Published: Jan 23, 2007

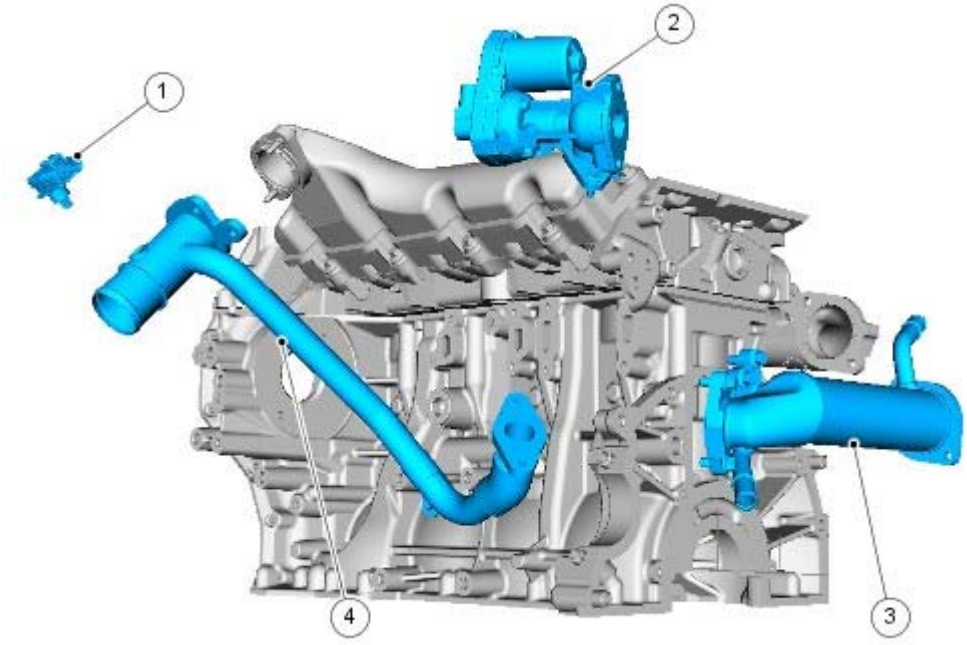
Specifications

Description	Nm	lb-ft
Exhaust gas recirculation (EGR) valve to EGR valve outlet tube bolts	10	7
EGR valve to EGR cooler bolts	23	17
Exhaust manifold to EGR cooler bolts	23	17
EGR valve outlet tube to cylinder block bolt	23	17

Published: Nov 2, 2006

Engine Emission Control

EGR (exhaust gas recirculation) COMPONENT LOCATION



E63622

Item	Part Number	Description
1		MAP (manifold absolute pressure) sensor (shown for location purposes only)
2		EGR (exhaust gas recirculation) valve
3		EGR (exhaust gas recirculation) cooler
4		Gas transfer and mixer pipes

OVERVIEW

The EGR (exhaust gas recirculation) system comprises:

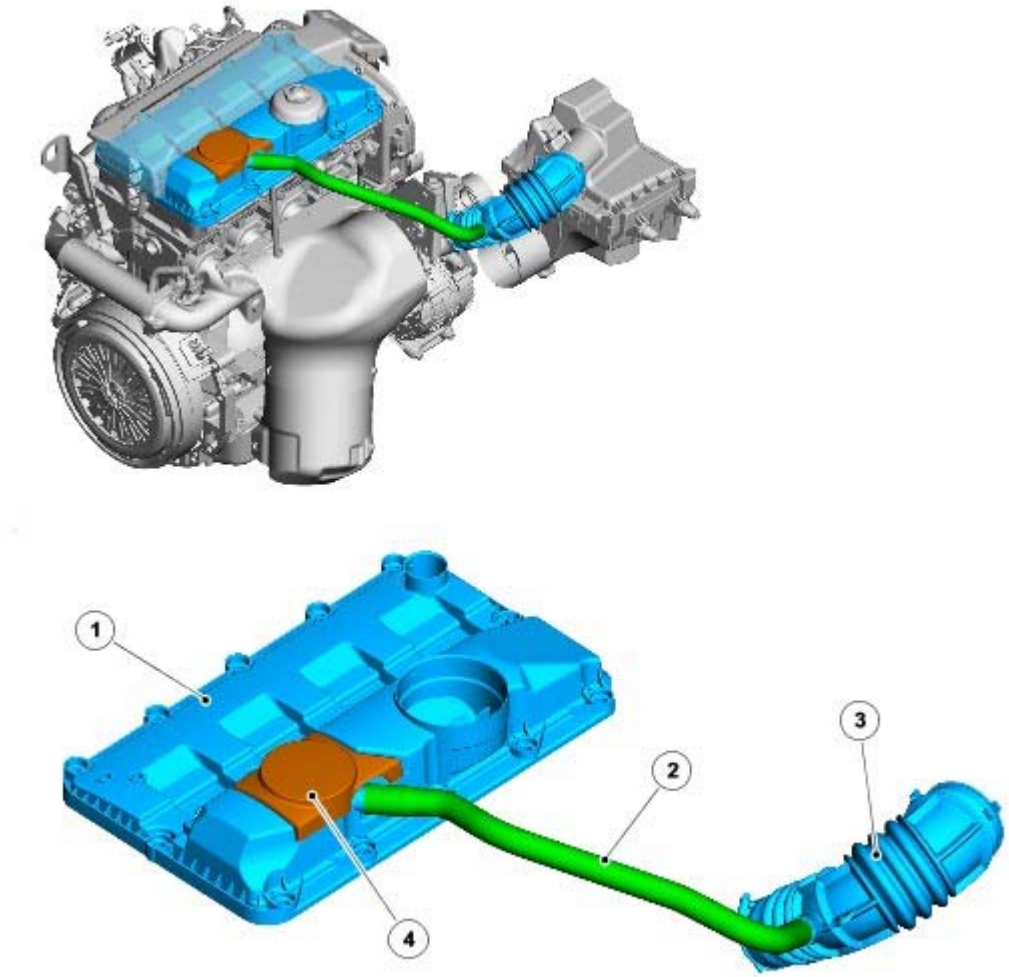
- EGR (exhaust gas recirculation) modulator
- EGR (exhaust gas recirculation) cooler
- Gas transfer pipe and mixer

The EGR (exhaust gas recirculation) cooler receives exhaust gas directly from the exhaust manifold, where it is cooled by a water matrix which is integrated into the overall engine cooling system.. Attached to the Cool side of the cooler is the EGR (exhaust gas recirculation) valve. This valve is motor driven – controlled by the ECM (engine control module) to provide varying amounts of EGR (exhaust gas recirculation) recirculation depending on the engine operation. At engine switch off the valve opens and closes several times to clear any deposits which may have accumulated during running.

The EGR (exhaust gas recirculation) pipe transports the cooled gas to the mixer where it is blended into to the incoming air stream.

The ECM (engine control module) monitors the EGR (exhaust gas recirculation) system function and stores fault codes in the event of failure. The EGR (exhaust gas recirculation) valve can also be activated for testing using the Land Rover recommended diagnostic tool.

CRANKCASE VENTILATION COMPONENT LOCATION



E86519

Item	Part Number	Description
1		Cylinder head cover
2		Gas transfer pipe
3		Air intake tube
4		Oil separator

OVERVIEW

The crankcase ventilation system on the engine manages the positive pressure built up during running. In order to prevent excessive oil loss/consumption the separator ensures that all gasses emitted from the crankcase during engine running are separated from any oil particles.

Crankcase gas enters the oil separator unit located in the engine cam cover due to the pressure differential between the crank case and the air induction duct. The oil separator removes oil from the crankcase gasses. The crank case pressure is released into the air induction system via the Crank Case Vent Tube. The separated oil drains from the separator to the oil pan via the engines internal oil galleries.

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Engine Emission Control

Overview

For information on description and operation:
Engine Emission Control

Inspection and Verification

1 . Verify the customer concern.

2 . Visually inspect for obvious signs of mechanical or electrical damage.

Mechanical	Electrical
• Engine breather hoses • Oil separator • Exhaust gas recirculation (EGR) pipes (check for cracks) • EGR valve • EGR cooler(s)	• Fuse(s) • Wiring harness • Loose or corroded electrical connector(s) • EGR valve • Engine control module (ECM)

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

4 . Use the approved diagnostic system or a scan tool to retrieve any diagnostic trouble codes (DTCs) before moving onto the symptom chart or DTC index.

Make sure that all DTCs are cleared following rectification.

Make sure that all DTCs are cleared following rectification.

Symptom Chart

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

DTC Index

NOTE:

If a control module or component is suspect and the vehicle remains under manufacturer warranty, refer to the

Warranty Policy and Procedures manual (section B1.2), or determine if any prior approval program is in operation, before the replacement of a component.

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra 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.

NOTE:

For a full list of engine control module (ECM) DTCs:

Electronic Engine Controls

DTC	Description	Possible cause	Action
P006A00	Manifold absolute pressure (MAP) sensor - mass or volume air flow correlation	**NOTE:** The MAP sensor is part of the manifold absolute pressure temperature (MAPT) sensor ● Restricted air intake path ● Exhaust gas recirculation (EGR) valve stuck open ● Turbocharger fault ● MAP sensor fault ● Mass air flow (MAF) sensor fault	Check the intake air path for restrictions. Rectify as necessary. Check for DTCs indicating an EGR, turbocharger, MAPT or MAF sensor fault. Rectify as necessary. Clear the DTCs and check for normal operation.
P010029	Mass or volume air flow A circuit - signal invalid	● Restricted air intake path ● Check for leak between mass air flow (MAF) sensor and turbocharger ● MAF sensor fault ● Turbocharger fault ● Exhaust gas recirculation (EGR) valve fault	Check the intake air system for leaks, restrictions, etc. Check for related DTCs. Rectify as necessary. Clear the DTCs and test for normal operation.
P04031A	Exhaust gas recirculation (EGR) control circuit - circuit resistance below threshold	● EGR control valve actuator circuit: short circuit to ground ● EGR control valve actuator circuit: short circuit to power ● EGR control valve actuator circuit: open circuit ● EGR control valve fault	
		● EGR control valve	

P04031B	Exhaust gas recirculation (EGR) control circuit - circuit resistance above threshold	actuator circuit: short circuit to ground • EGR control valve actuator circuit: short circuit to power • EGR control valve actuator circuit: open circuit • EGR control valve fault	Check the EGR control valve actuator and circuits. Refer to the electrical guides. Install a new EGR valve if necessary. Exhaust Gas Recirculation (EGR) Valve (17.45.01) Clear the DTCs and test for normal operation.
P040311	Exhaust gas recirculation (EGR) control circuit - circuit short to ground	• EGR control valve actuator circuit: short circuit to ground • EGR control valve fault	
P040312	Exhaust gas recirculation (EGR) control circuit - circuit short to battery	• EGR control valve actuator circuit: short circuit to power • EGR control valve fault	
P040472	Exhaust gas recirculation (EGR) control circuit range/performance - actuator stuck open	• EGR control valve actuator circuit fault • EGR control valve fault	Check the EGR control valve actuator and circuits. Refer to the electrical guides. Install a new EGR valve if necessary. Exhaust Gas Recirculation (EGR) Valve (17.45.01) Clear the DTCs and test for normal operation.
P040473	Exhaust gas recirculation (EGR) control circuit range/performance - actuator stuck closed	• EGR control valve actuator circuit fault • EGR control valve fault	
P14022F	Exhaust gas recirculation (EGR) control valve metering orifice restricted - signal erratic	• EGR valve control circuit: open circuit • EGR valve control circuit: short circuit to ground • EGR valve control circuit: short circuit to power • EGR valve fault	Check the EGR valve actuator and circuits. Refer to the electrical guides. Install a new EGR valve if necessary. Exhaust Gas Recirculation (EGR) Valve (17.45.01) Clear the DTCs and test for normal operation.
P140216	Exhaust gas recirculation (EGR) control valve - circuit voltage below threshold	• EGR valve control circuit: open circuit • EGR valve control circuit: short circuit to ground • EGR valve fault	
P140217	Exhaust gas recirculation (EGR) control valve - circuit voltage above threshold	• EGR valve control circuit: short circuit to power • EGR valve fault	
P140977	Exhaust gas recirculation (EGR) control valve vacuum regulator solenoid circuit - commanded position not reachable	• EGR valve control circuit: open circuit • EGR valve control circuit: short circuit to ground • EGR valve control circuit: short circuit to power • EGR valve fault	Check the EGR valve actuator and circuits. Refer to the electrical guides. Install a new EGR valve if necessary. Exhaust Gas Recirculation (EGR) Valve (17.45.01) Clear the DTCs and test for normal operation.

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Exhaust Gas Recirculation (EGR) Cooler (17.45.38)

Removal

1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect

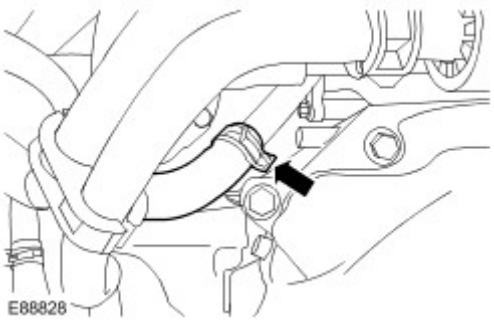
2 . **WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

Raise and support the vehicle.

3 . **NOTE:**
Position a container to collect the fluid spillage.

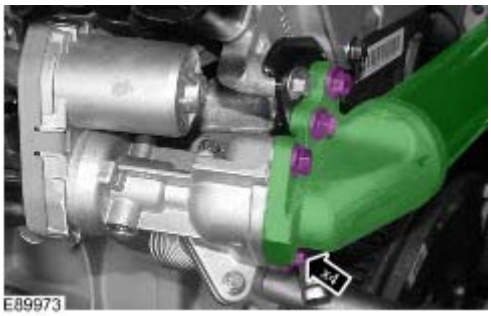
Disconnect the exhaust gas recirculation (EGR) cooler LH coolant hose.

- Clamp the hose to minimize coolant loss.
- Release the clip.



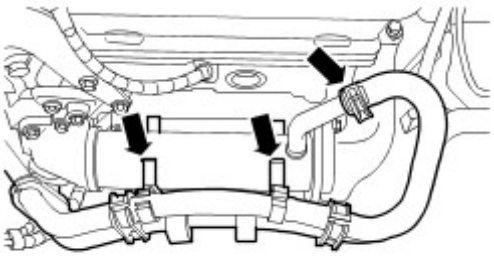
4 . Release the EGR cooler from the EGR valve and from the EGR cooler bracket.

- Remove the 4 bolts.
- Remove and discard the gasket.



5 . Disconnect the EGR cooler RH coolant hose.

- Clamp the hose to minimize coolant loss.
- Release the clip.
- Release the coolant hoses from the EGR cooler.



E88840

6 . Reposition the coolant expansion tank.

- Remove the bolt.

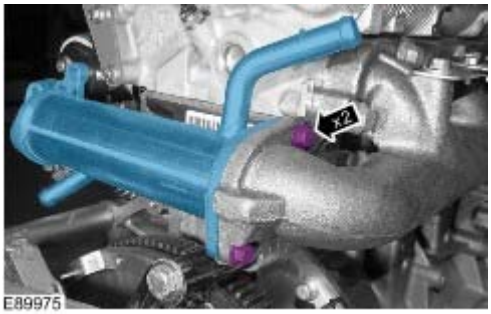
E89974

7 . **NOTE:**

Engine shown removed for clarity.

Remove the EGR cooler.

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



E89975

Installation

1 . **NOTE:**

Clean the component mating faces.

Install the EGR cooler.

- Install a new gasket.
- Tighten the bolts to 23 Nm (17 lb.ft).

2 . Secure the coolant expansion tank.

- Tighten the bolt to 10 Nm (7 lb.ft).

3 . Connect the EGR cooler RH coolant hose.

- Secure with the clip.
- Secure the coolant hoses to EGR cooler.
- Remove the hose clamp.

4 . Secure the EGR cooler to the EGR valve and the EGR cooler bracket.

- Install a new gasket.
- Tighten the bolts to 23 Nm (17 lb.ft).

5 . Connect the EGR cooler LH coolant hose.

- Secure with the clip.
- Remove the hose clamp.
- Remove the container.

6 . Connect the battery ground cable.
For additional information, refer to Battery Connect

7 . Check and top up the coolant.

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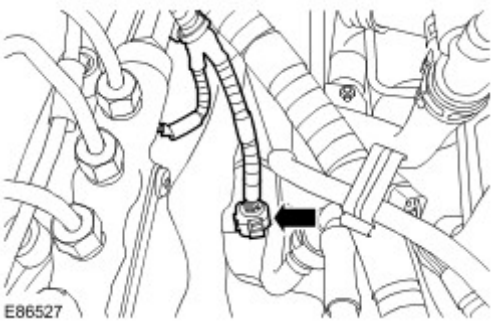
Exhaust Gas Recirculation (EGR) Valve (17.45.01)

Removal

1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect

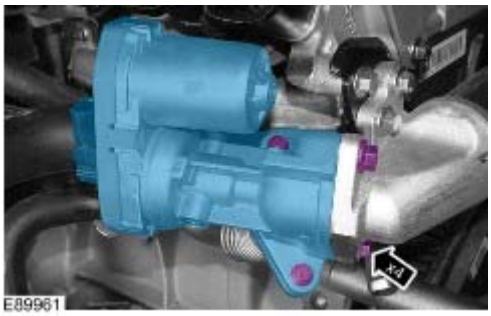
2 . Disconnect the exhaust gas recirculation (EGR) valve electrical connector.



3 . **NOTE:**
Engine shown removed for clarity.

Remove the EGR valve.

- Remove the 4 bolts.
- Remove and discard the 2 gaskets.



Installation

1 . Install the EGR valve.

- Clean the component mating faces.
- Install new gaskets.
- Tighten the M6 bolts to 10 Nm (7lb.ft).
- Tighten the M8 bolts to 23 Nm (17lb.ft).

2 . Connect the EGR valve electrical connector.

3 . Connect the battery ground cable.
For additional information, refer to Battery Connect