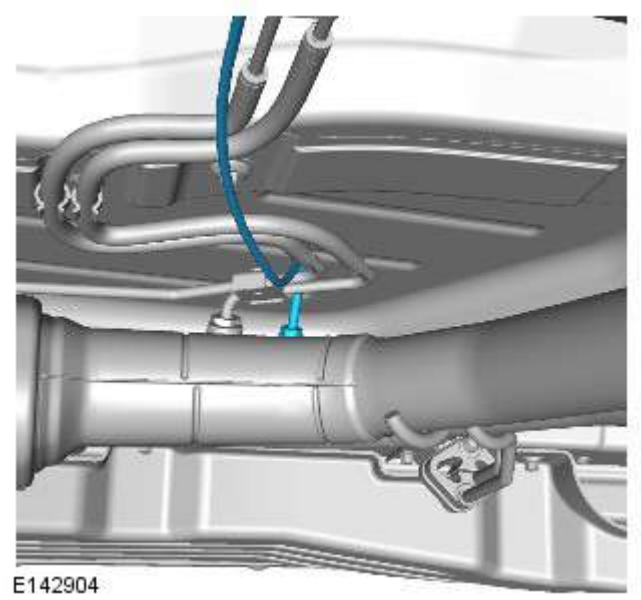
This step is for information only.



4.

CAUTION:

Make sure that the mating faces are clean and free of foreign material.



Torque: **35 Nm**

INSTALLATION

1.

CAUTION:

If accidentally dropped or knocked install a new sensor.

NOTE:

If the original sensor is to be installed, apply lubricant meeting specification ESE-M12A4-A to the thread of the sensor.

To install, reverse the removal procedure.

PUBLISHED: 30-MAY-2014
2015.0 RANGE ROVER (LG), 303-14

ELECTRONIC ENGINE CONTROLS - TDV8 4.4L DIESEL

ENGINE OIL LEVEL SENSOR (G1780268)

REMOVAL AND INSTALLATION

12.60.51	SWITCH - OIL LEVEL INDICATOR - RENEW	LEFT HAND DRIVE, 4400 CC, TDV8, WITH PARTICULATE FILTER	8.4	USED WITHINS	

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
   Refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

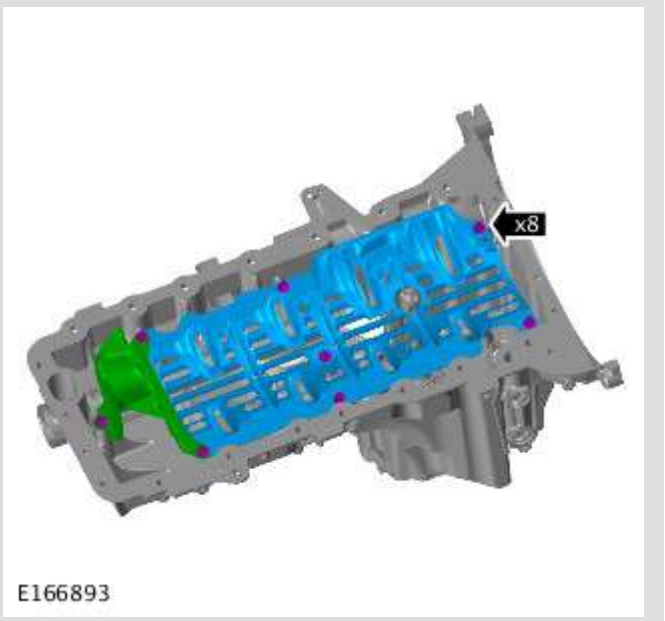
2. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

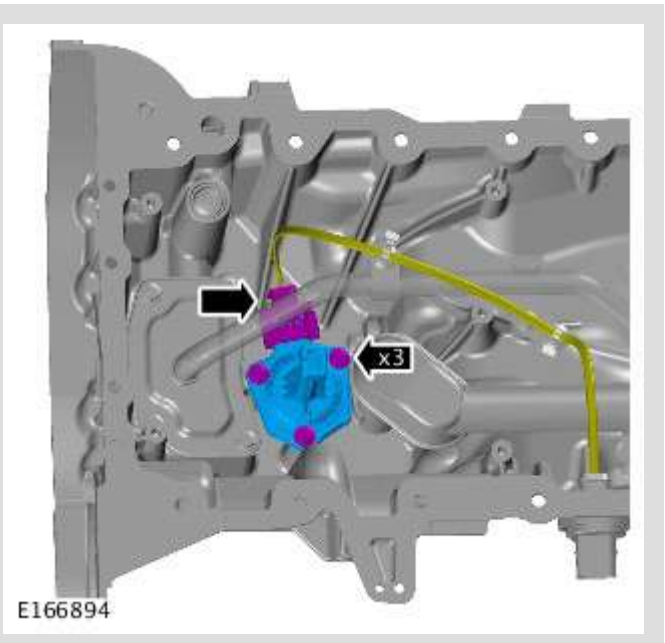
3. Refer to: Oil Pan (303-01E Engine - TDV8 4.4L Diesel, Removal and Installation).

4.



Torque: **10 Nm**

5.



Torque: **10 Nm**

INSTALLATION

1. To install, reverse the removal procedure.