

Exhaust Gas Recirculation (EGR) Systems

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Exhaust Gas Recirculation (EGR) Systems

Description and Operation

Exhaust Gas Recirculation (EGR) Systems

Engine Applications

The Exhaust Gas Recirculation (EGR) system recirculates a portion of the exhaust gases into the intake manifold under average vehicle driving conditions to reduce combustion temperatures and exhaust gas NO_x content. The amount of exhaust gas recirculated varies from zero with a cold engine, to a fixed rate for a hot engine with intermediate load and low engine speed. The flow rate increases steadily as coolant rises above 55°C (131°F) for the 1.3L.

All the systems use control solenoid(s), activated by the Power-train Control Module (PCM), to operate the EGR system. The EGR system can be deactivated, aside from component malfunction, by the PCM and sensor inputs to the PCM. The components that help control the EGR system are listed below.

EGR System Components and Applications

Component	1.3L
Crankshaft Position (CKP) Sensor	X
EGR Control (EGRC) Solenoid	X
EGR Vacuum Modulator Valve (EGRM)	
EGR Temperature (EGRT) Sensor	
EGR Vacuum Regulator (EVR) Solenoid	
EGR Valve	X
EGR Valve Position (EVP) Solenoid	X
EGR Vent (EGRV) Solenoid	X
Engine Coolant Temperature (ECT) Sensor	X
Idle (IDL) Switch	X
Mass Air Flow (MAF) Sensor	X
Measuring Core Volume Air Flow (MC-VAF) Sensor	
Power-train Control Module (PCM)	X
Throttle Position (TP) Sensor	X

EGR System Operation

NOTE: Refer to the appropriate Mechanical Emission Related System Schematic Diagram in Section 3 for EGR routing and the EGR system's relationship with other engine/ emission systems.

Exhaust Gas Recirculation (EGR) Systems

Description and Operation

1.3L

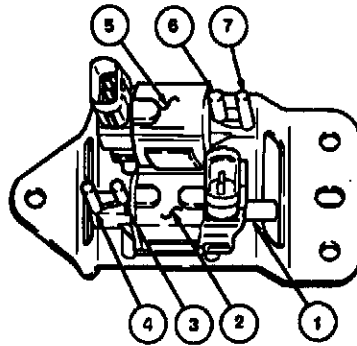
Two solenoids control the Exhaust Gas Recirculation (EGR) valve. The solenoids are the Exhaust Gas Recirculation Vent (EGRV) solenoid and Exhaust Gas Recirculation Control solenoid. If the Power-train Control Module (PCM) and the sensor inputs determine the EGR valve needs to be opened, the PCM activates the EGRC solenoid. The EGRV solenoid vents the vacuum into the atmosphere until the desired EGR valve position is reached.

The EGR system uses an EGR Valve Position (EVP) sensor that is mounted to the top of the EGR valve. As the EGR valve moves, the EVP sensor detects this motion and notifies the PCM. The PCM uses this information, along with the information received from the previously listed input sensors; to modify the EGR valve position for improved emission control.

If any of these components fail, the Malfunction Indicator Lamp (MIL) will illuminate, informing the operator of a system failure.

Exhaust Gas Recirculation Vent (EGRV) Solenoid and Control (EGRC) Solenoid

The Exhaust Gas Recirculation Control (EGRC) solenoid regulates vacuum to the Exhaust Gas Recirculation (EGR) valve by an output signal from the Power-train Control Module (PCM). The Exhaust Gas Recirculation Vent (EGRV) solenoid, also controlled by an output signal from the PCM, vents vacuum into the atmosphere in order to maintain the EGR valve position. Together, the EGRC and EGRV solenoids are capable of accurately controlling the EGR flow through all models.



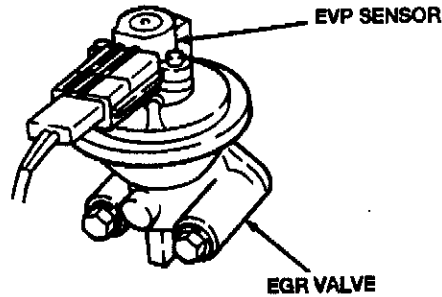
Item	Description
1	Port to air cleaner
2	EGR Vent Solenoid
3	Interconnecting Hose Port to EGRC
4	Vacuum Port to EGR Valve
5	EGR Control Solenoid
6	Interconnecting Hose Port to EGRV
7	Vacuum Supply Port

Exhaust Gas Recirculation (EGR) Systems

Description and Operation

Exhaust Gas Recirculation (EGR) Valve

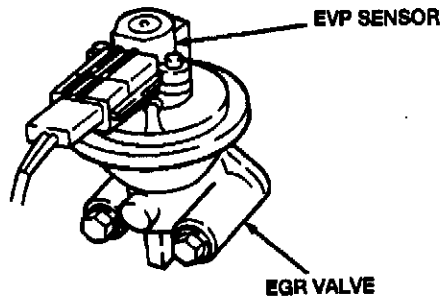
The Exhaust Gas Recirculation (EGR) valve recirculates portions of the exhaust back into the engine to reduce the amount of nitrogen released during combustion, and to reduce the combustion temperature. The amount of exhaust gases that are released into the engine is proportional to the load on the engine.



Engine Location	RH side of the engine below the intake manifold
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Exhaust Gas Recirculation Valve Position (EVP) Sensor

The Exhaust Gas Recirculation Valve Position (EVP) Sensor provides information to the Power-train Control Module (PCM) reflecting the Exhaust Gas Recirculation (EGR) valve position. There are two purposes of the EVP sensor. The sensor indicates the amount of exhaust gases flowing into the engine by monitoring the EGR valve movement and also notifies the PCM of electrical failure in the EVP sensor.



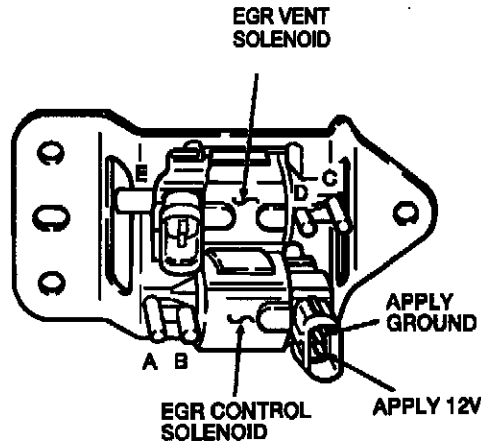
Engine Location	Mounted to the top of the EGR Valve
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Exhaust Gas Recirculation (EGR) Systems

Diagnosis and Testing

Pinpoint Tests

TEST STEP	RESULT	ACTION TO TAKE
EGR 1 Check EGR Control Solenoid <ul style="list-style-type: none">• Key OFF.• Disconnect the Exhaust Gas Recirculation Control (EGRC) Solenoid• Attach a hose to port A and blow into it to verify that air does not flow through to port B.• Apply 12 volts and ground to the EGRC solenoid as shown below.• Attach a hose to port A and blow into it to verify that air flows through port B Does The EGRC solenoid function properly?	Yes NO	Go to EGR 2. REPLACE the EGRC Solenoid.

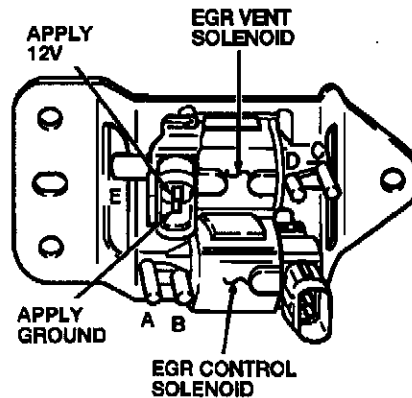


Exhaust Gas Recirculation (EGR) Systems

Diagnosis and Testing

Pinpoint Tests

TEST STEP	RESULT	ACTION TO TAKE
EGR 2 Check EGR Control Solenoid <ul style="list-style-type: none">• Key OFF.• Disconnect the Exhaust Gas Recirculation Vent (EGRV) Solenoid.• Block Port D.• Attach a hose to Port C and blow into it to verify that air does not flow through to Port E.• Apply 12 volts and ground to the EGRV solenoid as shown below.• Attach a hose to Port C and blow into it to verify that air flows through Port E. Does The EGRV solenoid function properly?	Yes NO	Go to EGR 3. REPLACE the EGRC Solenoid.



Exhaust Gas Recirculation (EGR) Systems

Diagnosis and Testing

Pinpoint Tests

TEST STEP	RESULT	ACTION TO TAKE
<p>EGR 3 Check EGR Control Solenoid</p> <ul style="list-style-type: none">• Run the engine until normal operating temperature is reached.• Key OFF.• Connect a Rotunda Vacuum Tester 021-00037 or equivalent to the Exhaust Gas Recirculation (EGR) valve vacuum source port as shown below.• Key ON, engine running.• Idle the engine.• Verify the engine runs rough when applied vacuum reaches the specified value, or the engine stalls at a higher vacuum (refer to General Specifications chart at the end of the section). <p>Does The EGR valve function properly? NOTE: For diagnosis of the EGR Valve Position (EVP) sensor refers to the EEC Pinpoint Tests, Section 6.</p>	<p>Yes</p> <p>NO</p>	<p>RETURN to the Diagnostic Routines.</p> <p>REPLACE the EGR valve.</p>

