

Published: 11-May-2011

Electronic Engine Controls - TD4 2.2L Diesel -

General Specification

Item	Specification
Engine management system:	
Make	BOSCH
Type	EDC 15 C2
Camshaft position sensor:	
Make	Electrifil
Type	Hall effect
Crankshaft position sensor:	
Make	Electrifil
Type	Hall effect

Torque Specifications

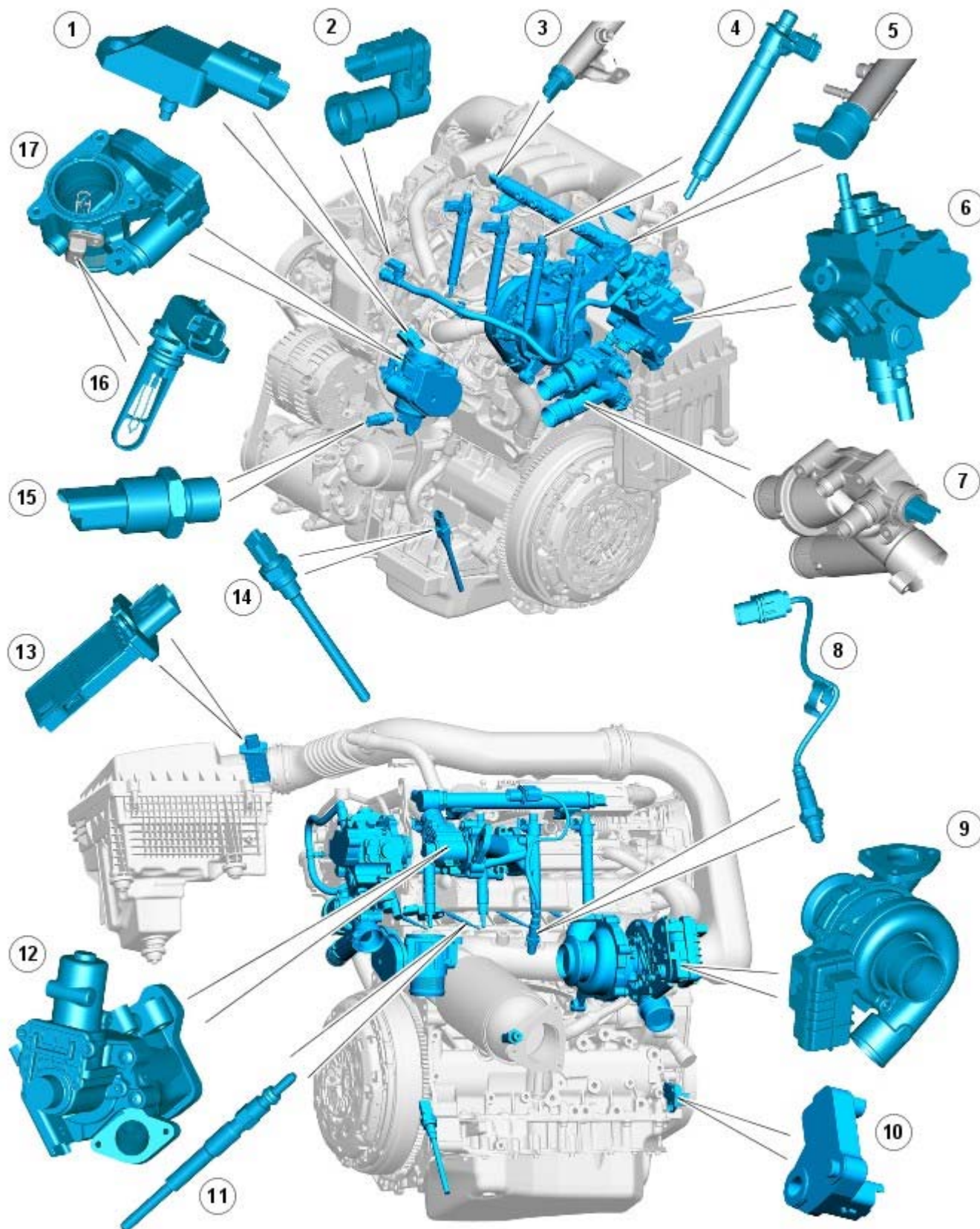
Description	Nm	lb-ft
Camshaft position (CMP) sensor retaining bolt	6	5
Crankshaft position (CKP) sensor retaining bolt	10	7
Engine oil pressure (EOP) sensor	35	26
Intake air temperature sensor (IAT)	10	7
Intake Manifold Runner Control (IMRC) Actuator	10	7
Manifold absolute pressure (MAP) sensor	10	7
Mass air flow (MAF) sensor retaining screws	2	1
Oil temperature/level sensor	27	20
Turbocharger Boost Pressure Sensor	8	7

Part Number

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Electronic Engine Controls - TD4 2.2L Diesel - Electronic Engine Controls

Description and Operation

COMPONENT LOCATION SHEET 1 OF 2

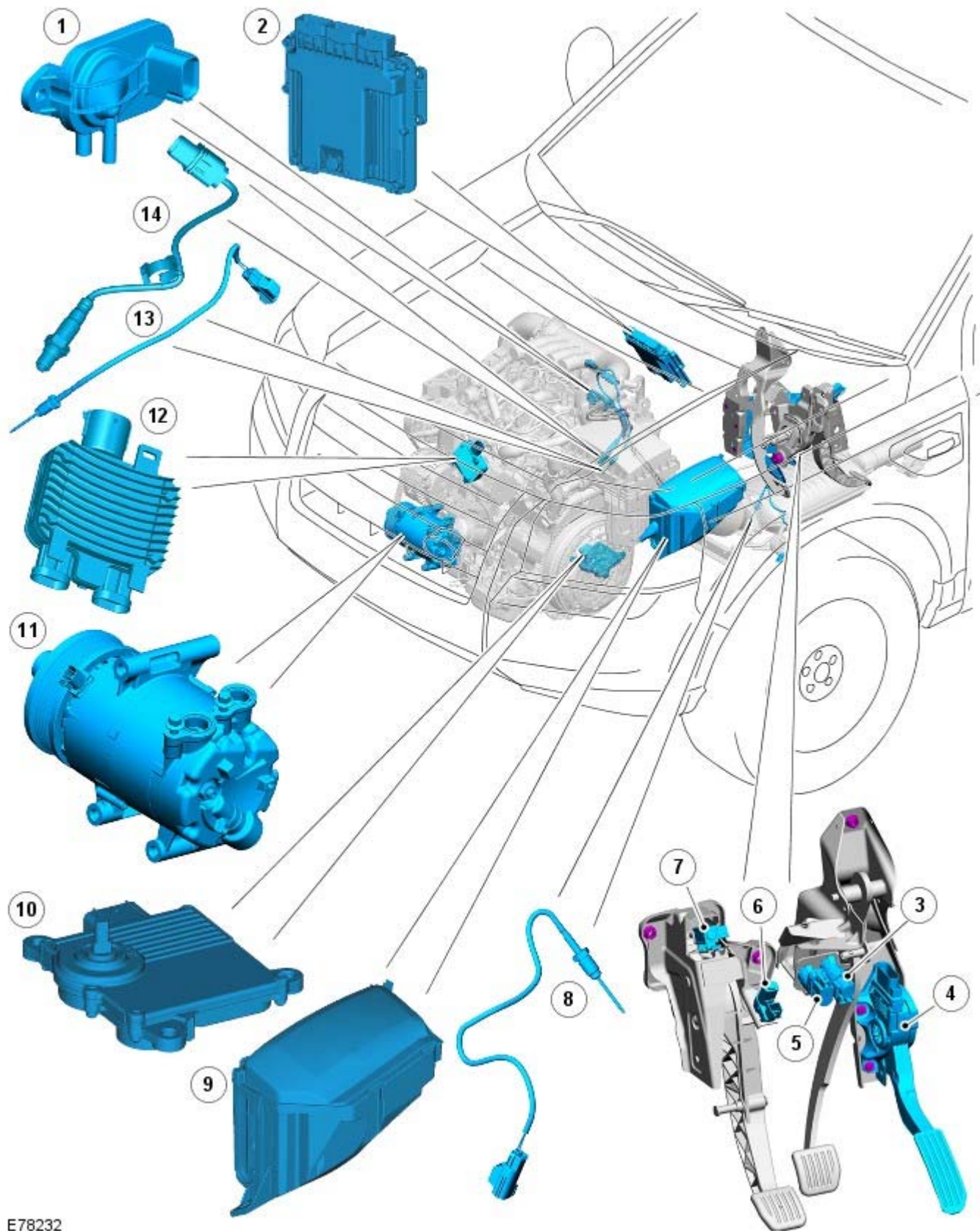
E78231

Item	Part Number	Description
1	-	manifold absolute pressure (MAP) sensor
2	-	Fuel temperature sensor

3	Fuel rail pressure sensor
4	Injector (4 off)
5	Pressure control valve
6	Fuel pump (incorporating volume control valve)
7	engine coolant temperature (ECT) sensor
8	heated oxygen sensor (HO2S)
9	Variable nozzle turbocharger (VNT) controller
10	crankshaft position (CKP) sensor
11	Glow plugs (4 off)
12	exhaust gas recirculation (EGR) valve
13	mass air flow (MAF)/intake air temperature (IAT) sensor
14	Oil level and temperature sensor (Diesel Particulate Filter (DPF) vehicles only)
15	engine oil pressure (EOP) sensor
16	IAT sensor
17	Electric throttle

COMPONENT LOCATION SHEET 2 OF 2

NOTE: left-hand (LH) drive vehicle shown, right-hand (RH) drive similar



E78232

Item		Description
1		Differential pressure sensor (DPF vehicles only)
2		engine control module (ECM)
3		Stoplamp switch
4		accelerator pedal position (APP) sensor
5		Speed control inhibit switch
6		Start inhibit switch
7		Clutch switch

8		Downstream exhaust temperature sensor (DPF vehicles only)
9		battery junction box (BJB)
10		transmission control module (TCM) (automatic vehicles only)
11		air conditioning (A/C) compressor
12		Cooling fan control module
13		Upstream temperature sensor (DPF vehicles only)
14		Heated oxygen sensor

OVERVIEW

The TD4 diesel engine has an Electronic Diesel Control (EDC) engine management system. The system is controlled by an ECM which 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.

The ECM controls fuel delivery to all 4 cylinders via a common rail injection system. The common rail system uses a fuel rail to accumulate highly pressurized fuel and feed the 4, 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. Accelerator pedal demand is communicated to the ECM by 2 potentiometers located in a throttle position sensor. The ECM uses the 2 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.

The ECM processes information from the following input sources:

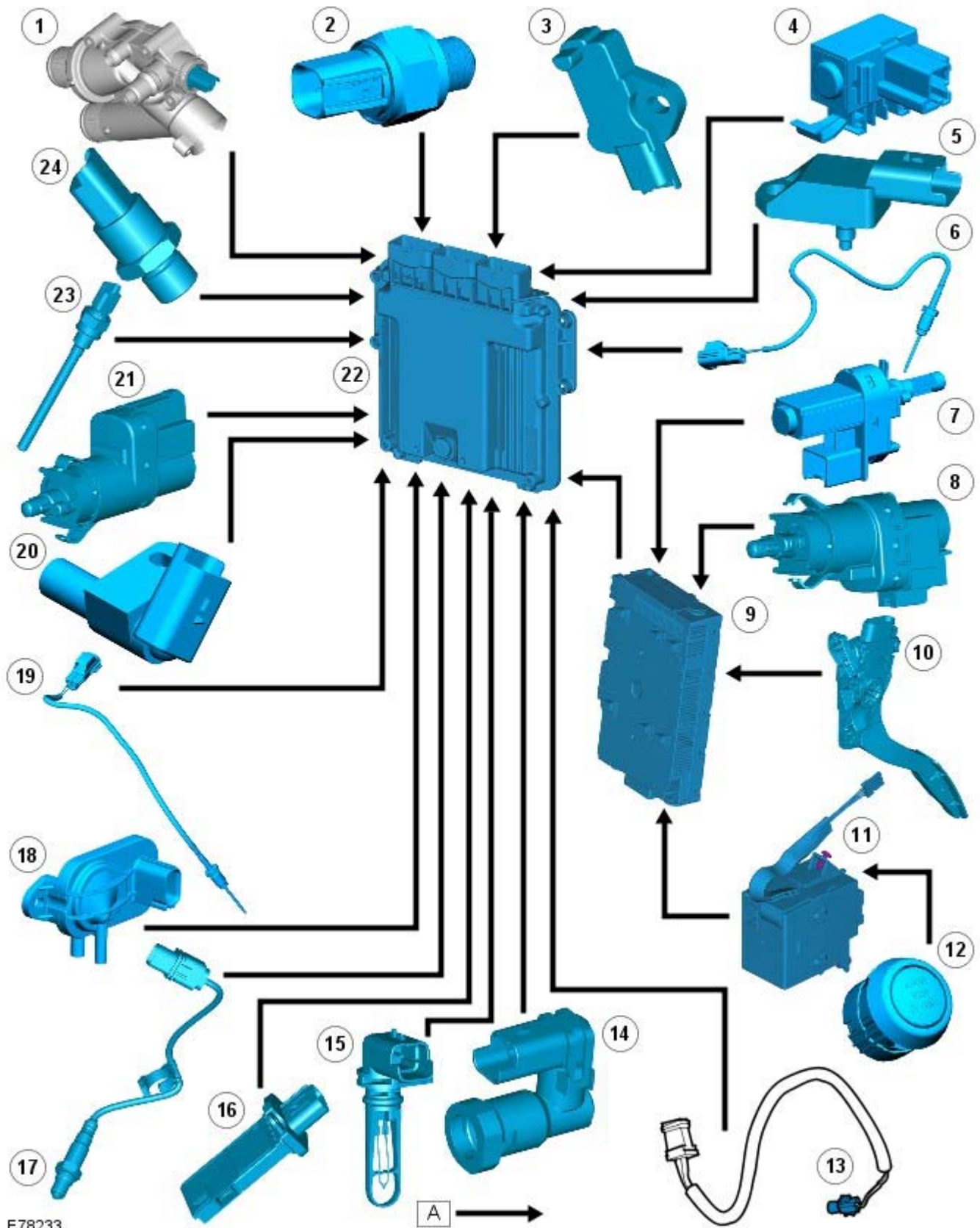
- camshaft position (CMP)
- CKP
- Manifold air temperature and pressure
- Engine coolant temperature
- Oil temperature
- Intake air flow and temperature
- Fuel temperature

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

- Fuel injectors (4 off)
- Cooling fan control module
- Electric throttle valve
- Electronic vane controlled turbocharger
- Port deactivation
- Fuel pressure control valve
- Fuel volume control valve
- EGR
- Glow plugs (4 off).

CONTROL DIAGRAM SHEET 1 OF 2

NOTE: **A** = Hardwired

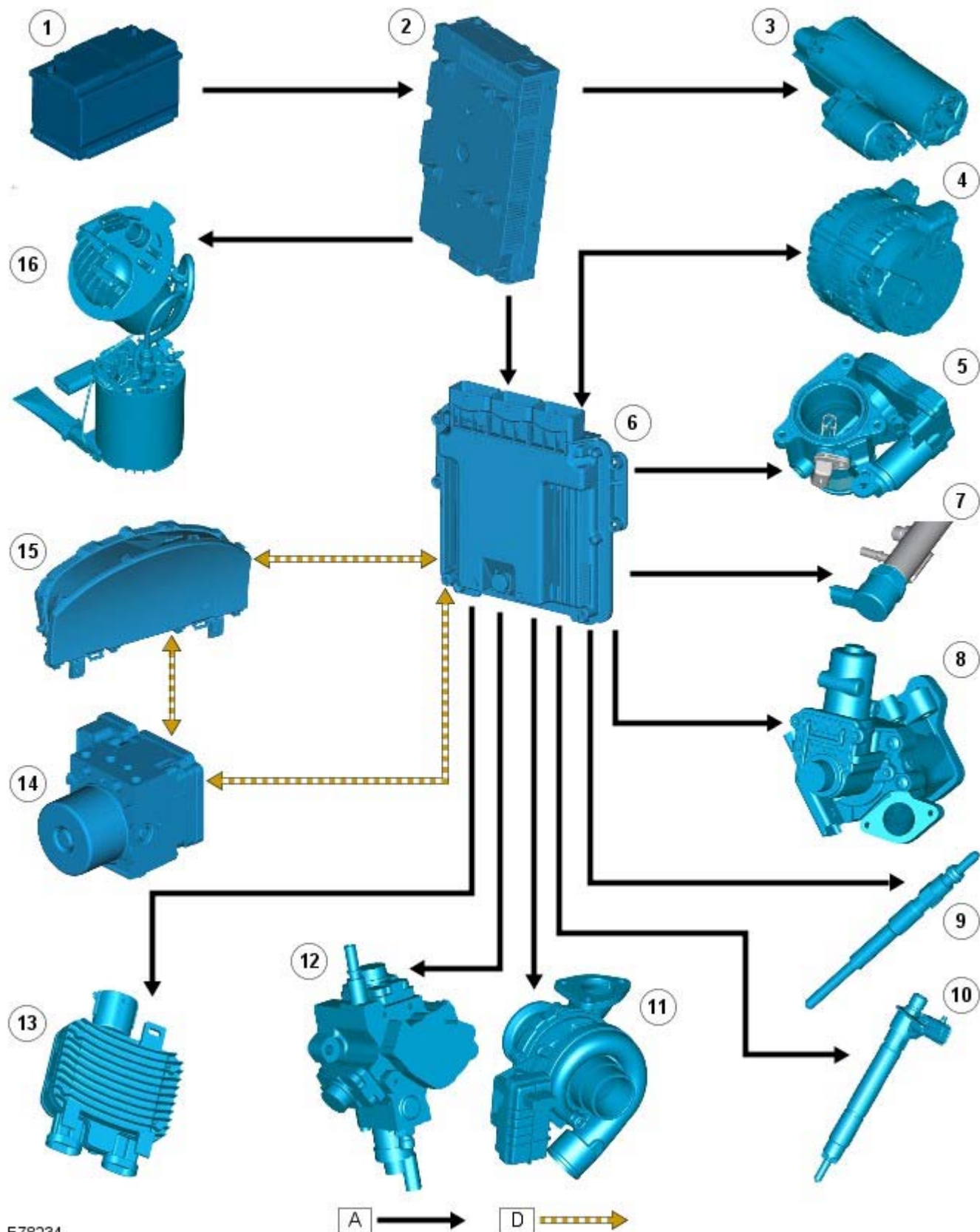


Item		Description
1		ECT sensor
2		1st gear position switch
3		CKP sensor
4		Start inhibit switch
5		MAP sensor
6		Down stream exhaust temperature sensor
7		Clutch switch

8		Stoplamp switch
9		central junction box (CJB)
10		APP sensor
11		Start control module
12		Start control switch
13		Ambient air temperature sensor
14		Fuel temperature sensor
15		IAT sensor
16		MAF sensor
17		HO2S
18		Differential pressure sensor
19		Upstream exhaust temperature sensor
20		CMP sensor
21		Speed control inhibit switch
22		ECM
23		Oil level and temperature sensor
24		EOP sensor

CONTROL DIAGRAM SHEET 2 OF 2

NOTE: **A** = Hardwired; **D** = High speed controller area network (CAN)



E78234

Item		Description
1		Battery
2		CJB
3		Starter motor
4		Generator
5		Electric throttle
6		ECM
7		Pressure control valve

8	EGR valve
9	Glow plug
10	Injector
11	Variable nozzle turbocharger (VNT) controller
12	Fuel pump (incorporating volume control valve)
13	Fan control module
14	anti-lock brake system (ABS) module
15	Instrument cluster
16	Fuel transfer pump

Electronic Engine Controls - TD4 2.2L Diesel - Electronic Engine Controls

Diagnosis and Testing

Principles of Operation

For a detailed description of the electronic engine controls, refer to the relevant Description and Operation section in the workshop manual.

REFER to: Electronic Engine Controls (303-14 Electronic Engine Controls - TD4 2.2L Diesel, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage and system integrity.



Visual Inspection

Mechanical	Electrical
<ul style="list-style-type: none"> Fuel level (minimum of four liters for run out of fuel strategy) Contaminated fuel Engine oil level Cooling system coolant level Fuel system Air intake system Vacuum system 	<ul style="list-style-type: none"> Wiring harness Electrical connector(s) Fuses(s) Relay(s)


3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively, check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

Symptom Chart

Symptom	Possible Cause	Action
Engine Non-Start		
Engine does not crank	<ul style="list-style-type: none"> Security system/Immobilizer engaged Battery Powertrain control module relay Park/Neutral switch Brake/clutch switches Throttle valve stuck Starting system Engine seized 	Check that security system is disarmed. Ensure battery is in fully charged and serviceable condition. Check for DTCs and refer to relevant DTC Index. Check Park/neutral and Brake/clutch switches. Ensure correct start procedure is being adhered to. Check engine is not seized
Engine cranks but does not start	<ul style="list-style-type: none"> Contaminated fuel Engine breather system disconnected/restricted Throttle valve stuck Air intake system Fuel system Electronic engine controls 	Check for fuel contamination. Check engine breather and air intake system integrity. Ensure correct start procedure is being adhered to. Check for DTCs and refer to the relevant DTC Index
Difficult To Start		
Difficult to start cold	<ul style="list-style-type: none"> Check engine coolant level/anti-freeze content Battery Electronic engine controls Exhaust gas recirculation (EGR) valve stuck open Fuel pump 	Check engine coolant level/condition. Ensure battery is in fully charged and serviceable condition. Check for DTCs and refer to relevant DTC Index
Difficult to start hot	<ul style="list-style-type: none"> Electronic engine controls Injector leak Fuel system Intake air system Exhaust gas recirculation valve 	Check for DTCs and refer to the relevant DTC Index. Check engine, fuel, intake air, exhaust, systems for integrity

Symptom	Possible Cause	Action
	<ul style="list-style-type: none"> stuck open Blocked exhaust/catalytic converter Engine compressions low 	
Difficult to start after hot soak (vehicle standing, engine off, after engine has reached operating temperature)	<ul style="list-style-type: none"> Injector leak Electronic engine controls Fuel pump Exhaust gas recirculation valve stuck open 	Check fuel and engine control systems for DTCs and refer to the relevant DTC Index
Engine cranks too fast/slow	<ul style="list-style-type: none"> Battery Compressions high/low Starting system 	Check battery is fully charged and in serviceable condition. Check engine compressions. Check integrity of starting system
Driveability		
Rough idle	<ul style="list-style-type: none"> Low/contaminated fuel Fuel system Air intake system Electronic engine controls 	Check fuel level/condition. Check for DTCs and refer to relevant DTC Index. Check integrity of fuel, air intake, and engine systems
Engine idle speed high, low, erratic	<ul style="list-style-type: none"> Air intake system Excessive blow-by Exhaust gas recirculation valve Turbo charger bearing/seal Electronic engine controls 	Check for DTCs and refer to the relevant DTC Index. Check integrity of air intake, Turbo charger, and engine systems
Lack of power under acceleration	<ul style="list-style-type: none"> Contaminated fuel Air intake system Blocked exhaust/catalytic converter Turbo charger fault Fuel system Electronic engine controls Low engine compressions 	Check for fuel contamination. Check for DTCs and refer to relevant DTC Index. Check integrity of air intake, exhaust, Turbo charger, and engine systems
Engine stops/stalls	<ul style="list-style-type: none"> Contaminated fuel Fuel system Air intake system Electronic engine controls 	Check for fuel contamination. Check for DTCs and refer to the relevant DTC Index. Check integrity of fuel, air intake, and engine systems
Diesel Particulate Filter (DPF) Warning Messages		
'DPF Full Visit Dealer' message displayed. Torque derate, regeneration locked out (DTC P200200 also logged)	<ul style="list-style-type: none"> Particulate filter soot mass quantity above maximum threshold 	 CAUTION: All intake air system leaks MUST be rectified before carrying out dynamic regeneration. Check for and rectify any related DTCs. Check for correct installation and integrity of intake air system, rectify as required. Carry out dynamic regeneration using the manufacturer approved diagnostic system
'Reduced Engine Performance' message displayed. No effect to driveability. Regeneration reduced to lower level (2) (DTC P054516 also logged)	<ul style="list-style-type: none"> Pre-catalytic converter temperature sensor circuit voltage below threshold 	Refer to electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for short to ground or open circuit
'Reduced Engine Performance' message displayed. No effect to driveability (DTC P222700 also logged)	<ul style="list-style-type: none"> Atmospheric pressure sensor defective 	Clear DTC, run engine for 2 minutes, set ignition status to OFF (power down), run engine for further 2 minutes, set ignition status to OFF (power down), set ignition status to ON and read DTCs. If DTC still present refer to new module/component installation note at the top of the DTC Index
'Reduced Engine Performance' or 'Engine System Fault' message displayed. Torque derate, regeneration locked out (DTC P244A16 also logged)	<ul style="list-style-type: none"> Particulate filter differential pressure below limit 	Clear DTC, cycle ignition status from ON to OFF (power down) a minimum of six times, set ignition status to ON, if DTC remains install a new differential pressure sensor
'DPF Full Visit Dealer' message displayed. Torque derate, regeneration locked out (DTC P244B68 also logged)	<ul style="list-style-type: none"> Particulate filter differential pressure high - engine protection active 	 CAUTION: All intake air system leaks MUST be rectified before carrying out dynamic regeneration.

Symptom	Possible Cause	Action
logged)		Check for correct installation and integrity of differential pressure sensor hoses, rectify as required. Check for correct installation and integrity of intake air system, rectify as required. Carry out dynamic regeneration using the manufacturer approved diagnostic system
'Reduced Engine Performance' or 'Engine System Fault' message displayed. Torque derate, regeneration locked out (DTC P244C00 also logged)	<ul style="list-style-type: none"> Downstream catalytic converter temperature sensor voltage below lower limit Sensor failure 	Refer to the electrical circuit diagrams and check downstream catalytic converter temperature sensor circuit for open circuit. Install new temperature sensor as required
'Reduced Engine Performance' or 'Engine System Fault' message displayed. Torque derate, regeneration locked out (DTC P244D00 also logged)	<ul style="list-style-type: none"> Downstream catalytic converter temperature sensor voltage above upper limit Sensor failure 	Refer to the electrical circuit diagrams and check downstream catalytic converter temperature sensor circuit for short to power. Install new temperature sensor as required
'Reduced Engine Performance' or 'Engine System Fault' message displayed. Regeneration locked out (DTC P245300 also logged)	<ul style="list-style-type: none"> Particulate filter stationary corrected differential pressure below minimum 	Differential pressure sensor hoses crossed over
'Reduced Engine Performance' or 'Engine System Fault' message displayed. Torque derate, regeneration locked out (DTC P245500 also logged)	<ul style="list-style-type: none"> Particulate filter differential pressure sensor voltage above upper limit Sensor failure 	Refer to the electrical circuit diagrams and check differential pressure sensor supply circuit for short to power. Install a new sensor as required
'Reduced Engine Performance' or 'Engine System Fault' message displayed. Torque derate, regeneration locked out (DTC P245600 also logged)	<ul style="list-style-type: none"> Leaking or blocked differential pressure sensor hoses Differential pressure sensor circuit short, open circuit Sensor failure 	Check for split/degraded, blocked differential pressure sensor hoses, refer to electrical circuit diagrams and check differential pressure sensor circuits for short, open circuit. Install a new sensor as required
'Oil Service required' message displayed (DTC P250F00 also displayed)	<ul style="list-style-type: none"> Engine oil contaminated 	Check engine oil condition, renew as required
'Oil Service required' message displayed (DTC P252F00 also displayed)	<ul style="list-style-type: none"> Engine oil contaminated 	Check engine oil condition, renew as required
'Oil Service required' message displayed (DTC P253F00 also displayed)	<ul style="list-style-type: none"> Engine oil contaminated 	Check engine oil condition, renew as required
'Reduced Engine Performance' message displayed. No effect to driveability, regeneration reduced to lower level (2) (DTC P208000 also logged)	<ul style="list-style-type: none"> Exhaust gas temperature sensor 1 plausibility fault 	Refer to electrical circuit diagrams and check upstream catalytic converter temperature sensor circuit for short circuit, open circuit
'Reduced Engine Performance' or 'Engine System Fault' message displayed. Regeneration locked out (DTC P244A00 also logged)	<ul style="list-style-type: none"> Signal not plausible. Differential pressure sensor hose line defective 	Check for correct installation and integrity of differential pressure sensor hoses, rectify as required
'Reduced Engine Performance' or 'Engine System Fault' message displayed. Torque derate, regeneration locked out (DTC P244B22 also logged)	<ul style="list-style-type: none"> Signal amplitude > maximum. Particulate filter uncorrected differential pressure value above limit in after run 	 CAUTION: All intake air system leaks MUST be rectified before carrying out dynamic regeneration. Check for correct installation and integrity of differential pressure sensor hoses, rectify as required. Check for correct installation and integrity of intake air system, rectify as required. Carry out dynamic regeneration using the manufacturer approved diagnostic system
'DPF Full' message displayed, with see hand book icon (DTC P245200 also logged)	<ul style="list-style-type: none"> Poor driving style, unable to facilitate regeneration 	<ul style="list-style-type: none"> Refer driver to hand book

Symptom	Possible Cause	Action
'Reduced Engine Performance' or 'Engine System Fault' message displayed. Torque derate, regeneration locked out (DTC P245400 also logged)	<ul style="list-style-type: none"> ● Particulate filter differential pressure sensor voltage below lower limit ● Sensor failure 	Refer to the electrical circuit diagrams and check differential pressure sensor supply circuit for short, open circuit. Install a new sensor as required
'Reduced Engine Performance' or 'Engine System Fault' message displayed. Torque derate, regeneration locked out (DTC P208400 also logged)	<ul style="list-style-type: none"> ● Exhaust gas temperature sensor 2 plausibility fault 	Refer to electrical circuit diagrams and check downstream catalytic converter temperature sensor circuit for short circuit, open circuit
'Reduced Engine Performance' message displayed. No effect to driveability, regeneration reduced to lower level (2) (DTC P054617 also logged)	<ul style="list-style-type: none"> ● Pre-catalytic converter temperature sensor circuit voltage above threshold 	Refer to electrical circuit diagrams and check pre-catalytic converter temperature sensor circuit for short to power
'Reduced Engine Performance' or 'Engine System Fault' message displayed. Regeneration locked out (DTC P244A00 also logged)	<ul style="list-style-type: none"> ● Signal not plausible. Differential pressure sensor hose line defective 	Check for correct installation and integrity of differential pressure sensor hoses, rectify as required
'Reduced Engine Performance' message displayed. No effect to driveability, regeneration reduced to lower level (2) (DTC P244B22 also logged)	<ul style="list-style-type: none"> ● Signal amplitude > maximum. Particulate filter uncorrected differential pressure value above limit in after run 	 CAUTION: All intake air system leaks MUST be rectified before carrying out dynamic regeneration. Check for correct installation and integrity of differential pressure sensor hoses, rectify as required. Check for correct installation and integrity of intake air system, rectify as required. Carry out dynamic regeneration using the manufacturer approved diagnostic system
'DPF Full Visit Dealer' message displayed. Torque derate, regeneration locked out (DTC P244A97 also logged)	<ul style="list-style-type: none"> ● Particulate filter differential pressure sensor blocked 	Check for blocked/restricted Differential Pressure sensor and hoses

DTC Index

NOTE: If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

NOTE: Generic scan tools may not read the codes listed, or may read only five digit codes. Match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give additional information read by the manufacturer approved diagnostic system).

NOTE: When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance always take the resistance of the DMM leads into account.

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

NOTE: Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.

NOTE: If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

For a complete list of all diagnostic trouble codes that could be logged on this vehicle, please refer to section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - TD4 2.2L Diesel, DTC: Engine Control Module \(ECM\)](#) (100-00 General Information, Description and Operation).

Electronic Engine Controls - TD4 2.2L Diesel - Camshaft Position (CMP)

Sensor

Removal and Installation

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).

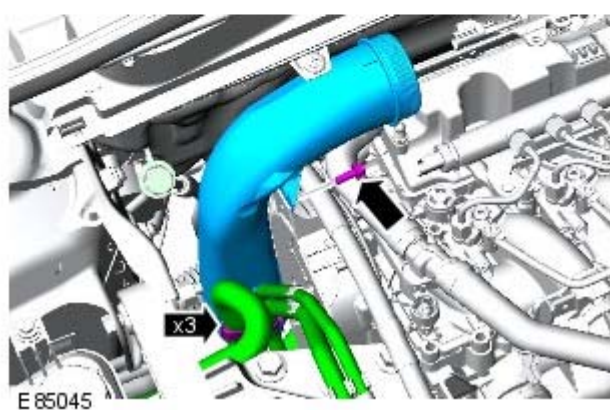
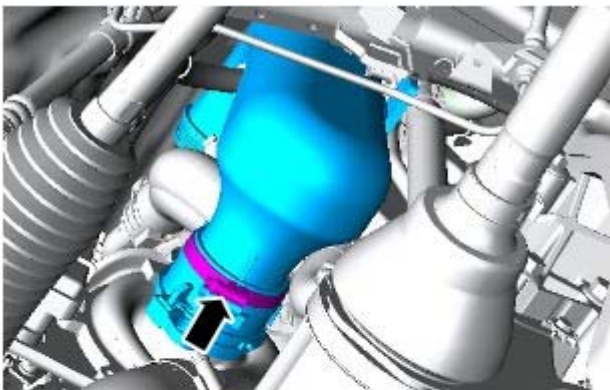
2.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

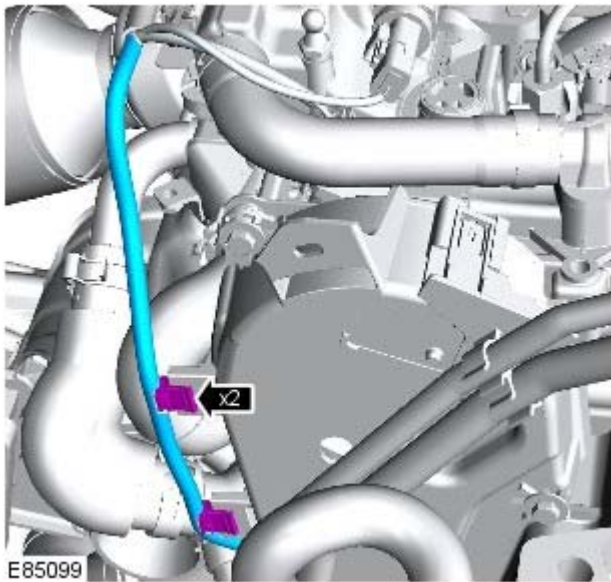
3. Remove the engine cover.

Refer to: [Engine Cover - TD4 2.2L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

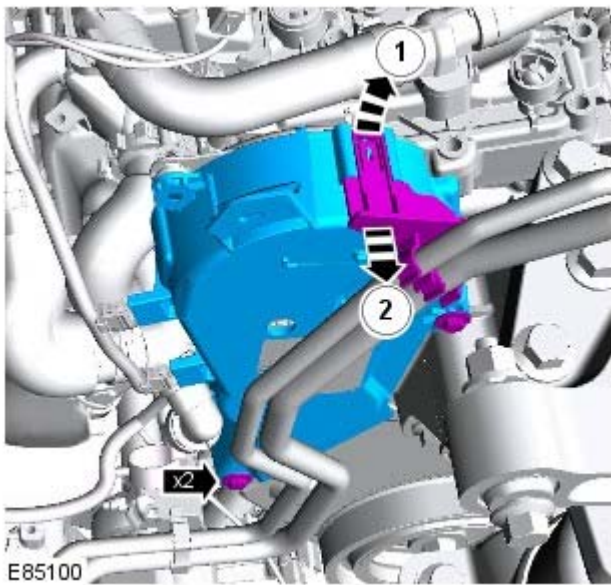
- 4.



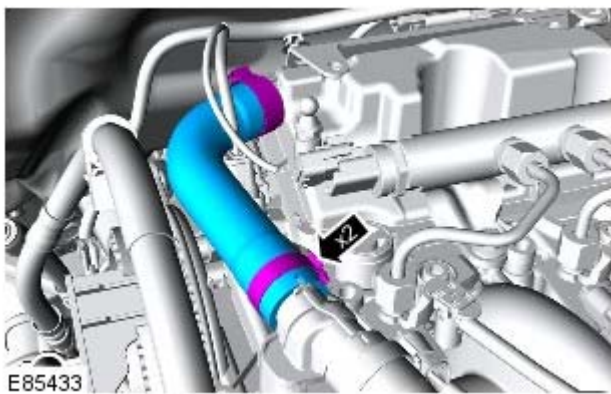
5.

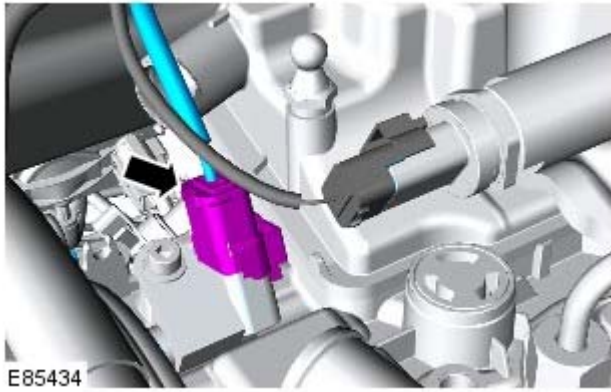


6. Torque: 6 Nm

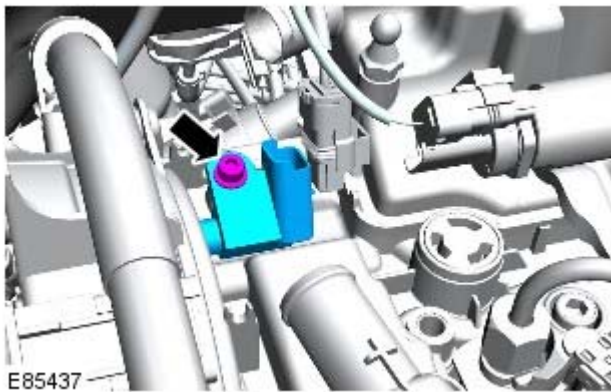


7. Remove and discard the hose clips.

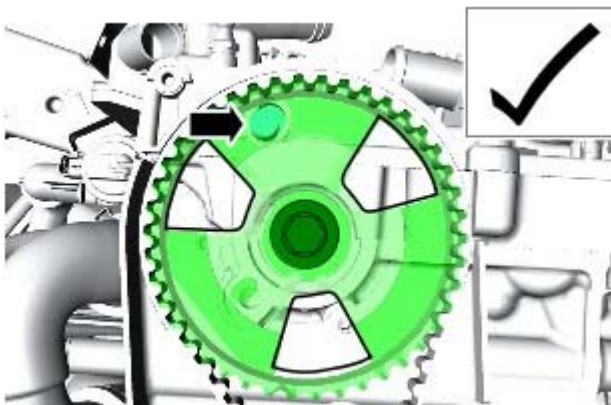





8.

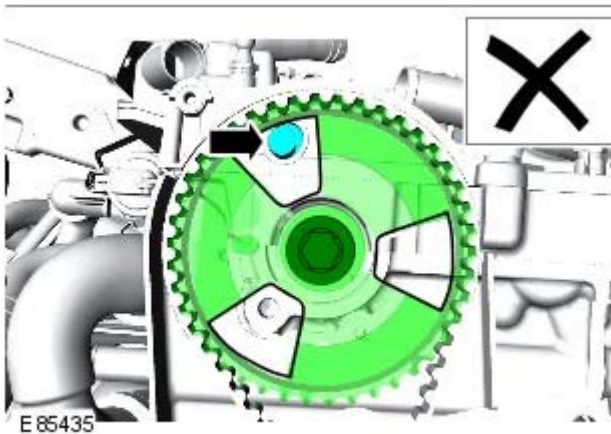


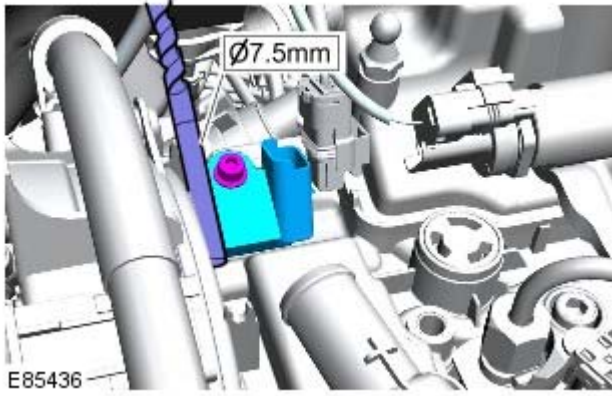
9. Torque: 4 Nm




10.  **CAUTION:** Incorrect installation of the camshaft position (CMP) sensor could result in engine damage.

New CMP sensor only: The CMP sensor tip must rest on one of the 4 webs on the back of the camshaft pulley, to achieve the correct alignment of the CMP sensor.






11.  **CAUTION:** Incorrect installation of the camshaft position (CMP) sensor could result in engine damage.

Used CMP sensor only: Insert a 7.5 mm diameter drill between the valve cover and the CMP sensor as shown, to achieve the correct alignment of the CMP sensor.

Installation

1.  **CAUTION:** Make sure that the component is clean, free of foreign material and lubricant.

To install, reverse the removal procedure.

Electronic Engine Controls - TD4 2.2L Diesel - Crankshaft Position (CKP) Sensor

Removal and Installation

Removal

NOTE: Removal steps in this procedure may contain installation details.

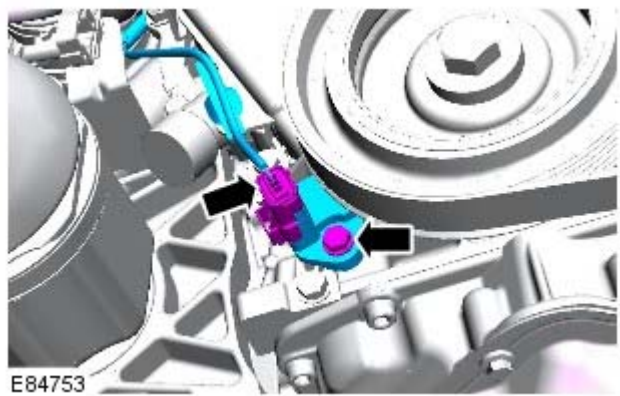
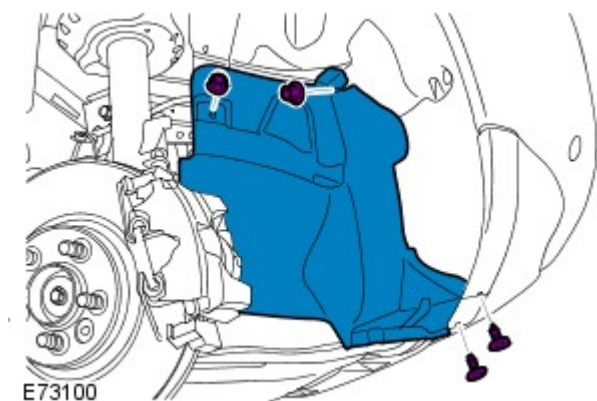
1.  **WARNING:** Make sure to support the vehicle with axle stands.


Raise and support the vehicle.

2. Remove the front wheel.

Refer to: [Wheel and Tire](#) (204-04 Wheels and Tires, Removal and Installation).

- 3.



4.  **CAUTION:** Make sure that the wiring harnesses are correctly located.

Torque: 8 Nm

Installation

1. To install, reverse the removal procedure.

Electronic Engine Controls - TD4 2.2L Diesel - Engine Coolant Temperature (ECT) Sensor

Removal and Installation

Removal

1. Remove the air cleaner assembly.


Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - I6 3.2L Petrol, Removal and Installation).

2. Remove the engine cover.

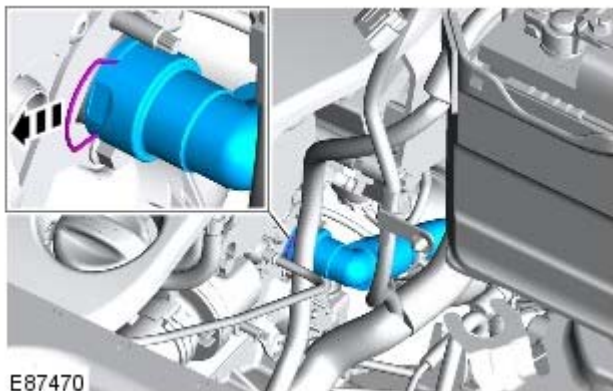
Refer to: [Engine Cover - TD4 2.2L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

3. Drain the cooling system.

Refer to: [Cooling System Draining, Filling and Bleeding](#) (303-03B Engine Cooling - TD4 2.2L Diesel, General Procedures).

4.  **WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

Raise and support the vehicle.



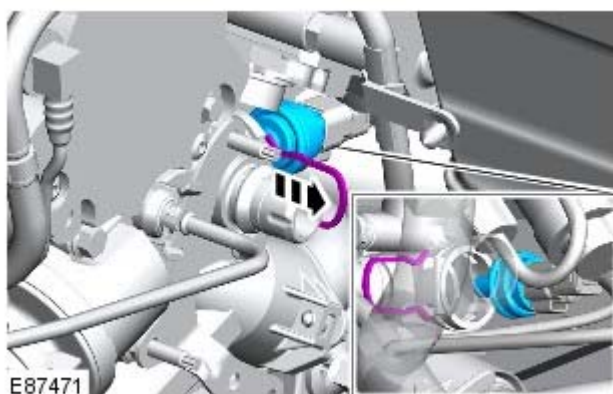
5. **CAUTIONS:**



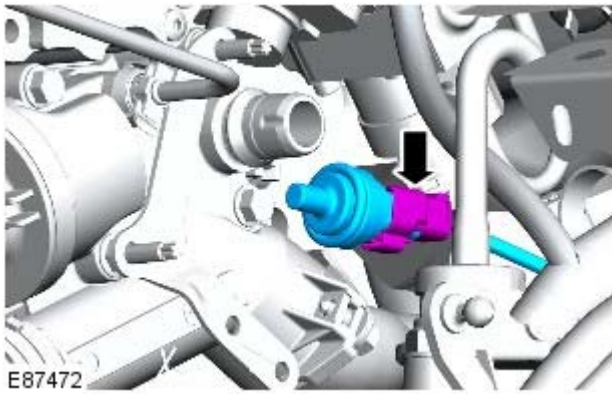
Be prepared to collect escaping coolant.



A new O-ring seal is to be installed.




6. **NOTE:** Remove and discard the O-ring seal.



7.

Installation

1. Connect the engine coolant temperature (ECT) sensor electrical connector.

2.  **CAUTION:** A new O-ring seal is to be installed.
Install the engine coolant temperature (ECT) sensor.

3. Connect the heater outlet pipe.

4. Install the air cleaner assembly.

Refer to: [Air Cleaner](#) (303-12A Intake Air Distribution and Filtering - I6 3.2L Petrol, Removal and Installation).

5. Install the engine cover.

Refer to: [Engine Cover - TD4 2.2L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

6. Refill and bleed the cooling system.

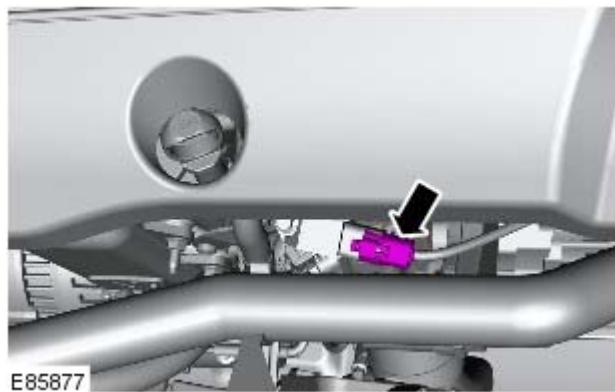
Refer to: [Cooling System Draining, Filling and Bleeding](#) (303-03B Engine Cooling - TD4 2.2L Diesel, General Procedures).

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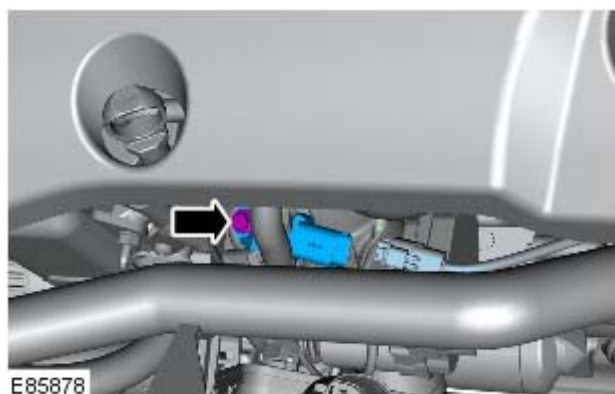
Electronic Engine Controls - TD4 2.2L Diesel - Manifold Absolute Pressure (MAP) Sensor

Removal and Installation

Removal



1.



2. Torque: 10 Nm

Installation

1. To install, reverse the removal procedure.

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Electronic Engine Controls - TD4 2.2L Diesel - Intake Air Temperature (IAT) Sensor

Removal and Installation

Removal

NOTE: Removal steps in this procedure may contain installation details.

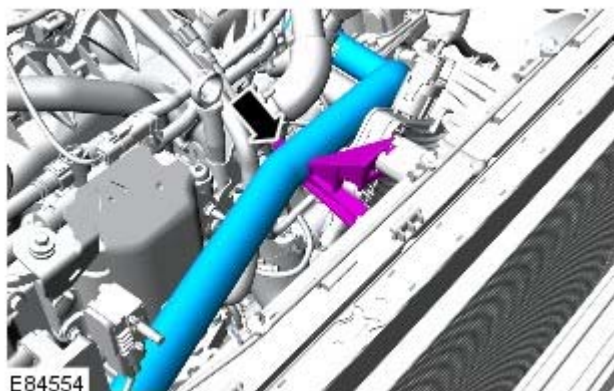
1. Remove the cover and disconnect the battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

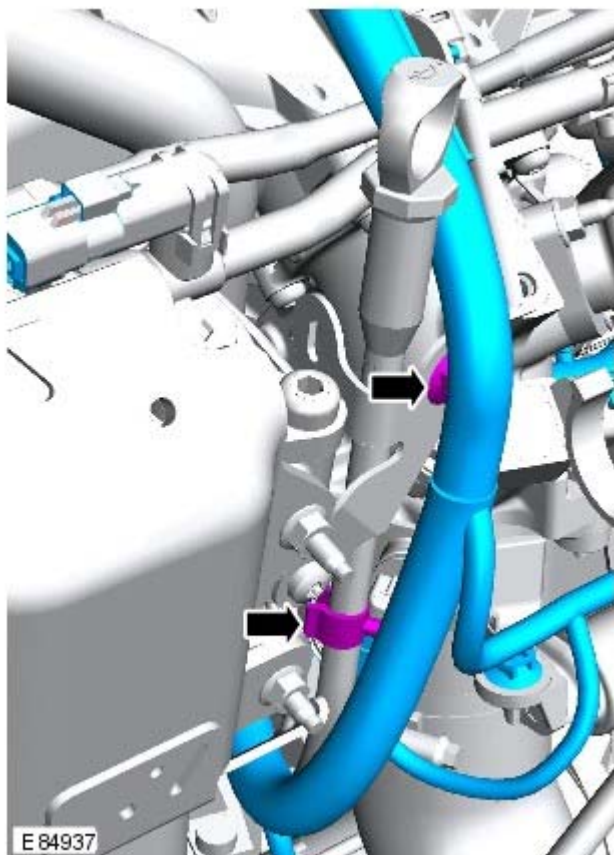
2. Remove the engine cover.

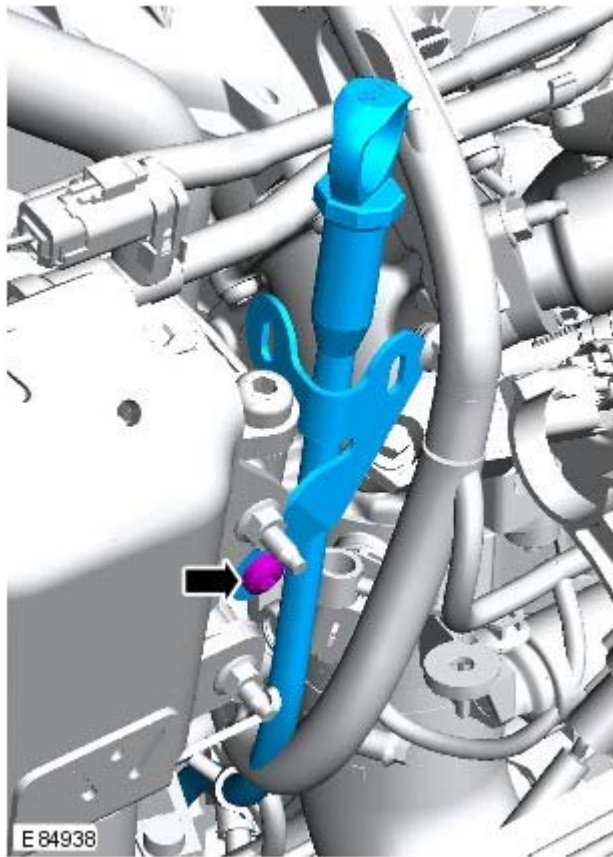
Refer to: [Engine Cover - TD4 2.2L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

- 3.

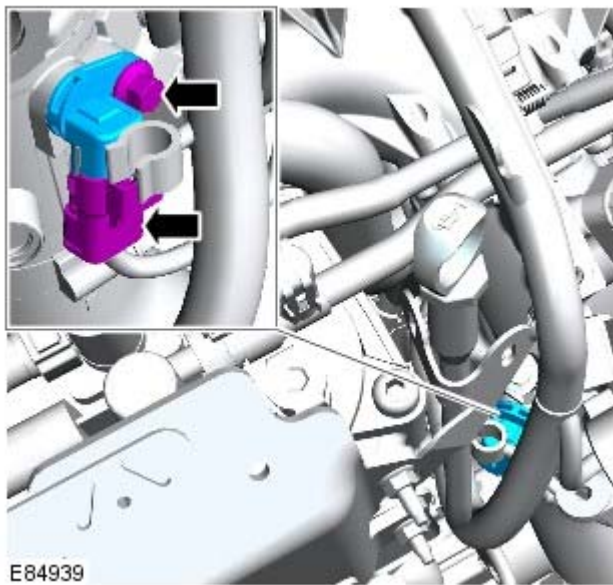


- 4.






5. Torque: 10 Nm



6.  CAUTION: A new O-ring seal is to be installed.

Installation

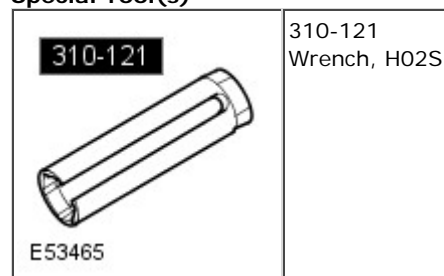
1.  CAUTION: Make sure that the mating faces are clean and free of foreign material.

To install, reverse the removal procedure.

Electronic Engine Controls - TD4 2.2L Diesel - Heated Oxygen Sensor (HO2S)

Removal and Installation

Special Tool(s)



Removal



WARNING: Observe due care when working near a hot exhaust system.

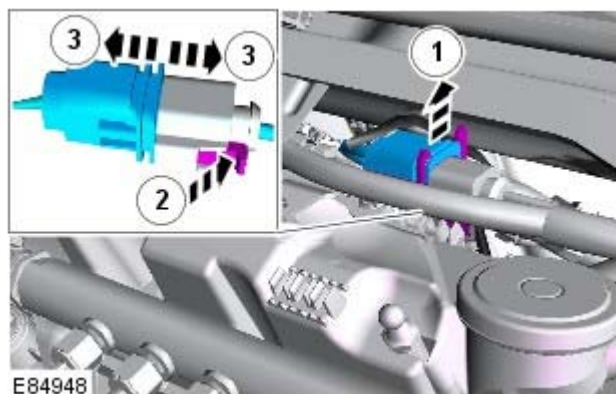


1. **WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

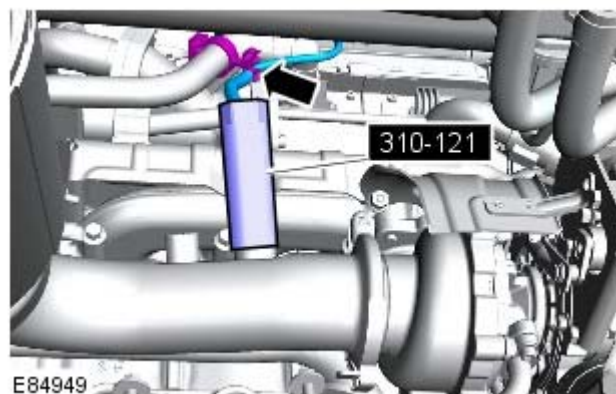
Raise and support the vehicle.

2. Remove the engine cover.

Refer to: [Engine Cover - TD4 2.2L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).



- 3.



4. Using the special tool, remove the heated oxygen sensor (HO2S).

Special Tool(s): [310-121](#)

Installation

1. For HO2S anti-seize compound information, refer to the specification section.

Refer to: [Specifications](#) (303-08B Engine Emission Control - TD4 2.2L Diesel, Specifications).

2.  **CAUTION:** Make sure the anti-seize compound does not contact the HO2S tip.

Apply anti-seize compound to the sensor threads.

3. Install the HO2S.

Special Tool(s): [310-121](#)
Torque: 45 Nm

4. Connect the HO2S electrical connector.

5. Install the engine cover.

Refer to: [Engine Cover - TD4 2.2L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

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Electronic Engine Controls - TD4 2.2L Diesel - Engine Oil Pressure (EOP)

Sensor

Removal and Installation

Removal

NOTE: Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.

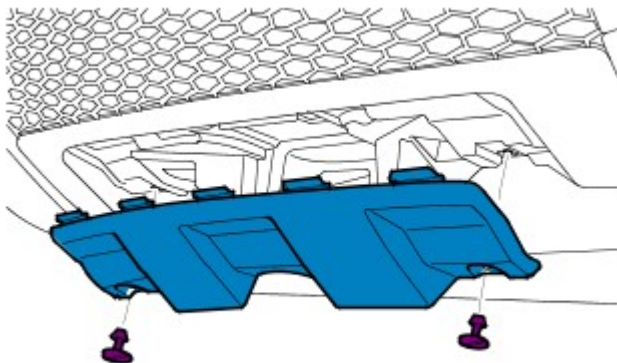
Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2. Raise and support the vehicle.

3. Remove the engine undershield.

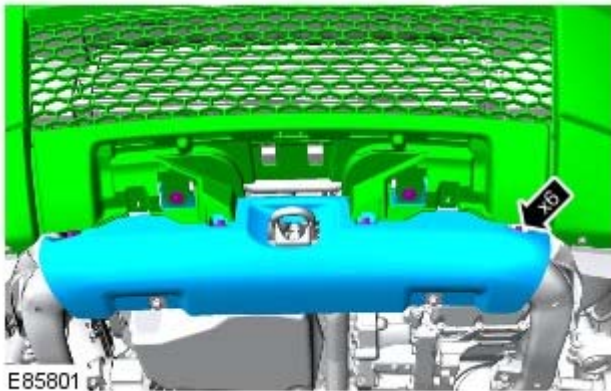
Refer to: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).

- 4.

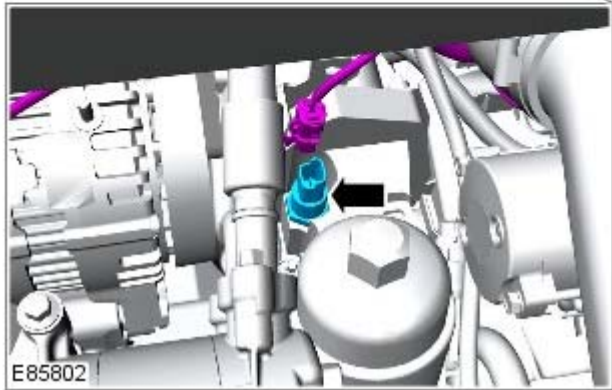
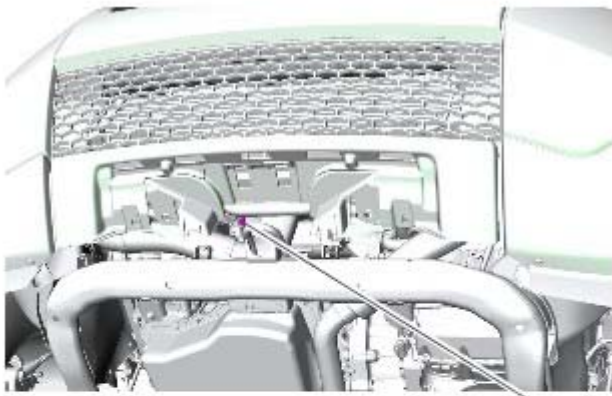


E73341

- 5.



E85801



6. CAUTIONS:



Be prepared to collect escaping fluids.



Replace the washer.

Torque: 32 Nm

Installation

1. To install, reverse the removal procedure.
2. Check and top-up the engine oil if required.

Published: 11-May-2011

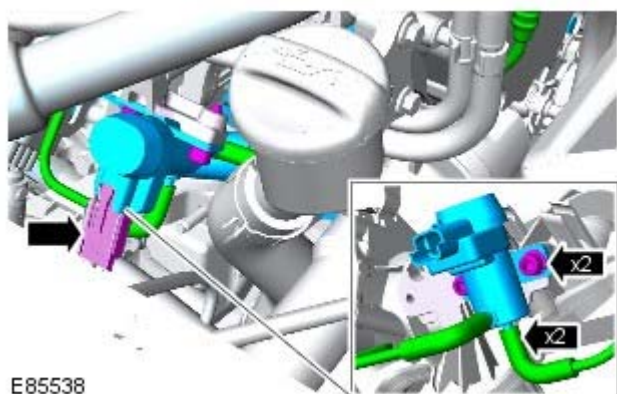
Electronic Engine Controls - TD4 2.2L Diesel - Intake Manifold Runner Control (IMRC) Actuator

Removal and Installation

Removal

1. Remove the engine cover.

Refer to: [Engine Cover - TD4 2.2L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).



2. Torque: 10 Nm

Installation

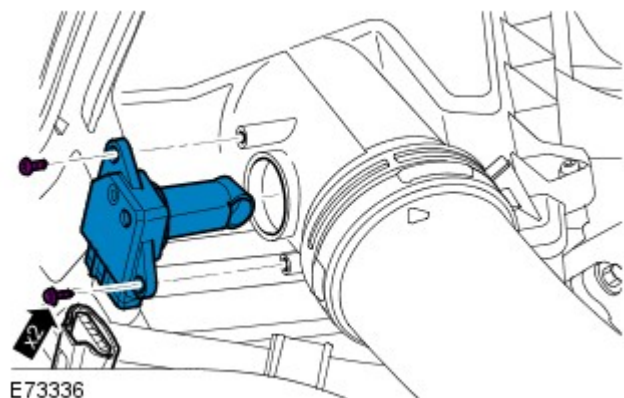
1. To install, reverse the removal procedure.

Published: 11-May-2011

Electronic Engine Controls - TD4 2.2L Diesel - Mass Air Flow (MAF) Sensor

Removal and Installation

Removal



1. Torque: 2 Nm

Installation

1. To install, reverse the removal procedure.

2. **NOTE:** For NAS vehicles only.

If required, carry out a short drive cycle.

Refer to: Powertrain Control Module (PCM) Short Drive Cycle Self-Test (303-14A, General Procedures).

Electronic Engine Controls - TD4 2.2L Diesel - Crankshaft Position (CKP)

Sensor Ring

Removal and Installation

Removal

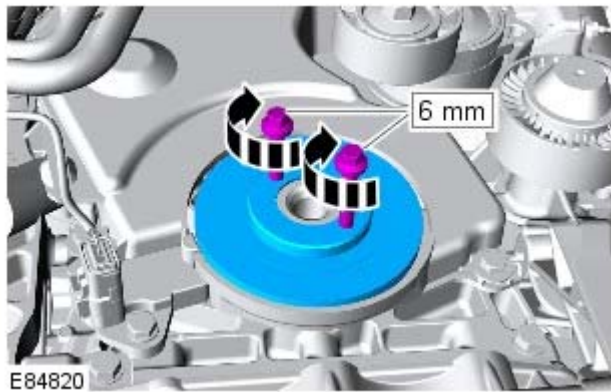
NOTE: Removal steps in this procedure may contain installation details.

1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Remove the crankshaft pulley.

Refer to: [Crankshaft Pulley](#) (303-01B Engine - TD4 2.2L Diesel, Removal and Installation).



3.  **CAUTION:** "Make sure that a new component is installed. "

NOTE: M6 bolts can be used to extract the component.

NOTE: Make sure that this component is installed to the noted removal position.

Installation

1. To install, reverse the removal procedure.

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Electronic Engine Controls - TD4 2.2L Diesel - Engine Control Module (ECM)

Removal and Installation

Removal

NOTE: Removal steps in this procedure may contain installation details.

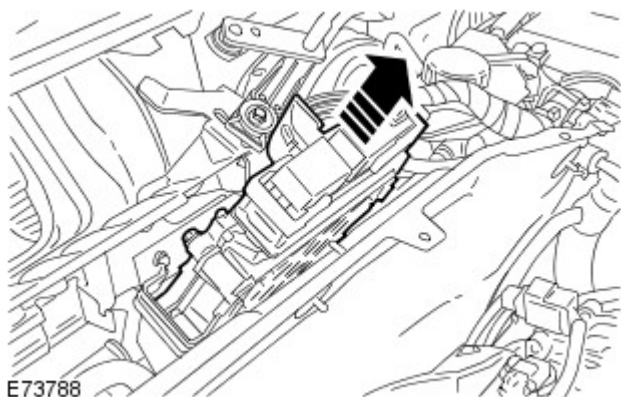
1. Remove the cover and disconnect the battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

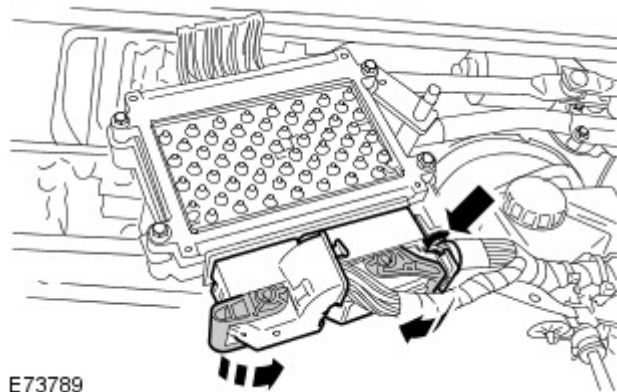
2. Remove the plenum chamber panel.

Refer to: [Plenum Chamber](#) (412-01 Climate Control, Removal and Installation).

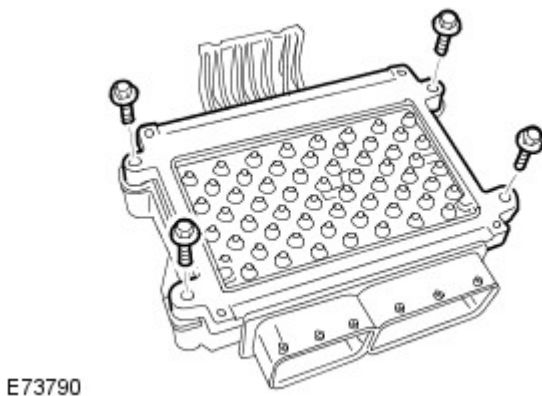
- 3.



4. Petrol ECM shown, diesel similar.



5. Torque: 6 Nm



Installation

All vehicles

1. To install, reverse the removal procedure.

Vehicles with diesel particulate filter (DPF)

2. Renew the engine oil and filter.

Refer to: [Engine Oil Draining and Filling](#) (303-01B Engine - TD4 2.2L Diesel, General Procedures).

All vehicles

3. If a new component has been installed, configure using Land Rover approved diagnostic equipment.

Electronic Engine Controls - TD4 2.2L Diesel - Fuel Temperature Sensor

Removal and Installation

Removal

WARNINGS:



Avoid flames, sparks or lighted substances.



Wait for a minimum of 1 minute after the engine has stopped before carrying out any repair to the fuel injection system.

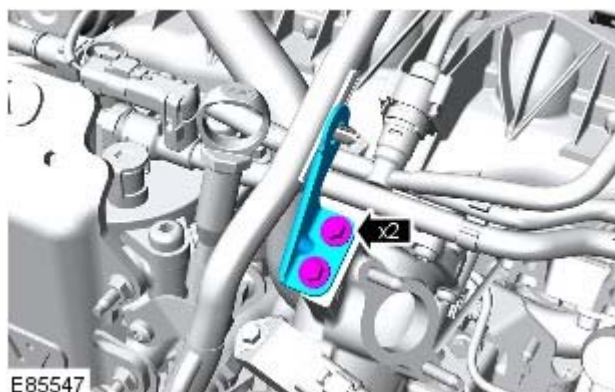
1. Remove the cover and disconnect the battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2. Remove the engine cover.

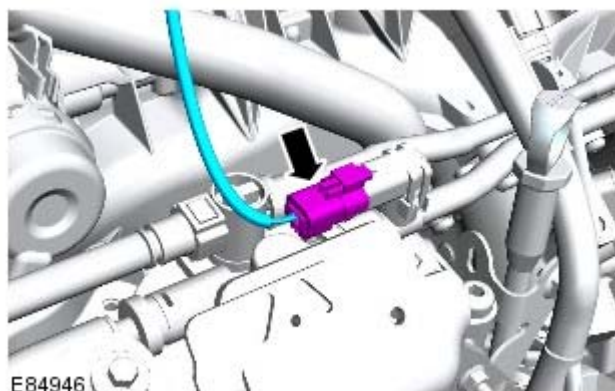
Refer to: [Engine Cover - TD4 2.2L Diesel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

3. Torque: 10 Nm

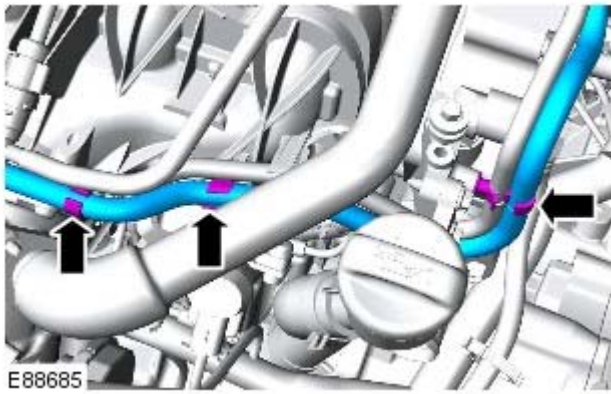


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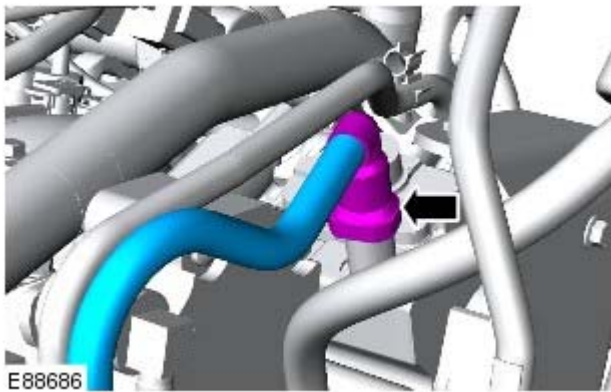
- 4.






E84946

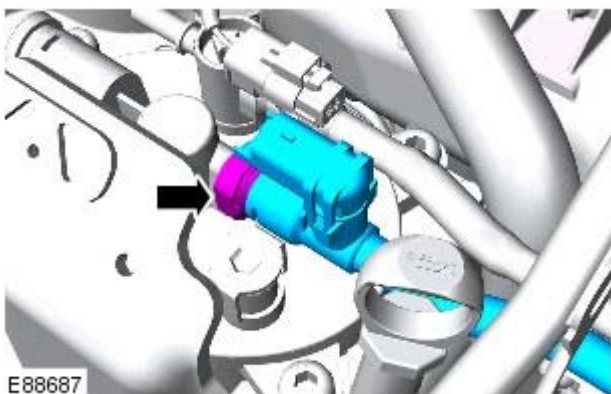


5.






6. CAUTIONS:


-  Make sure that the area around the component is clean and free of foreign material.
-  Be prepared to collect escaping fluids.
-  Make sure that all openings are sealed. Use new blanking caps.



7. CAUTIONS:

-  Make sure that the area around the component is clean and free of foreign material.
-  Be prepared to collect escaping fluids.
-  Make sure that all openings are sealed. Use new blanking caps.

Installation

1.  CAUTION: Make sure that the area around the component is clean and free of foreign material.

To install, reverse the removal procedure.

Published: 11-May-2011

Electronic Engine Controls - TD4 2.2L Diesel - Oil Temperature Sensor

Removal and Installation

Removal

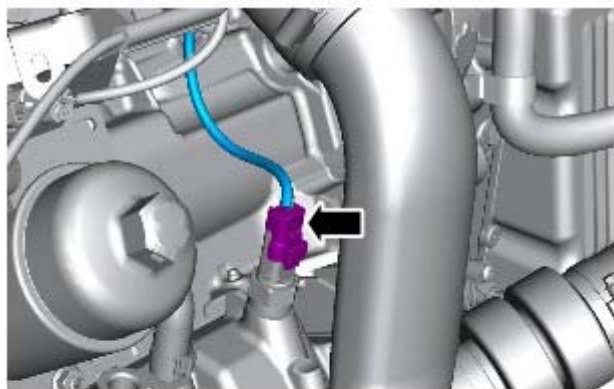
NOTE: Removal steps in this procedure may contain installation details.

1. Remove the cover and disconnect the battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

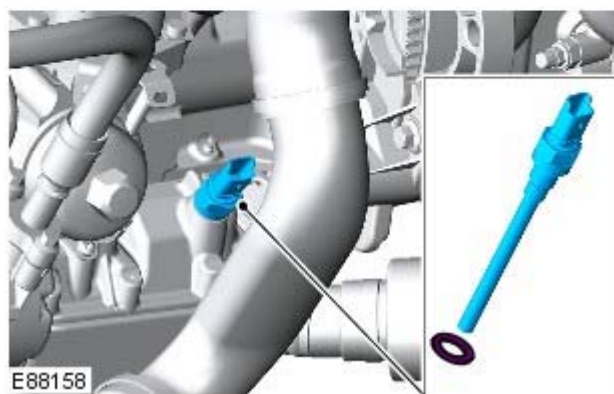
2. Remove the starter motor.

Refer to: [Starter Motor](#) (303-06B Starting System - TD4 2.2L Diesel, Removal and Installation).



3.  **CAUTION:** Make sure that a new sealing washer is installed.

Torque: 27 Nm



Installation

1. To install, reverse the removal procedure.
2. Check and top-up the engine oil if required.

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Electronic Engine Controls - TD4 2.2L Diesel - Exhaust Gas Temperature Sensor


Removal and Installation

Removal



WARNING: Observe due care when working near a hot exhaust system.

NOTE: Removal steps in this procedure may contain installation details.

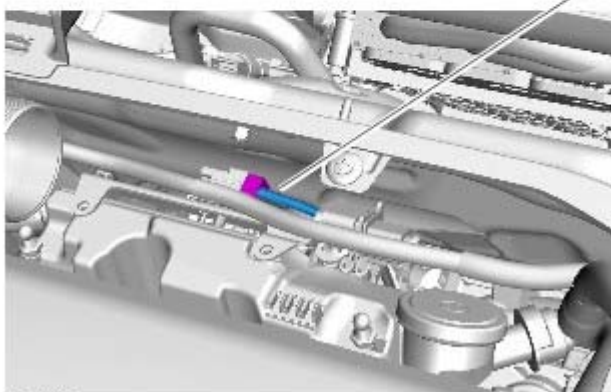
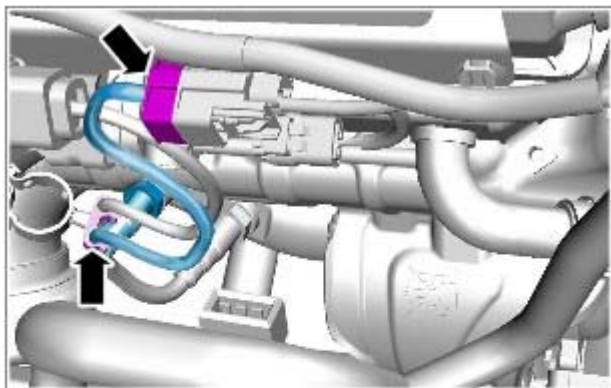
1.  **WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

Raise and support the vehicle.

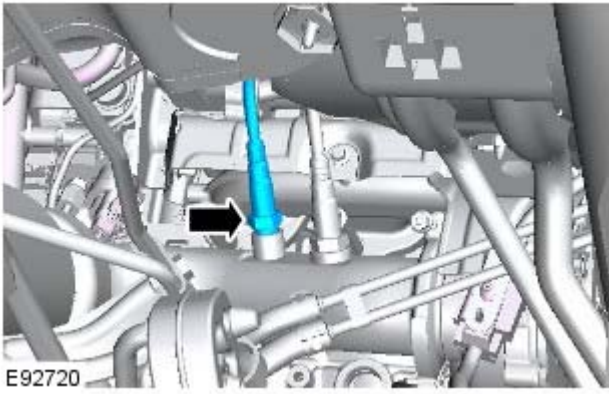
2. Remove the engine cover.


Refer to: Engine Cover - 2.2L Diesel (501-05, Removal and Installation).

- 3.



E92719



4.  **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.

Torque: 35 Nm

Installation

1. Apply anti-seize compound to the sensor threads.

Refer to: Specifications (303-08, Specifications).

2. To install, reverse the removal procedure.

Electronic Engine Controls - TD4 2.2L Diesel - Diesel Particulate Filter (DPF) Temperature Sensor


Removal and Installation

Removal

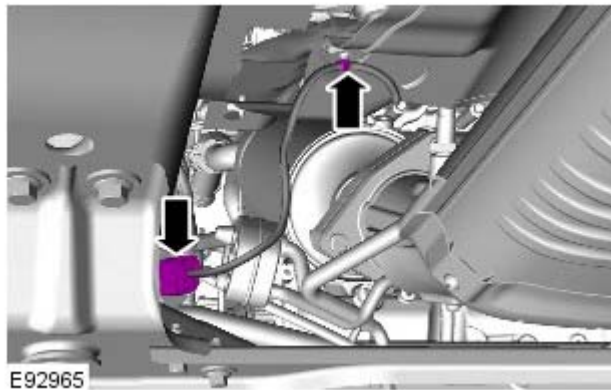


WARNING: Observe due care when working near a hot exhaust system.

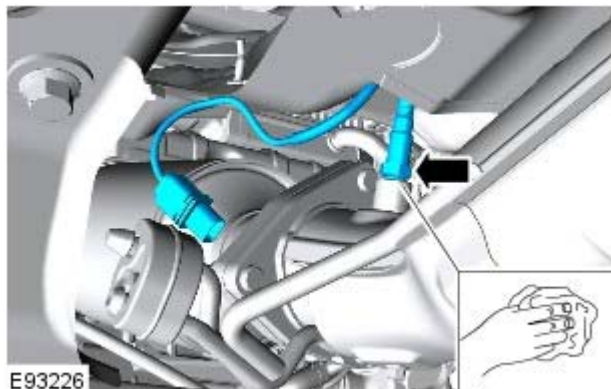
NOTE: Removal steps in this procedure may contain installation details.


1.  **WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

Raise and support the vehicle.



2.



3.  **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.

Torque: 35 Nm

Installation

1. Apply anti-seize compound to the sensor threads.

Refer to: Specifications (303-08, Specifications).

2. To install, reverse the removal procedure.