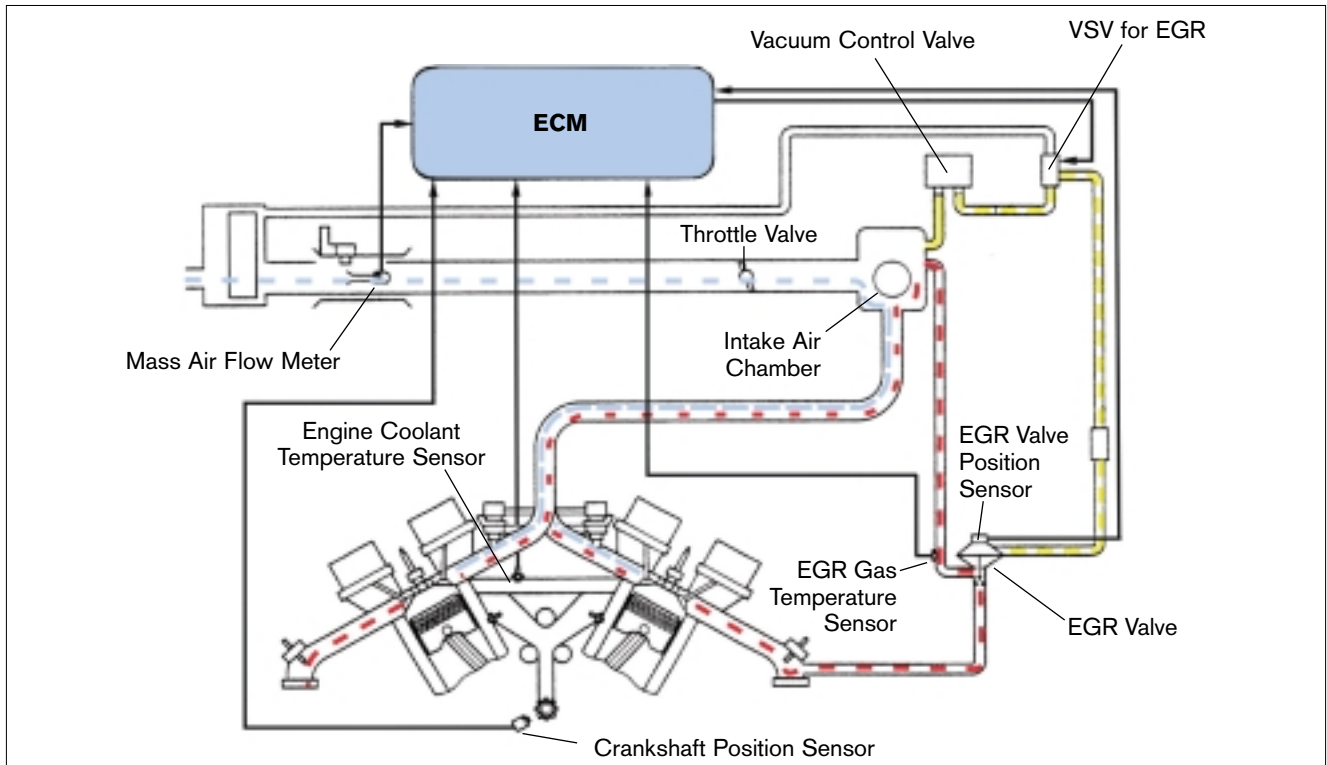


Exhaust Gas Recirculation (EGR) System Diagnosis



1. Determine the condition of the EGR system based on OBD II data and monitors and engine symptoms.
2. Describe the different types of EGR monitors.

Exhaust Gas Recirculation (EGR) System Diagnosis

Basic EGR System

Exhaust gases are directed to the intake manifold to lower oxides of nitrogen emissions.

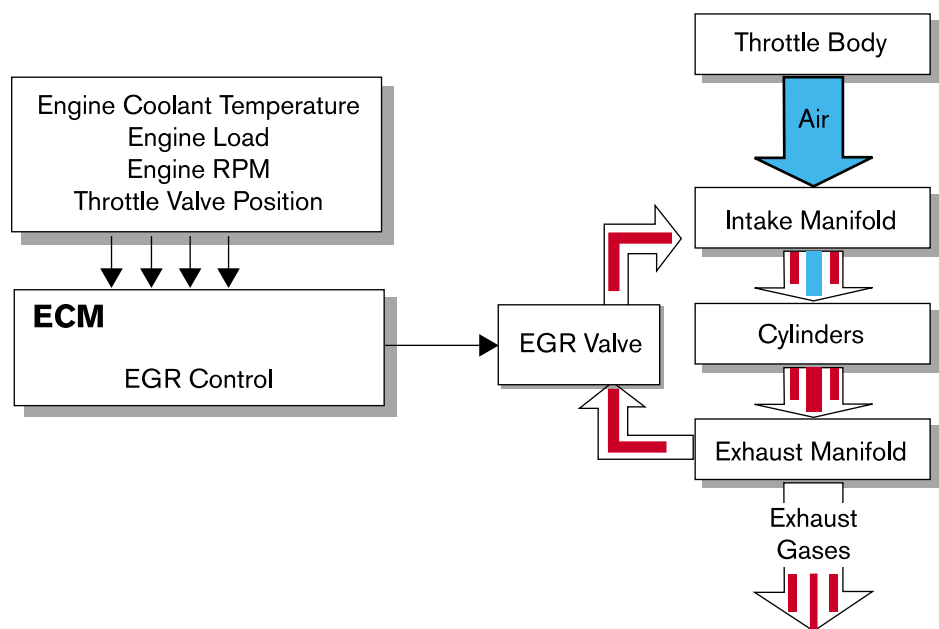


Fig. 9-1

TL874901

Overview

Though the EGR system is used for knock control and to control oxides of nitrogen emissions, the EGR system is monitored because a failure in this system will affect hydrocarbon emissions.

Exhaust Gas Recirculation (EGR) System Monitors

The EGR monitor is designed to detect insufficient or excessive EGR flow and component performance. When the EGR valve is open, the ECM confirms that exhaust gas is flowing. When the EGR valve is shut off, the ECM confirms exhaust gas flow has stopped. The sensors are also monitored for open, shorts, and performance. There are three types of detection methods are:

- EGR temperature detection method
- EGR MAP detection method
- EGR valve position/temperature detection method

The method of detection can be determined by the type of sensors used.

EGR Monitor P0401, P0402

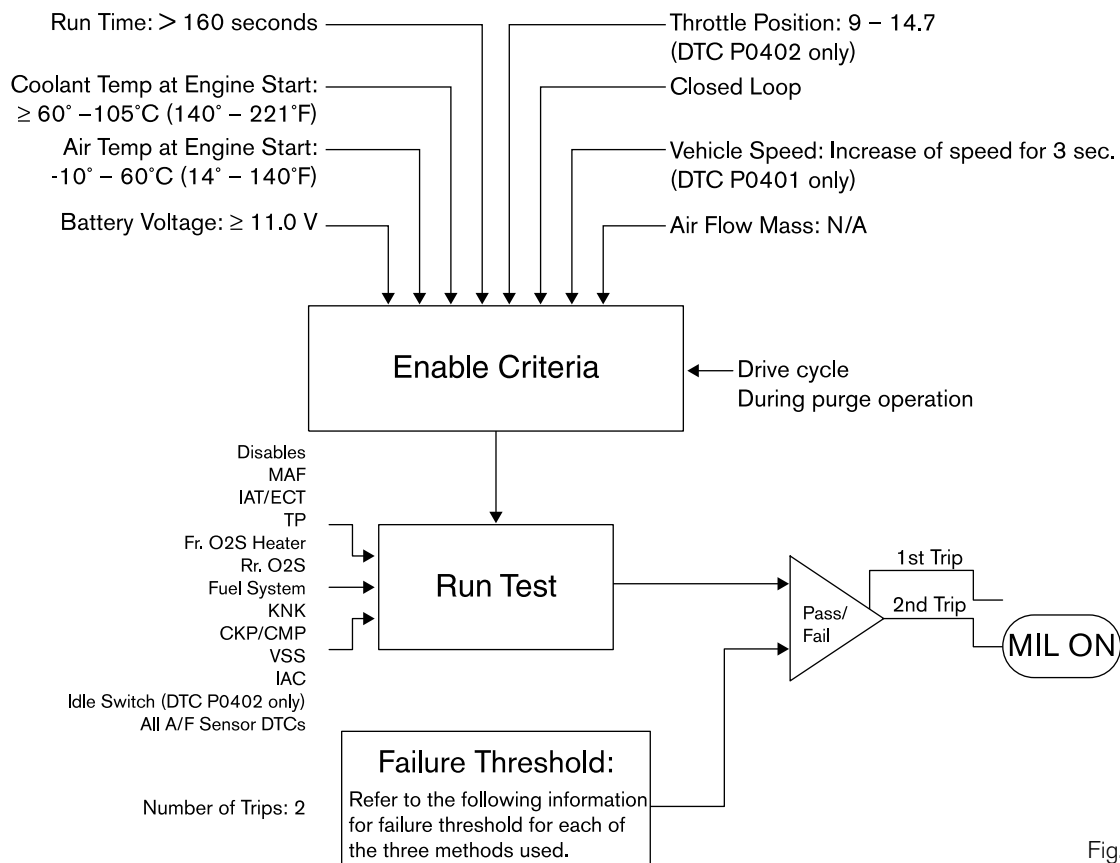


Fig. 9-2

TL874f902

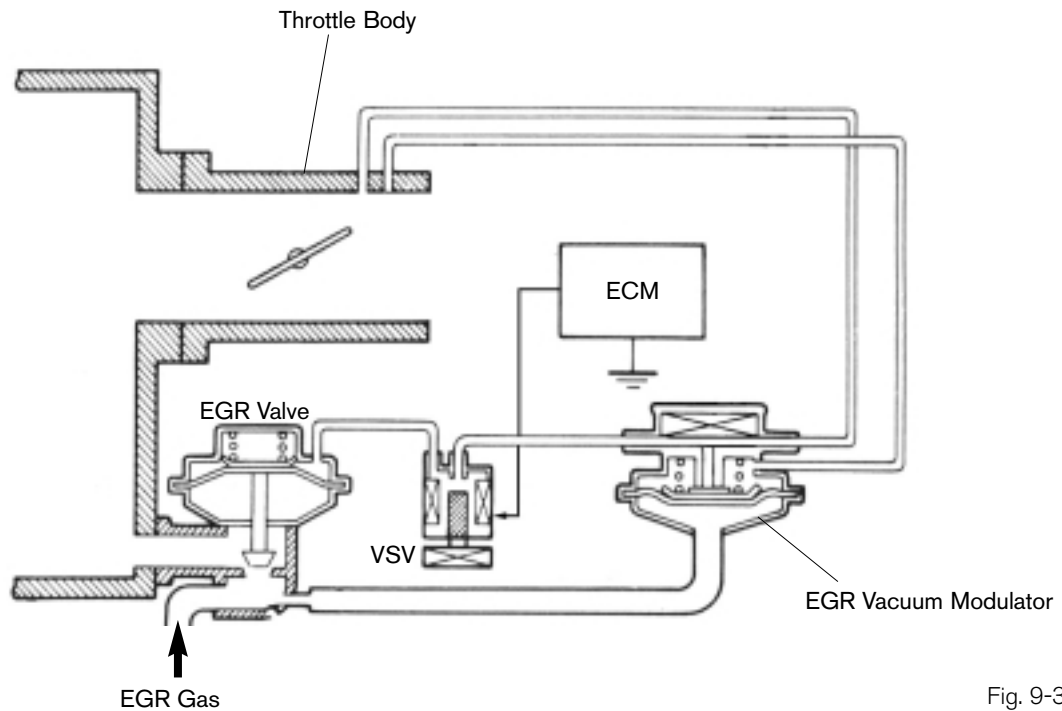
Cutoff Control EGR System

Fig. 9-3
T874903

EGR Temperature Detection Method This method is used on the VSV Cut-off Control EGR System. An EGR temperature sensor is installed in the EGR passageway. During normal EGR flow, the temperature of the EGR temperature sensor will rise at least 35°C (95°F) above ambient air temperature.

P0401: Insufficient Flow When the EGR valve is open, the ECM compares EGR temperature to intake air temperature. If the temperature does not rise a specified amount over ambient temperature, the ECM assumes there is a problem in the system, and this information is stored in the ECM. If the problem occurs on the second trip, DTC P0401 will set and the MIL will turn on.

P0402: Excessive Flow When the EGR is off, the ECM measures EGR temperature. If the EGR is open, the EGR temperature will be higher than expected. If the problem occurs on the second trip, DTC P0402 will set and the MIL will turn on.

EGR MAP Detection Method

This method is used on the VSV Cut-off Control EGR System on engines equipped with a MAP Sensor. The MAP sensor is used for EGR flow detection, therefore this system does not include an EGR temperature sensor. When the EGR valve is open intake manifold pressure rises (loss of vacuum). The MAP sensor detects this increase in manifold pressure.

P0401: Insufficient Flow With the EGR on, if the MAP signal is not higher than the calculated value this condition would indicate a restriction in the EGR exhaust passage.

P0402: Excessive Flow With EGR off, if the MAP signal is higher than the calculated value, this condition would indicate an open EGR valve. At idle, if MAP is higher than expected and there is a misfire, DTC P0402 will set on the second trip.

Constant Vacuum EGR

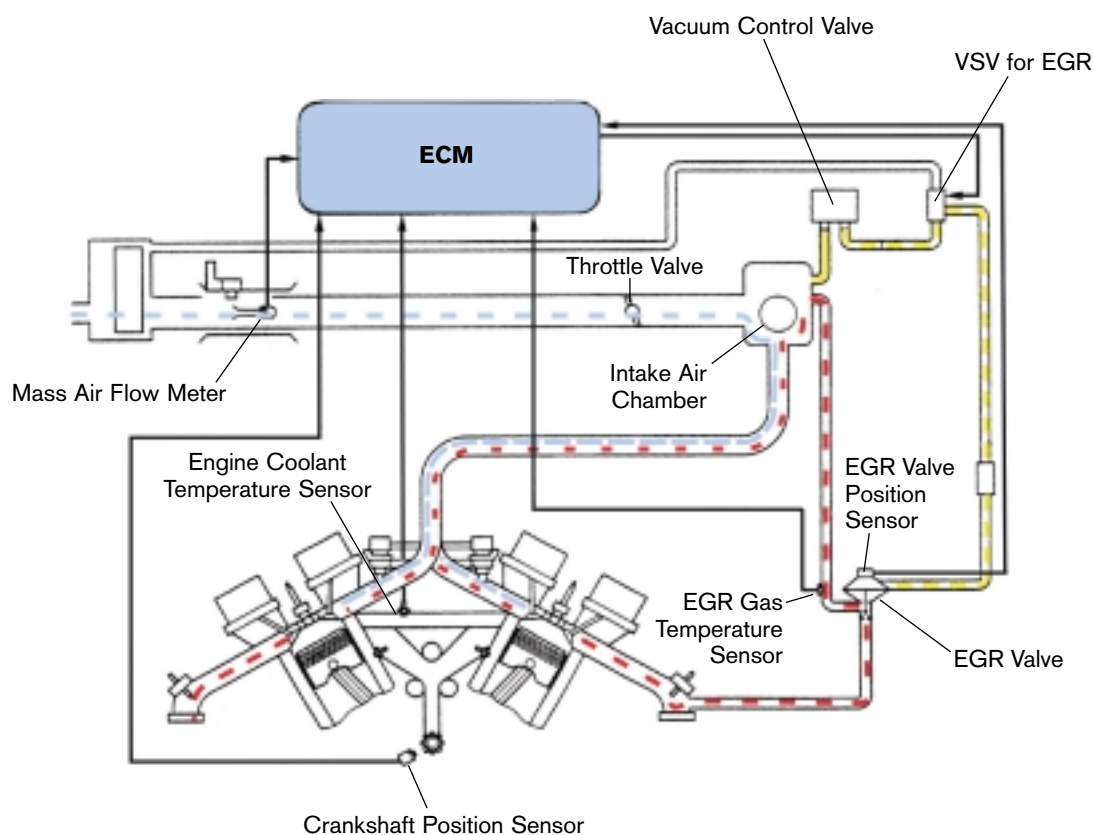


Fig. 9-4

T874904

EGR Valve Position/ Temperature Detection Method	This method uses a temperature sensor for insufficient EGR flow and an EGR Valve Position sensor for excessive EGR flow on the Constant Vacuum EGR system.
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P0401: Insufficient Flow When the EGR valve is open, the ECM compares EGR temperature to intake air temperature. If the temperature does not rise a specified amount over ambient temperature, the ECM assumes there is a problem in the system, and this information is stored in the ECM. If the problem occurs on the second trip, DTC P0401 will set and the MIL will turn on.

P0402: Excessive Flow The ECM uses the EGR valve height position sensor to detect excessive flow. When the EGR is off and the sensor signal is greater than the specification stored in the ECM, the ECM assumes the EGR valve did not close. If the problem occurs on the second trip, DTC P0402 will set and will turn the MIL on.



Notes



WORKSHEET 9-1 EGR Monitor

Vehicle	Year/Prod. Date	Engine	Transmission

Worksheet Objectives

Investigate how the ECM monitors the EGR system based on OBD II data and monitors and engine symptoms. Determine when the EGR system is not working properly.

Tools and Equipment

- Repair Manual
- Vehicle EWD
- Diagnostic Tester
- DVOM
- Hand Tool Set with Vacuum Pump

SECTION 1 EGR Cut-off Control System/ EGR Temperature Detection System P0401/P0402

1. Disconnect EGR valve vacuum hose, and connect a handheld vacuum pump.
2. Connect Diagnostic Tester, go to the DATA LIST, EGR TEMPERATURE SENSOR.

Record EGR Temperature signal: _____

3. Start the engine, and bring the engine to operating temperature.

Record EGR Temperature signal: _____

4. Apply vacuum to the EGR valve so that the engine starts to misfire. Raise engine RPM to 1000 RPM.

What is happening to the EGR temp?

5. After 3 minutes, disconnect vacuum pump.

What is happening to the EGR temp?

6. How does ECM know the EGR valve failed to open?

7. How does ECM know the EGR valve failed to close?

SECTION 2 EGR Cut-off Control System/ MAP detection system P0401/P0402

1. Disconnect EGR valve vacuum hose, and connect a handheld vacuum pump.

2. Connect Diagnostic Tester, go to DATA LIST, MAP SENSOR.

Record MAP sensor signal: _____

3. Start the engine, and bring the engine to operating temperature.

4. Apply vacuum to the EGR valve so that the engine starts to misfire.

What happened to the MAP sensor signal?

Did intake manifold pressure increase or decrease?

6. Remove vacuum from the EGR valve.

What happened to the MAP sensor signal?

Did intake manifold pressure increase or decrease?

7. How does ECM know the EGR valve failed to open?

8. How does ECM know the EGR valve failed to close?

SECTION 3: Constant Vacuum EGR Detection System P0401/P0402

1. Disconnect EGR valve vacuum hose, and connect a handheld vacuum pump.
2. Connect Diagnostic Tester, go to dATA LIST, EGR POSITION SENSOR and EGR TEMPERATURE SENSOR.

Record EGR Position Sensor and EGR Temperature Sensor signal: _____

3. Apply vacuum according to the chart below and record EGR Position Sensor at each point.

<u>0</u> in. Hg	<u>1.0</u> in. Hg	<u>1.5</u> in. Hg	<u>2.0</u> in. Hg

What happened to the EGR Position Sensor signal?

- _____
4. Remove vacuum.
 5. Start the engine and bring it to operating temperature.

Record EGR Position Sensor signal: _____

6. Apply vacuum to the EGR valve so that the engine starts to misfire.

Record EGR Position Sensor and EGR Temperature Sensor signal: _____

7. Remove vacuum from the EGR valve. Did the EGR Position Sensor return to its original position?

- _____
8. What sensor does this system use to detect if the EGR valve opened?

- _____
9. How does ECM know the EGR valve failed to open?

- _____
10. What sensor does this system use to detect if the EGR valve closed?

- _____
11. How does ECM know the EGR valve failed to close?

SECTION 4

1. List three items that could prevent the EGR flow in a Cut-Off Control System.

2. List three items that could cause excessive EGR flow in a Cut-off Control System

3. List three items that could prevent the EGR valve in a Constant Control Vacuum System from opening.

4. List three items that could prevent the EGR valve in a Constant Control Vacuum System from closing.

5. How will you know if the EGR monitor passed or failed in one trip?

6. How many trips will it take for P0401/P0402 DTCs to set?

7. Will DTCs P0401/P0402 set a Freeze Frame?

EGR Monitor

Name: _____ Date: _____

Review this sheet as you are doing the worksheet. Check each category after completing the worksheet and instructor presentation. Ask the instructor if you have questions. The comments section is for you to write where to find the information, questions, etc.

I have questions

I know I can

Topic

Comment

Locate components using the EWD and RM			
Find wire colors, pin numbers using the EWD and RM			
Set the conditions for the test			
Determine of the condition of the EGR system by using Readiness Tests			
Describe the different types of EGR monitors			
Test EGR Valve Position Sensor and compare to specs. to determine condition			