

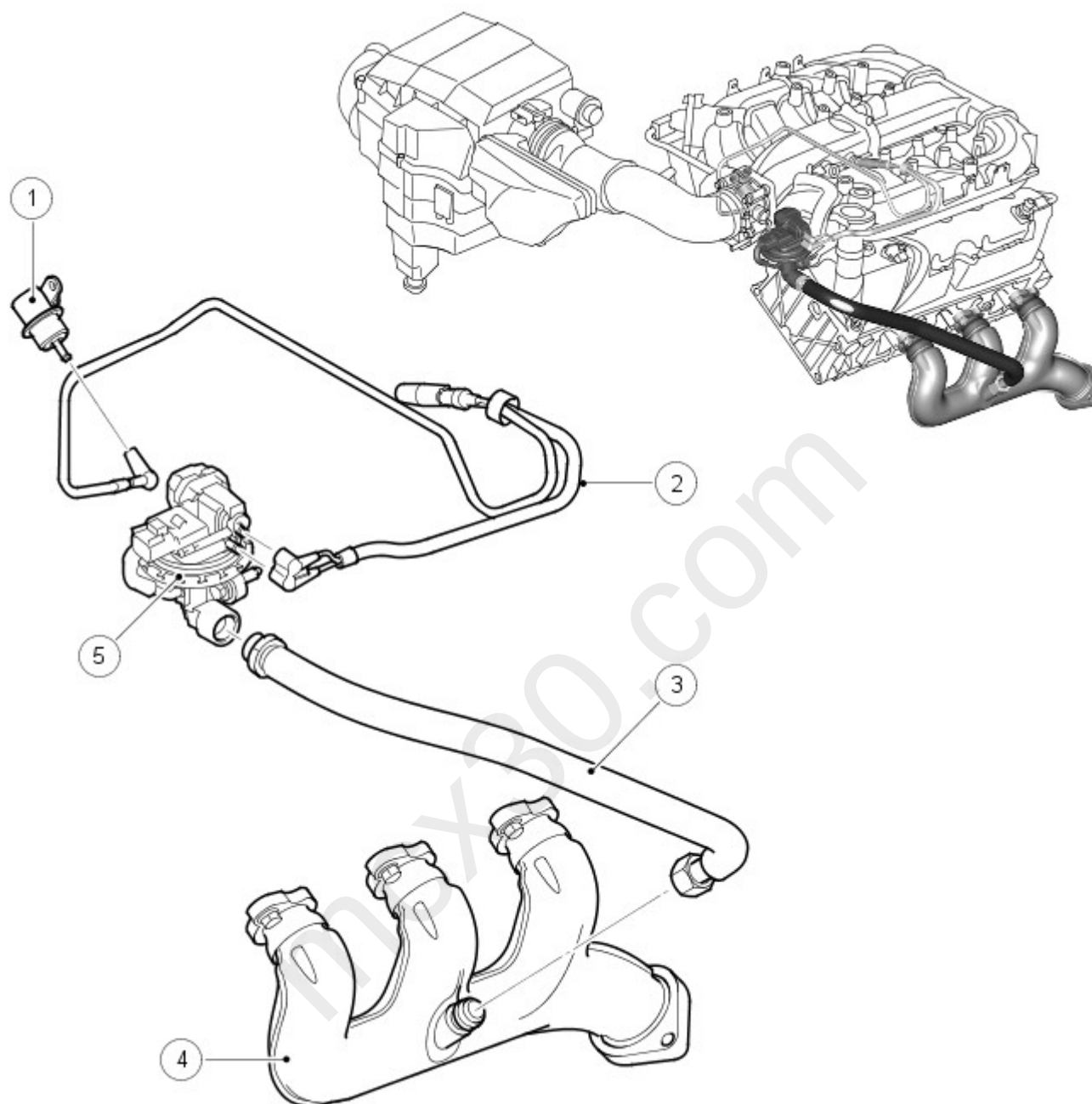
Engine Emission Control - V6 4.0L Petrol -**Torque Specifications**

Description		Nm	lb-ft
Exhaust gas recirculation (EGR) modulator valve bolts		25	18
Exhaust gas recirculation (EGR) feed pipe to EGR valve union nut		25	18

Engine Emission Control - V6 4.0L Petrol - Engine Emission Control

Description and Operation

Exhaust Gas Recirculation Component Location



E48510

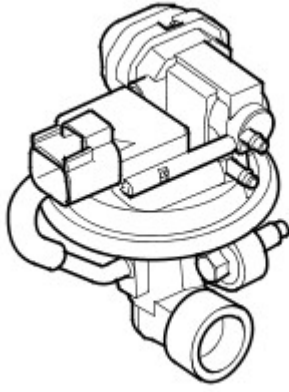
Item	Part Number	Description
1	-	Fuel rail damper
2	-	Vacuum control hoses
3	-	Exhaust manifold to Exhaust Gas Recirculation (EGR) hose
4	-	Exhaust manifold
5	-	ESM valve

Engine emissions on the V6 petrol engine are controlled by the Engine Control Module (ECM). The engine emission control system comprises:

- EGR system
- Crankcase emission system

EGR SYSTEM

ESM Valve



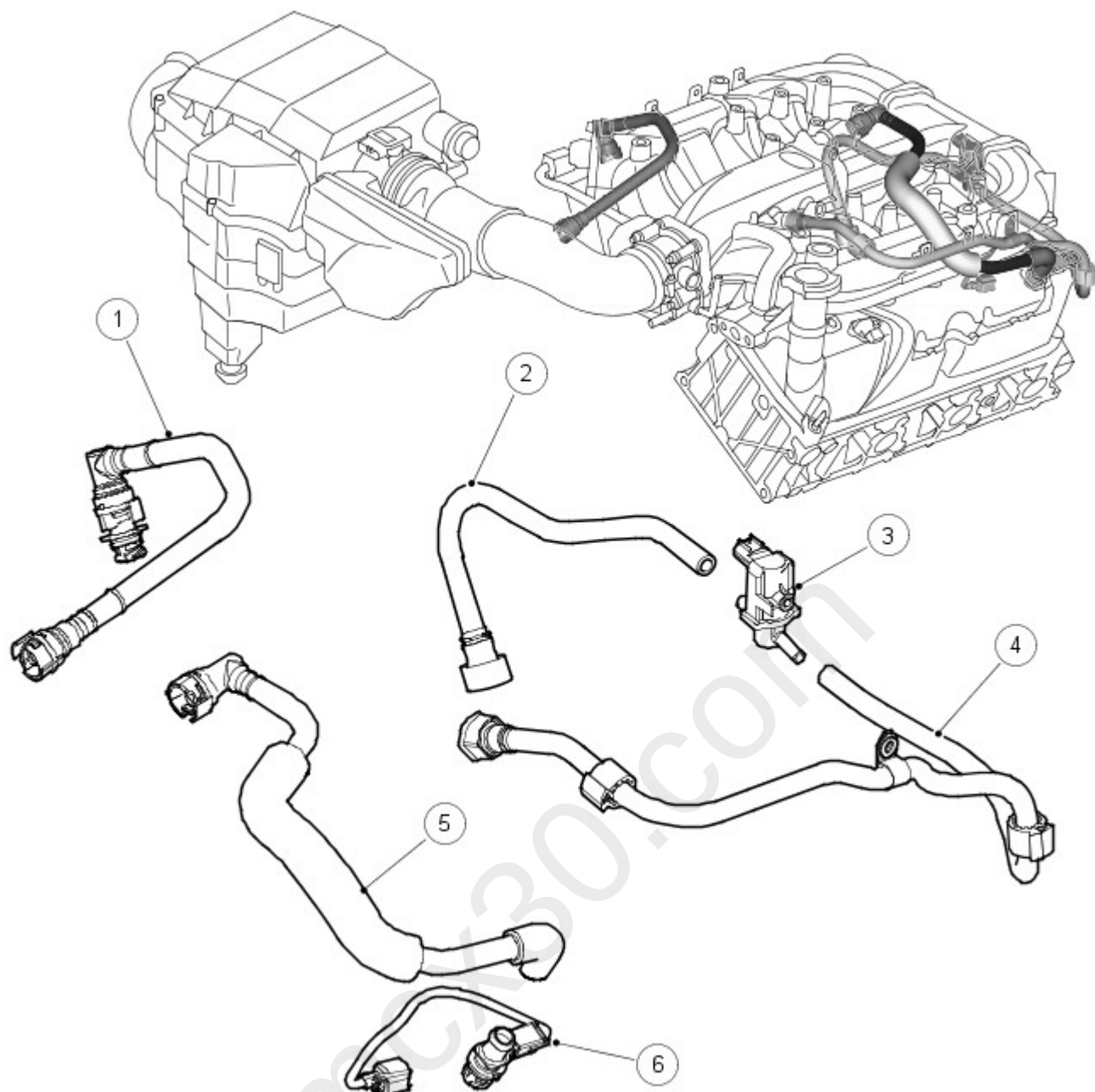
E48511

The EGR System Module (ESM) valve is located on the intake manifold with a pipe connecting the exhaust manifold to the valve. Connection between the sensor and the harness is via a six-way connector. The ESM valve is electrically controlled by a Pulse Width Modulated (PWM) signal. The ESM valve allows burned exhaust gas to be recirculated back into the engine. Since exhaust gas has much less oxygen than air, it is basically inert. The exhaust gas takes the place of air in the cylinder and reduces combustion temperature. As the combustion temperature is reduced, so are the oxides of nitrogen (NOx) emissions.

The ESM valve has an integrated Differential Pressure Feedback-Electronic/Manifold Absolute Pressure (DPFE/MAP) sensor. This pressure transducer monitors the pressure differential on either side of an orifice in the ESM system flow path and then transmits that information to the ECM. The pressure drop measured across this orifice is used to estimate the flow rate of recirculated exhaust gas. An Electronic Vacuum Regulator (EVR) is used to control the vacuum signal to the ESM valve based on the electrical signal from the ECM. The ECM monitors the ESM level based on the feedback from the DPFE/MAP sensor, which creates a closed loop system.

CRANKCASE VENTILATION SYSTEM

Crankcase Ventilation System Component Location



E48512

Item	Part Number	Description
1	-	Crankcase Ventilation (CCV) Hose and cam lock connector
2	-	Engine to evaporative emissions control tube
3	-	Evaporative emissions control valve
4	-	Crankcase Ventilation (CCV) hose
5	-	Positive Crankcase Ventilation(PCV) hose and PCV valve
6	-	PCV jump lead with integral thermistor

Positive Crankcase Ventilation (PCV) Valve



E48513

The crankcase ventilation system comprises:

- Positive Crankcase Ventilation (PCV) valve
- Positive Crankcase Ventilation (PCV) hose
- Crankcase Ventilation (CCV) hose

The PCV is an electrically heated control valve that allows the gas from left hand cylinder head to flow into the air intake. The PCV valve is electrically heated to allow it to remain operational in cold climates. The PCV heater power is fed from the fuel pump relay, therefore heating is always active while the engine is running. The current supplied is internally regulated by the PCV.

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Engine Emission Control - V6 4.0L Petrol - Engine Emission Control

Diagnosis and Testing

Principles of Operation

For a detailed description of the engine emission control system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Engine Emission Control](#) (303-08C Engine Emission Control - V6 4.0L Petrol, 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 checked and/or the donor vehicle.

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

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

Visual Inspection

Mechanical	Electrical
● Exhaust gas recirculation system ● Breather hoses ● Positive crankcase ventilation valve ● Fuel level ● Fuel contamination/grade/quality ● Throttle body	● Fuses ● Loose or corroded electrical connectors ● Exhaust Gas Recirculation (EGR) valve ● Engine Control Module (ECM)

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. 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 Causes	Action
Difficult to start cold	● Battery ● Crankshaft Position (CKP) sensor ● Exhaust Gas Recirculation (EGR) valve stuck open ● Fuel system ● Evaporative emissions purge valve	For battery information, CKP sensor, fuel system and purge valve tests, refer to relevant workshop manual section. Check the EGR valve.
Engine stalls soon after start	● Breather system disconnected/restricted ● Engine Control Module (ECM) relay ● MAF sensor ● Ignition system ● Air filter restricted ● Air leakage ● Fuel lines	Check the engine breather hoses, PCV, etc. Check the Engine Control Module (ECM) relay operation. For MAF sensor, ignition system tests, air intake and fuel line information, refer to relevant workshop manual section.
Poor throttle response	● APP sensor malfunction ● TP sensors ● ECT sensor ● MAF sensor ● Transmission malfunction ● Traction control event ● Air leakage ● Breather system disconnected/restricted	For APP, TP, ECT, MAF sensor tests, intake system checks and transmission information, refer to relevant workshop manual section. Check the breather system hoses, PCV, etc.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Engine Control Module \(PCM\) 4.0L V6](#) (100-00 General Information, Description and Operation).

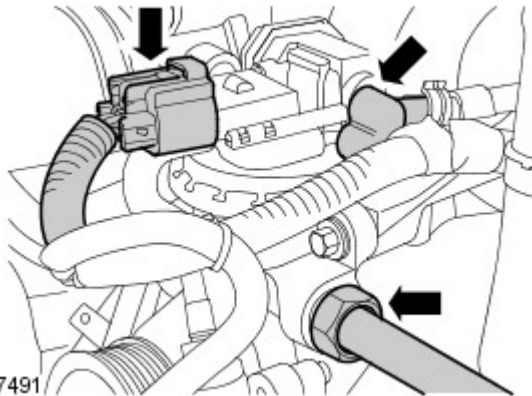
Engine Emission Control - V6 4.0L Petrol - Exhaust Gas Recirculation (EGR)

Modulator Valve

Removal and Installation

Removal

1. Disconnect the battery ground cable.
For additional information, refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).
2. Remove the engine cover.
For additional information, refer to: [Engine Cover - V6 4.0L Petrol](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).
3. Disconnect the EGR valve electrical connector.
4. Disconnect the EGR valve vacuum hose.



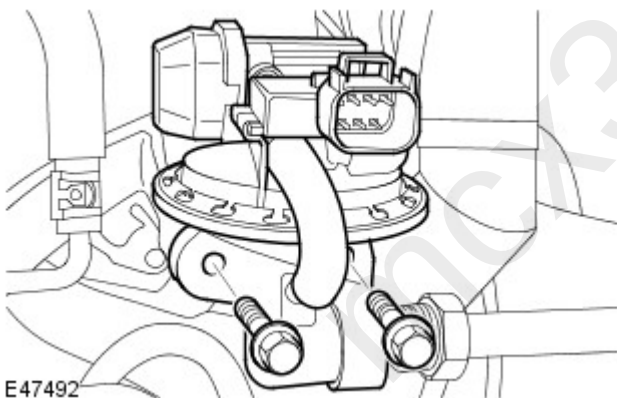
5.  **CAUTION:** Before the disconnection or removal of any components, ensure the area around joint faces and connections are clean. Plug any open connections to prevent contamination.

Disconnect the EGR valve feed pipe.

- Loosen the EGR union nut and release the pipe.

6. Remove the EGR valve.

- Remove the 2 bolts.
- Collect and discard the gasket.



Installation

1. Install the EGR valve.
 - Clean the component mating faces.
 - Install a new gasket.
 - Tighten the bolts to 25 Nm (18 lb.ft).
2. Connect the feed pipe to the EGR valve.
 - Tighten the union to 25 Nm (18 lb.ft).
3. Connect the vacuum hose to the EGR valve.
4. Connect the EGR valve electrical connector.
5. Install the engine cover.
For additional information, refer to: [Engine Cover - V6 4.0L Petrol](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).
6. Connect the battery ground cable.
For additional information, refer to: [Specifications](#) (414-00

Battery and Charging System - General Information, Specifications).

7. NOTE: For NAS vehicles only.

If required, carry out a long drive cycle.

For additional information, refer to: Powertrain Control Module (PCM) Long Drive Cycle Self-Test (303-14A, General Procedures).

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