DIAGNOSTIC TROUBLE CODE (DTC) P0440

EVAPORATIVE EMISSION SYSTEM LARGE LEAK/LOW TANK VACUUM

Circuit Description

The Evaporative (EVAP) Emission system includes the following components:

- Fuel tank.
- EVAP Emission vent solenoid.
- Fuel tank pressure sensor.
- Fuel pipes and hoses.
- Fuel vapor lines.
- Fuel cap.
- EVAP Emission canister.
- Purge lines.
- EVAP Emission canister purge valve.
- EVAP Emission service port.

The EVAP emission system is checked by applying vacuum to the EVAP emission system and monitoring for a vacuum decay. The powertrain control module (PCM)/engine control module (ECM) monitors the vacuum level through the fuel tank pressure sensor signal.

At the appropriate time, the EVAP emission canister purge valve and the EVAP emission vent solenoid are turned ON, allowing the engine to draw a small vacuum on the entire evaporative emission system. After the desired vacuum level has been achieved, the EVAP emission canister purge valve is turned OFF, sealing the system. If a sufficient vacuum level cannot be achieved, a large leak is indicated. This can be caused by the following conditions:

- Missing or faulty fuel cap
- Disconnected or faulty fuel tank pressure sensor
- Disconnected, damaged, pinched, or blocked EVAP emission purge line
- Disconnected or faulty EVAP emission canister purge valve
- Disconnected or faulty EVAP emission vent solenoid
- Open ignition feed circuit to the EVAP emission vent or purge solenoid
- Damaged EVAP emission canister
- Leaking fuel sender assembly O–ring
- Leaking fuel tank or fuel filler beck

Any of the above conditions can set DTC P0440.

The test is failed if the tank vacuum is less than 10 in H2O for 15 seconds and the manifold vacuum integral is greater than 49152 (proportional to purge mass from the tank).

Conditions for Setting the DTC

- DTC(s) P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0121, P0122, P0123, P0131, P0132, P0133, P0134, P0135, P0137, P0138, P0140, P0141, P0201, P0202, P0203, P0204, P0300, P0402, P0404, P0405, P0406, P0443, P0449, P0452, P0453, P0506, P0507, P1130, P1133, P1134, P1627, P1640 will not set.
- Intake Air Temperature (IAT) is between 4˚C and 34˚C (39˚F and 93˚F) at engine start up.
- Engine Coolant Temperature (ECT) is between 4˚C and 34˚C (39˚F and 93˚F) at engine start up.
- Barometric Pressure (BARO) is greater than 68 kPa.
- IAT is not more than 8˚C (46˚F) greater than the ECT at start up.
- BARO is greater than 68 kPa.
- Fuel tank level is between 10% and 90%.
- The Throttle Position (TP) sensor is less than or equal to 100%.
- No fuel slosh and the change in fuel level percent is 21 counts in 0.125 sec.
- Manifold vacuum is greater than or equal to 10 kPa.
- Fuel level or change in tank pressure is less than or equal to 24.9 in H2O.
- System voltage is between 11 volts and 16 volts.
- The EVAP emission system is unable to achieve or maintain vacuum during the diagnostic test. The amount of decay will vary within the fuel level.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will illuminate.
- The PCM/ECM will record operating conditions at the time the diagnostic fails. This information will be stored in the Freeze Frame and Failure Records buffers.
- A history DTC is stored.
- Coolant fan turns on.

Conditions for Clearing the MIL/DTC

- The MIL will turn off after three consecutive ignition cycles in which the diagnostic runs without a fault.
- A history DTC will clear after 80 consecutive warm–up cycles without a fault.
- DTC(s) can be cleared with battery disconnect.

Diagnostic Aids

Although this DTC is considered a type A diagnostic, it acts like a type B diagnostic under certain conditions. Whenever this diagnostic reports the system has passed, or if the battery is disconnected, the diagnostic must fail twice before setting a DTC. The initial failure is not reported to the diagnostic executive or displayed on a scan tool. A passing system always reports to the diagnostic executive immediately.

Check for the following conditions:

- Missing or damaged fuel cap.

- Missing or damaged O–rings at fuel vapor and EVAP emission purge line canister fittings.
- Cracked or punctured EVAP emission canister.
- Damaged source vacuum line, EVAP emission purge line, EVAP emission vent hose or fuel tank vapor line.
- Poor connection at PCM/ECM. Inspect harness connectors for the following conditions:
  - Backed–out terminals
  - Improper mating
  - Broken locks
  - Improperly formed
  - Damaged terminals
  - Poor terminal–to–wire connection
- Damaged harness. Inspect the wiring harness to the EVAP emission vent solenoid, EVAP emission canister purge valve, and the fuel tank pressure sensor for an intermittent open or short circuit.
- Kinked, pinched or plugged vacuum source, EVAP emission purge, or fuel tank vapor line. Verify that the lines are not restricted.

Test Description

Number(s) below refer to the step number(s) on the Diagnostic Table.

1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
3. If a vent solenoid or an EVAP emission canister purge valve electrical malfunction is present, the purge system will not operate correctly. Repairing the electrical malfunction will very likely correct the condition that set DTC P0440.
4. Checks the fuel tank pressure sensor at ambient pressure.
6. Forces fuel tank pressure sensor to re–zero.
7. Determines whether or not the EVAP emission system is sealed sufficiently to be pressurized. If not, the large leak must be located and corrected before continuing with diagnosis.
8. Verifies that the fuel tank pressure sensor accurately reacts to EVAP emission system pressure changes.
11. Ensures that sufficient source vacuum is present at the EVAP emission canister purge valve.
12. Checks for a stuck closed EVAP emission canister purge valve.
19. Insures proper system integrity.

DTC P0440 Evaporative Emission System Large Leak/Low Tank Vacuum

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Visually/physically check the fuel cap for missing or loose conditions. 2. Replace or tighten the fuel cap if necessary. Is a loose or missing fuel cap found?		Go to *Step 19*	Go to *Step 3*
3	1. Install a scan tool. 2. Command the evaporative (EVAP) emission canister purge valve and vent solenoid ON and OFF with the scan tool. Does the purge valve and vent solenoid click when commanded ON and OFF?	0 in. H2O (±1 in. H2O)	Go to *Step 4*	Go to ”PCM/ECM Output Diagnosis”
4	1. Turn the ignition switch OFF. 2. Remove the fuel cap. 3. Turn the ignition switch ON. Is the Fuel Tank Pressure at the specified value?	0 in. H2O (±1 in. H2O)	Go to *Step 7*	Go to *Step 5*
5	Check the battery. Has the battery been disconnected?		Go to ”EVAP Control System Diagnosis”	Go to *Step 6*
6	Disconnect the battery. Is the action complete?		Go to *Step 4*	

Step	Action	Value(s)	Yes	No
7	**Important :** Before continuing with this diagnosis, zero the EVAP Emission Pressure and Vacuum gauges on the EVAP emission pressure/purge cart. Also read the temperature variation instruction card. 1. Reinstall the fuel cap. 2. Using the scan tool, command the EVAP emission vent solenoid ON (closed). 3. Connect an EVAP emission pressure/purge cart to the EVAP emission service port. 4. Attempt to pressurize the EVAP emission system to the specified value using an EVAP emission pressure/purge cart. (Monitor the pressure using the gauge on the cart with the switch in the HOLD position.) Can the specified value be achieved?	5 in. H2O (±2 in. H2O)	Go to *Step 8*	Go to *Step 9*
8	1. Maintain the fuel tank pressure at the specified value. 2. Observe the Fuel Tank Pressure on the scan tool. Is the Fuel Tank Pressure at the specified value?	5 in. H2O	Go to *Step 11*	Go to *Step 10*
9	1. Disconnect the fuel tank vapor line and the EVAP emission purge line from the EVAP emission canister. 2. Block the fuel tank vapor line fitting on the canister. 3. Connect a hand vacuum pump to the EVAP emission purge line fitting on the canister. 4. Ensure that the EVAP emission vent solenoid is still commanded ON (closed). 5. Attempt to apply vacuum to the canister. Can the specified vacuum be maintained?	5 in. Hg	Go to *Step 14*	Go to *Step 13*
10	1. Visually/physically check for the following conditions: • Restricted fuel tank vapor line. • Restricted EVAP emission purge line. 2. If a problem is found, repair as necessary. Is a repair necessary?		Go to *Step 19*	Go to ”EVAP Control System Diagnosis”
11	1. Disconnect the throttle body to EVAP emission canister purge valve vacuum hose from the EVAP emission canister purge valve. 2. Connect a hand vacuum pump to the EVAP emission canister purge valve vacuum source fitting. 3. Apply the specified amount of vacuum to the EVAP emission canister purge valve. 4. Command the EVAP emission purge ON, using the scan tool. Does the EVAP emission canister purge valve release the vacuum?	10 in. Hg (34 kPa)	Go to *Step 12*	Go to *Step 16*

Step	Action	Value(s)	Yes	No
12	1. Connect the Hg vacuum gauge on the EVAP pressure/purge cart of the vacuum source. 2. Start the engine. 3. Stabilize the engine rpm near the specified valve. 4. Momentarily snap the throttle open and then let the throttle return to idle. Does the vacuum gauge read greater than the specified value when the throttle was snapped open then close?	2500 rpm 10 in. Hg	Go to ”Diagnostic Aids”	Go to *Step 17*
13	1. Visually/physically check for the following conditions: • Vent hose disconnected or damaged. • EVAP emission canister damaged. 2. If a problem is found, repair as necessary. Is a repair necessary?		Go to *Step 19*	Go to *Step 18*
14	1. Visually/physically check for the following conditions: • Malfunctioning fuel cap. • Leaking fuel tank vapor line. • Damaged EVAP emission purge line. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 19*	Go to *Step 15*
15	1. Using the scan tool, command the EVAP emission vent solenoid ON. 2. With the cart connected to the EVAP emission service port continuously attempt to pressurize the EVAP emission system by leaving the cart control knob in the pressurized position. 3. Using the ultrasonic leak detector, locate and repair the leak in the EVAP emission system (it may be necessary to partially lower the fuel tank to examine the top tank connections). Is the repair complete?		Go to *Step 19*	
16	Replace the EVAP emission canister purge valve. Is the repair complete?		Go to *Step 19*	
17	Locate and repair the cause of no source vacuum to the EVAP emission canister purge valve. Is the repair complete?		Go to *Step 19*	

Step	Action	Value(s)	Yes	No
18	Replace the EVAP emission vent solenoid. Is the repair complete?		Go to *Step 19*	
19	**Important :** Review the temperature variation instructions included with the purge cart before performing this step. 1. Turn the ignition switch ON, with the engine OFF. 2. Using the scan tool, command the EVAP emission vent solenoid ON (closed). 3. Pressurize the EVAP emission system to the specified value using an EVAP emission pressure/purge cart. (Monitor the pressure using the gauge on the cart.) 4. Switch the rotary switch on the cart to HOLD and observe the EVAP emission pressure gauge. Does the pressure decrease to less than the specified value within 2 minutes?	15 in. H2O 10 in. H2O	System OK	Go to *Step 2*

DIAGNOSTIC TROUBLE CODE (DTC) P0442

EVAPORATIVE EMISSION SYSTEM SMALL LEAK

Circuit Description

The evaporative (EVAP) emission system includes the following components:

- Fuel tank.
- EVAP emission vent solenoid.
- Fuel tank pressure sensor.
- Fuel pipes and hoses.
- Fuel vapor lines.
- Fuel cap.
- EVAP emission canister.
- Purge lines.
- EVAP emission canister purge valve.
- EVAP emission service port.

The EVAP emission system is checked by applying vacuum to the EVAP emission system and monitoring for a vacuum decay. The powertrain control module (PCM)/engine control module (ECM) monitors the vacuum level through the fuel tank pressure sensor signal.

At the appropriate time, the EVAP emission canister purge valve and the EVAP emission vent solenoid are turned ON, allowing the engine to draw a small vacuum on the entire evaporative emission system. After the desired vacuum level has been achieved, the EVAP emission canister purge valve is turned OFF, sealing the system. A leak is detected by monitoring for a decrease in the vacuum level over a given time period, when all other variables remain constant. A small leak in the system will cause DTC P0442 to be set.

Conditions for Setting the DTC

- DTC(s) P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0121, P0122, P0123, P0131, P0132, P0133, P0134, P0135, P0137, P0138, P0140, P0141, P0201, P0202, P0203, P0204, P0300, P0402, P0404, P0405, P0406, P0443, P0449, P0452, P0453, P0506, P0507, P1130, P1133, P1134, P1627 and P1640 will not set.
- Intake air temperature (IAT) is between 4˚C and 34˚C (39˚F and 93˚F) at engine start up.
- Engine Coolant Temperature (ECT) is between 4˚C and 34˚C (39˚F and 93˚F) at engine start up.
- Barometric Pressure (BARO) is greater than 68 kPa.
- ECT is not more then 7˚C (12˚F) greater than the intake at temperature at start up.
- Vehicle speed is less than or equal to 90 mph.
- Fuel tank level is between 10% and 90%.
- The Throttle Position (TP) sensor is less than or equal to 100%.
- The change in fuel tank pressure is less than or equal to 24.9 in H2O.
- The vapor pressure slope is less than or equal to 0.061 in H2O/sec.
- System voltage is between 11 volt and 16 volt.
- No fuel slosh and the change in fuel level percent is 21 counts in 0.125 sec.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will illuminate.
- The PCM/ECM will record operating conditions at the time the diagnostic fails. This information will be stored in the Freeze Frame and Failure Records buffers.
- A history DTC is stored.
- Coolant fan turns on.

Conditions for Clearing the MIL/DTC

- The MIL will turn off after three consecutive ignition cycles in which the diagnostic runs without a fault.
- A history DTC will clear after 80 consecutive warm–up cycles without a fault.
- DTC(s) can be cleared by using the scan tool.

Diagnostic Aids

Although this DTC is considered a type A diagnostic (refer to ”Powertrain Control Module/Engine Control Module” in this section), it acts like a type B diagnostic under certain conditions. Whenever this diagnostic reports the system has passed, or if the battery is disconnected, the diagnostic must fail twice before setting a DTC. The initial failure is not reported to the diagnostic executive or displayed on a scan tool. A passing system always reports to the diagnostic executive immediately.

Check for the following conditions:

- Missing or damaged O–rings at fuel vapor and EVAP emission purge line canister fittings.
- Cracked or punctured EVAP emission canister.
- Damaged source vacuum line, EVAP emission purge line, EVAP emission vent hose or fuel tank vapor line.
- Poor connection at PCM/ECM. Inspect harness connectors for the following conditions:
  - Backed–out terminals
  - Improper mating
  - Broken locks
  - Improperly formed
  - Damaged terminals
  - Poor terminal–to–wire connection
- Damaged harness. Inspect the wiring harness to the EVAP emission vent solenoid EVAP emission canister purge valve and the fuel tank pressure sensor for an intermittent open or short circuit.

Test Description

Number(s) below refer to the step number(s) on the Diagnostic Table.

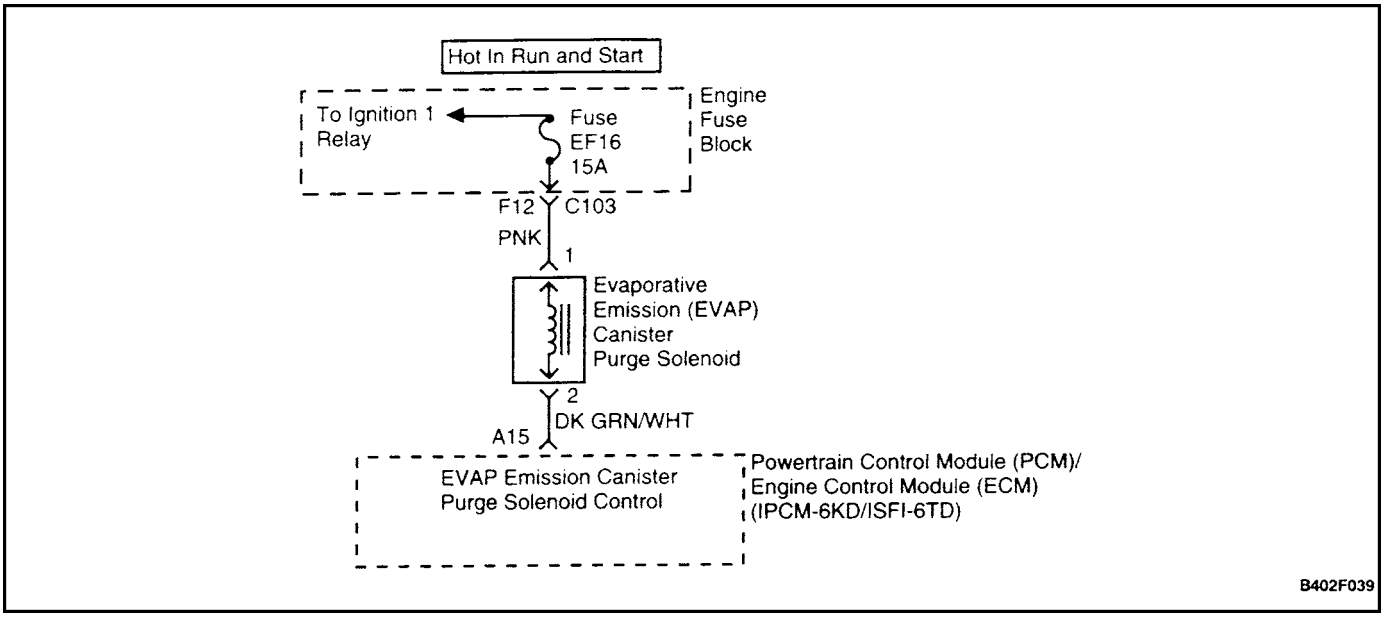
1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
2. If a vent solenoid or EVAP emission canister purge valve electrical malfunction is present, the purge system will not operate correctly. Repairing the electrical malfunction will very likely correct the condition that set DTC P0442.
3. Checks the fuel tank pressure sensor at ambient pressure.
5. Forces the fuel tank pressure sensor to re–zero.
5. Verifies that the fuel tank pressure sensor accurately reacts to EVAP emission system pressure changes.

DTC P0442 Evaporative Emission System Small Leak

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Install a scan tool. 2. Command the EVAP emission canister purge valve and vent solenoid ON and OFF with the scan tool. Does the purge valve and vent solenoid click ON and OFF?		Go to *Step 3*	Go to *”PCM/ ECM Output Diagnosis”*
3	1. Turn the ignition switch OFF. 2. Remove the fuel cap. 3. Turn the ignition switch ON. Is the Fuel Tank Pressure at the specified value?	0 in. H2O (±1 in. H2O)	Go to *Step 6*	Go to *Step 4*
4	Check the battery. Has the battery been disconnected?		Go to *”EVAP Control System Diagnosis”*	Go to *Step 5*
5	Disconnect the battery. Is the action complete?		Go to *Step 3*	
6	**Important :** Before continuing with this diagnosis, zero the EVAP emission Pressure and Vacuum gauges on the EVAP emission pressure/purge cart. Also read the temperature variation instruction card. 1. Reinstall the fuel cap. 2. Using the scan tool, command the EVAP emission vent solenoid ON (closed). 3. Connect an EVAP emission pressure/purge cart to EVAP emission service port. 4. Pressurize the EVAP emission system to the specified value using the EVAP emission pressure/purge cart. (Monitor the pressure using the gauge an the cart with the switch in the HOLD position.) 5. Observe the Fuel Tank Pressure on the scan tool. Is the Fuel Tank Pressure at the specified value?	5 in. H2O (±2 in. H2O)	Go to *Step 7*	Go to ”EVAP Control System Diagnosis”

Step	Action	Value(s)	Yes	No
7	**Important :** Review the temperature variation instructions included with the purge cart before performing this step. 1. Turn the ignition switch ON, with the engine OFF. 2. Using the scan tool, command the EVAP emission vent solenoid ON (closed). 3. Pressurize the EVAP emission system to the specified value using the EVAP emission pressure/purge cart. (Monitor the pressure using the gauge on the cart.) 4. Switch the rotary switch on the cart to HOLD and observe the EVAP emission pressure gauge. Does the pressure decrease to less than the specified value within 2 minutes?	15 in. H2O 10 in. H2O	Go to *Step 8*	Go to ”Diagnostic Aids”
8	1. Disconnect the fuel tank vapor line and the EVAP emission purge line from the EVAP emission canister. 2. Block the fuel tank vapor line fitting on the canister. 3. Connect a hand vacuum pump to the EVAP emission purge line fitting on the canister. 4. Ensure that the EVAP emission vent solenoid is still commanded ON (closed). 5. Attempt to apply vacuum to the canister. Can the specified vacuum be maintained?	5 in. Hg	Go to *Step 11*	Go to *Step 9*
9	1. Visually/physically check for the following conditions: • Vent hose disconnected or damaged. • EVAP emission canister damaged. 2. If a problem is found, repair as necessary. Is a repair necessary?		Go to *Step 13*	Go to *Step 10*
10	Replace the EVAP emission vent solenoid. Is the action complete?		Go to *Step 13*	
11	1. Visually/physically check for the following conditions: • Malfunctioning fuel cap. • Leaking fuel tank vapor line. • Damaged EVAP emission purge line. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 13*	Go to *Step 10*

Step	Action	Value(s)	Yes	No
12	1. Using the scan tool, command the EVAP emission vent solenoid ON (closed). 2. With the EVAP emission pressure/purge cart connected to the EVAP emission system by leaving the cart control knob in the pressurized position. 3. Using an ultrasonic leak detector, locate and repair the leak in the EVAP emission system (it may be necessary to partially lower the fuel tank to examine the top tank connections). Is the repair complete?		Go to *Step 13*	
13	**Important :** Review the temperature variation instructions included with the purge cart before performing this step. 1. Turn the ignition switch ON, with the engine OFF. 2. Using the scan tool, command the EVAP emission vent solenoid ON (closed). 3. Pressurize the EVAP emission system to the specified value using the EVAP emission pressure/purge cart. (Monitor the pressure using the gauge on the cart.) 4. Switch the rotary switch on the cart to HOLD and observe the EVAP emission pressure gauge. Does the pressure decrease to less than the specified value within 2 minutes?	15 in. H2O 10 in. H2O	System OK	Go to *Step 2*



DIAGNOSTIC TROUBLE CODE (DTC) P0443

EVAPORATIVE EMISSION SYSTEM PURGE CONTROL CIRCUIT

System Description

The evaporative (EVAP) emission system includes the following components:

- Fuel tank.
- EVAP emission vent solenoid.
- Fuel tank pressure sensor.
- Fuel pipes and hoses.
- Fuel vapor lines.
- Fuel cap.
- EVAP emission canister.
- Purge lines.
- EVAP emission canister purge valve.
- EVAP emission service port.

The EVAP emission system is checked by applying vacuum to the EVAP emission system and monitoring for a vacuum decay. The powertrain control module (PCM)/engine control module (ECM) monitors the vacuum level through the fuel tank pressure sensor signal.

At the appropriate time, the EVAP emission canister purge valve and the EVAP emission vent solenoid are turned ON, allowing the engine to draw a small vacuum on the entire evaporative emission system. After the desired vacuum level has been achieved, the EVAP emission canister purge valve is turned OFF, sealing the system.

Conditions for Setting the DTC

- Ignition ON.
- Ignition voltage is greater than 10 volts.
- Engine run time is greater than 5 sec.
- The PCM/ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will illuminate on the second consecutive drive trip that the diagnostic runs and fails.
- The PCM/ECM will record operating conditions at the time the diagnostic fails. This information will be stored in the Freeze Frame and Failure Records buffers.
- A history DTC is stored.

Conditions for Clearing the MIL/DTC

- The MIL will turn off after three consecutive ignition cycles in which the diagnostic runs without a fault.
- A history DTC will clear after 40 consecutive warm–up cycles without a fault.
- DTC(s) can be cleared by disconnecting the battery.
- Using a scan tool.

Diagnostic Aids

Using Freeze Frame and/or Failure Records data may aid in locating an intermittent condition. If the DTC cannot be duplicated, the information included in the Freeze Frame and/or Failure Records data can be useful in determining how many miles since the DTC set. The Fail Counter and the Pass Counter can also be used to determine how many ignition cycles the diagnostic reported a pass and/or a fail. Operate the vehicle within the same freeze frame conditions (rpm, load, vehicle speed, temperature, etc.) that were noted. This will isolate when the DTC failed.

Test Description

Number(s) below refer to the step number(s) on the Diagnostic Table.

1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
2. Listen for an audible click when the solenoid operates. Be sure that both the ON and the OFF states are commanded. Repeat the commands as necessary.
3. This check can detect a partially shorted coil which would cause excessive current flow. Leaving the circuit energized for 2 minutes allows the coil to warm up. When warm, the coil may open (amps drop to 0), or short (amps go above 0.75).
13. If no trouble is found in the control circuit the connection at the PCM/ECM, the PCM/ECM may be faulty. However, this is an extremely unlikely failure. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.

DTC P0443 Evaporative Emission Purge Control Circuit

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Turn the ignition ON, engine OFF. 2. Install the scan tool. 3. Command the Purge Solenoid ON and OFF. Does the solenoid turn ON and OFF with each command?		Go to *Step 3*	Go to *Step 5*
3	1. Turn the ignition OFF. 2. Disconnect the powertrain control module PCM)/engine control module (ECM) connector containing the solenoid control circuit (connector 1, red). 3. Turn the ignition ON. 4. Using a digital voltmeter (DVM) on a 10 amp scale, measure the current from the solenoid control circuit, at terminal A15 in the PCM/ECM harness connector to ground for 2 minutes. Does the current draw measure less than the specified value?	0.75 amps	Go to ”Diagnostic Aids”	Go to *Step 4*
4	1. Turn the ignition OFF. 2. Disconnect the solenoid. 3. Using a DVM, measure resistance from the solenoid control circuit, at terminal A15 in the PCM/ECM harness connector to ground. Does the DVM display infinite resistance?		Go to *Step 12*	Go to *Step 10*
5	1. Turn the ignition OFF. 2. Disconnect the solenoid. 3. Connect a test light between the terminals A and B in the solenoid harness connector. 4. Turn the ignition ON. 5. Using the scan tool , command the solenoid ON and OFF. Does the test light turn ON and OFF with each command?		Go to *Step 8*	Go to *Step 6*
6	With the test light connected to ground, probe the ignition feed circuit, at terminal A in the solenoid harness connector. Does the test light illuminate?		Go to *Step 7*	Go to *Step 11*

Step	Action	Value(s)	Yes	No
7	1. Turn the ignition OFF. 2. Reconnect the solenoid. 3. Disconnect the PCM/ECM connector containing the solenoid control circuit. 4. Turn the ignition ON. 5. With a fused jumper wire connected to ground, probe the solenoid control circuit, at terminal A15 in the PCM/ECM harness. Does the solenoid operate?		Go to *Step 9*	Go to *Step 10*
8	Check the connections at the solenoid. II a problem found and corrected?		Go to *Step 14*	Go to *Step 12*
9	Check the connections at the PCM/ECM. Is a problem found and corrected?		Go to *Step 14*	Go to *Step 13*
10	Repair the faulty solenoid control circuit. Is the repair complete?		Go to *Step 14*	
11	Repair the faulty solenoid ignition feed circuit. Is the repair complete?		Go to *Step 14*	
12	Replace the solenoid. Is the repair complete?		Go to *Step 14*	
13	Replace the PCM/ECM. Is the repair complete?		Go to *Step 14*	
14	1. Using the scan tool, clear the Diagnostic Trouble Codes (DTCs). 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 15*	Go to *Step 2*
15	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to applicable DTC table	System OK

DIAGNOSTIC TROUBLE CODE (DTC) P0446

EVAPORATIVE EMISSION SYSTEM VENT CONTROL MALFUNCTION

System Description

The evaporative (EVAP) emission system includes the following components:

- Fuel tank.
- EVAP emission vent solenoid.
- Fuel tank pressure sensor.
- Fuel pipes and hoses.
- Fuel vapor lines.
- Fuel cap.
- EVAP emission canister.
- Purge lines.
- EVAP emission canister purge valve.
- EVAP emission service port.

The evaporative emission system is checked by applying vacuum to the EVAP emission system and monitoring for a vacuum decay. The powertrain control module (PCM)/engine control module (ECM) monitors the vacuum level through the fuel tank pressure sensor signal.

At the appropriate time, the EVAP emission canister purge valve and the EVAP emission vent solenoid are turned ON, allowing the engine to draw a small vacuum on the entire evaporative emission system. After the desired vacuum level has been achieved, the EVAP emission canister purge valve is turned OFF, sealing the system.

A restricted or blocked EVAP emission canister vent path is detected by drawing a vacuum on the EVAP emission system, turning OFF the EVAP emission vent solenoid and the EVAP emission canister purge valve (EVAP emission vent solenoid Open, EVAP emission purge PWM 0%) and monitoring the fuel tank vacuum sensor input. With the EVAP emission vent solenoid open, any vacuum in the system should decrease quickly unless the vent path is blocked. A blockage can be caused by the following conditions:

- Faulty EVAP emission vent solenoid (stuck closed).
- Plugged kinked or pinched vent hose.
- Shorted EVAP emission vent solenoid driver circuit.
- Plugged evaporative canister.
- If any of these conditions are present, DTC P0446 will set.

Conditions for Setting the DTC

- DTC(s) P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0121, P0122, P0123, P0131, P0132, P0133, P0134, P0135, P0137, P0138, P0140, P0141, P0201, P0202, P0203, P0204, P0300, P0402, P0404, P0405, P0406, P0443, P0449, P0452, P0453, P0506, P0507, P1130, P1133, P01134, P1404, P1627, and P1640 will not set.
- The system voltage is between 11 volts and 16 volts.
- Tank vacuum is greater than 12 in H2O for 2 seconds.
- Intake air temperature (IAT) is between 4˚C and 32˚C (39˚F and 90˚F) at engine start up.
- Engine Coolant Temperature (ECT) is between 4˚C and 34˚C (39˚F and 93˚F) at engine start up.
- Barometric Pressure (BARO) is greater than 72.3 kPa.
- ECT is not more then 6.25_C (43_F) greater than the intake at temperature at start up.
- Fuel tank level is between 15% and 85%.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will illuminate.
- The PCM/ECM will record operating conditions at the time the diagnostic fails. This information will be stored in the Freeze Frame and Failure Records buffers.
- A history DTC is stored.
- Coolant fan turns on.

Conditions for Clearing the MIL/DTC

- The MIL will turn off after three consecutive ignition cycles in which the diagnostic runs without a fault.
- A history DTC will clear after 80 consecutive warm up cycles without a fault.
- DTC(s) can be cleared by disconnecting the battery.

Diagnostic Aids

Although this DTC is considered a type A diagnostic (refer to ”Powertrain Control Module/Engine Control Module” in this section), it acts like a type B diagnostic under certain conditions. Whenever this diagnostic reports the system has passed, or if the battery is disconnected, the diagnostic must fail twice before setting a DTC. The initial failure is not reported to the diagnostic executive or displayed on a scan tool. A passing system always reports to the diagnostic executive immediately.

Check for the following conditions:

- Poor connection at PCM/ECM. Inspect harness connectors for the following conditions:
  - Backed–out terminals
  - Improper mating
  - Broken locks
  - Improperly formed
  - Damaged terminals
  - Poor terminal–to–wire connection
- Damaged harness. Inspect the wiring harness to the EVAP emission vent solenoid and the fuel tank pressure sensor for an intermittent open or short circuit.

- Kinked, pinched, or plugged vent hose. Verify that the vent hose between the canister and the EVAP emission vent solenoid is not restricted.

Test Description

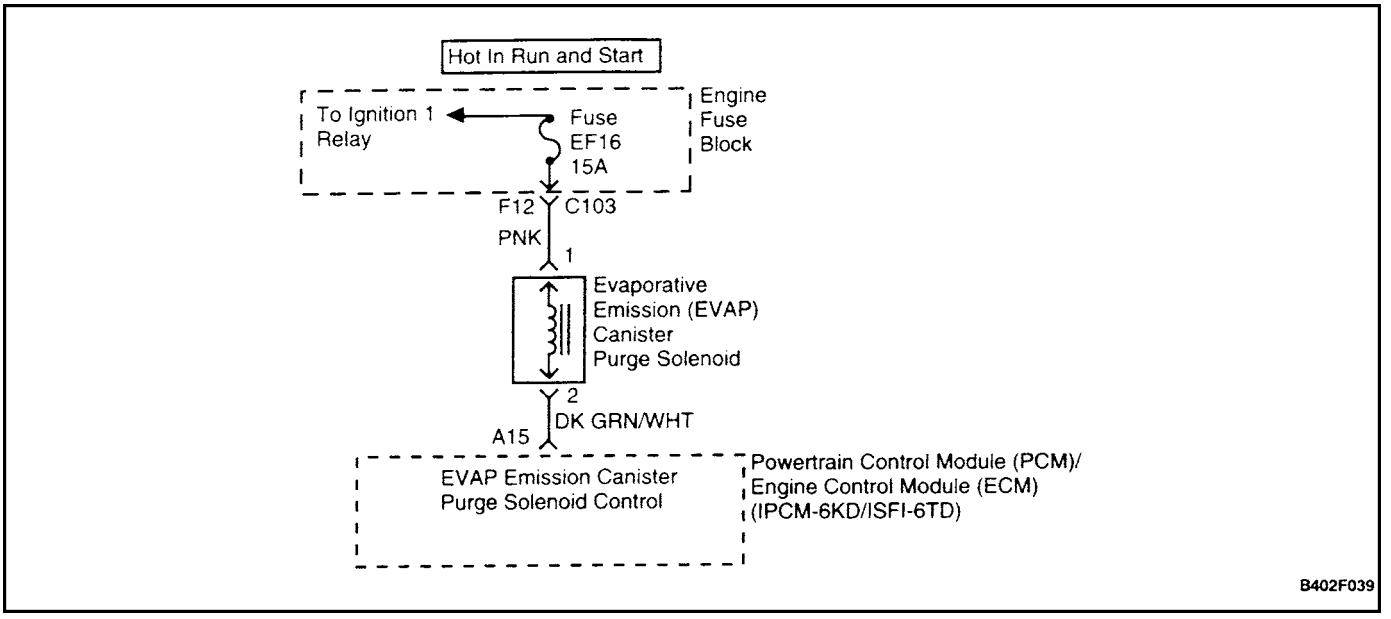
Number(s) below refer to the step number(s) on the Diagnostic Table.

1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
2. If a vent solenoid electrical malfunction is present, the purge system will not operate correctly. Repairing the electrical malfunction will very likely correct the condition that set DTC P0446.
3. Checks the fuel tank pressure sensor at ambient pressure.
5. Forces fuel tank pressure sensor to re–zero.
6. Verifies that the fuel tank pressure sensor accurately reacts to EVAP emission system pressure changes.
8. Checks for a blocked EVAP emission canister.
12. Duplicates the On–Board diagnostic test.

DTC P0446 Evaporative Emission System Vent Control Malfunction

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Install a scan tool. 2. Command the evaporative (EVAP) emission canister purge valve and vent solenoid ON and OFF with the scan tool. Does the purge valve and vent solenoid click ON and OFF?		Go to *Step 3*	Go to *”PCM/ ECM Output Diagnosis”*
3	1. Turn the ignition switch OFF. 2. Remove the fuel cap. 3. Turn the ignition switch ON. Is the Fuel Tank Pressure at the specified value?	0 in. H2O (±1 in. H2O)	Go to *Step 6*	Go to *Step 4*
4	Check the battery. Has the battery been disconnected?		Go to ”EVAP Control System Diagnosis”	Go to *Step 5*
5	Disconnect the battery. Is the action complete?		Go to *Step 3*	
6	**Important :** Before continuing with this diagnosis, zero the EVAP emission Pressure and Vacuum gauges on an EVAP emission pressure/purge cart. Also read the temperature variation instruction card. 1. Reinstall the fuel cap. 2. Using the scan tool, command the EVAP emission vent solenoid ON (closed). 3. Connect the EVAP emission pressure/purge cart to the EVAP emission service port. 4. Pressurize the EVAP emission system to the specified value using the EVAP emission pressure/purge cart. (Monitor the pressure using the gauge an the cart with the switch in the HOLD position.) 5. Observe the Fuel Tank Pressure on the scan tool. Is the Fuel Tank Pressure at the specified value?	5 in. H20	Go to *Step 7*	Go to ”EVAP Control System Diagnosis”

Step	Action	Value(s)	Yes	No
7	1. Maintain the specified EVAP emission pressure. 2. Using the scan tool, command the EVAP emission vent solenoid OFF (open) while observing the EVAP emission pressure gauge on the purge cart. Does the EVAP emission pressure return to the specified value within 5 seconds?	5 in. H2O	Go to "Diagnostic Aids"	Go to *Step 8*
8	1. Disconnect the large vent hose (marked air) from the EVAP emission canister. 2. Switch the rotary switch on the cart to PURGE. 3. Start the engine and allow the engine to reach operating temperature. 4. Observe the vacuum gauge for 5 seconds while holding the engine speed at the specified value. Does the vacuum remain below the specified value?	30 in. Hg 2500 rpm	Go to *Step 9*	Go to *Step 11*
9	1. Inspect the EVAP emission vent hose between the EVAP emission canister and the EVAP emission vent solenoid for being kinked, pinched, or otherwise blocked. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 12*	Go to *Step 10*
10	Replace the EVAP emission vent solenoid. Is the repair complete?		Go to *Step 12*	
11	Replace the EVAP emission canister. Is the repair complete?		Go to *Step 13*	
12	1. Using the scan tool, command the EVAP emission vent solenoid ON (closed). 2. Pressurize the EVAP emission system to the specified value. 3. Switch the rotary switch on the purge cart to HOLD. 4. Using the scan tool, command the EVAP emission vent solenoid OFF (open) while observing the EVAP emission pressure gauge on the purge cart. Does the EVAP emission pressure return to the specified value within 5 seconds?	5 in. H2O 0 in H2O	System OK	Go to *Step 2*



DIAGNOSTIC TROUBLE CODE (DTC) P0449

EVAPORATIVE EMISSION SYSTEM VENT SOLENOID CIRCUIT FAULT

System Description

The evaporative (EVAP) emission system includes the following components:

- Fuel tank.
- EVAP emission vent solenoid.
- Fuel tank pressure sensor.
- Fuel pipes and hoses.
- Fuel vapor lines.
- Fuel cap.
- EVAP emission canister.
- Purge lines.
- EVAP emission canister purge valve.
- EVAP emission service port.

The EVAP emission system is checked by applying vacuum to the EVAP emission system and monitoring for a vacuum decay. The powertrain control module (PCM)/engine control module (ECM) monitors the vacuum level through the fuel tank pressure sensor signal.

At the appropriate time, the EVAP emission canister purge valve and the EVAP emission vent solenoid are turned ON, allowing the engine to draw a small vacuum on the entire EVAP emission system. After the desired vacuum level has been achieved, the EVAP emission canister purge valve is turned OFF, sealing the system.

Conditions for Setting the DTC

- Ignition ON.
- Ignition voltage is greater than 10 v.
- Engine run time is greater than 5 seconds.
- The PCM/ECM detects that the commanded state of the driver and the actual state of the control circuit do not match.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will illuminate on the second consecutive drive trip that the diagnostic runs and fails.
- The PCM/ECM will record operating conditions at the time the diagnostic fails. This information will be stored in the Freeze Frame and Failure Records buffers.
- A history Diagnostic Trouble Code (DTC) is stored.

Conditions for Clearing the MIL/DTC

- The MIL will turn off after three consecutive ignition cycles in which the diagnostic runs without a fault.
- A history DTC will clear after 40 consecutive warm–up cycles without a fault.
- DTC(s) can be cleared by disconnecting the battery.
- Using a scan tool.

Diagnostic Aids

Using Freeze Frame and/or Failure Records data may aid in locating an intermittent condition. If the DTC cannot be duplicated, the information included in the Freeze Frame and/or Failure Records data can be useful in determining how many miles since the DTC set. The Fail Counter and the Pass Counter can also be used to determine how many ignition cycles the diagnostic reported a pass and/or a fail. Operate the vehicle within the same freeze frame conditions (rpm, load, vehicle speed, temperature, etc.) that were noted. This will isolate when the DTC failed.

Test Description

Number(s) below refer to the step number(s) on the Diagnostic Table.

1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
2. Listen for an audible click when the solenoid operates. Be sure that both the ON and the OFF states are commanded. Repeat the commands as necessary.
3. This check can detect a partially shorted coil which would cause excessive current flow. Leaving the circuit energized for 2 minutes allows the coil to warm up. When warm, the coil may open (amps drop to 0), or short (amps go above 0.75).
13. If no trouble is found in the control circuit the connection at the PCM/ECM, the PCM/ECM may be faulty. However, this is an extremely unlikely failure. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.

DTC P0449 Evaporative Emission System Vent Solenoid Circuit Fault

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Turn the ignition ON, engine OFF. 2. Install a scan tool. 3. Command the Purge Solenoid ON and OFF. Does the solenoid turn ON and OFF with each command?		Go to *Step 3*	Go to *Step 5*
3	1. Turn the ignition OFF. 2. Disconnect the powertrain control module PCM)/engine control module (ECM) connector containing the solenoid control circuit (connector 1, red). 3. Turn the ignition ON. 4. Using a digital voltmeter (DVM) on a 10 amp scale, measure the current from the solenoid control circuit, at terminal A15 in the PCM/ECM harness connector to ground for 2 minutes. Does the current draw measure less than the specified value?	0.75 amps	Go to ”Diagnostic Aids”	Go to *Step 4*
4	1. Turn the ignition OFF. 2. Disconnect the solenoid. 3. Using a DVM, measure resistance from the solenoid control circuit, at terminal A15 in the PCM/ECM harness connector to ground. Does the DVM display infinite resistance?		Go to *Step 12*	Go to *Step 10*
5	1. Turn the ignition OFF. 2. Disconnect the solenoid. 3. Connect a test light between the terminals A and B in the solenoid harness connector. 4. Turn the ignition ON. 5. Using the scan tool, command the solenoid ON and OFF. Does the test light turn ON and OFF with each command?		Go to *Step 8*	Go to *Step 6*

Step	Action	Value(s)	Yes	No
6	With the test light connected to ground, probe the ignition feed circuit, at terminal A in the solenoid harness connector. Does the test light illuminate?		Go to *Step 7*	Go to *Step 11*
7	1. Turn the ignition OFF. 2. Reconnect the solenoid. 3. Disconnect the PCM/ECM connector containing the solenoid control circuit. 4. Turn the ignition ON. 5. With a fused jumper wire connected to ground, probe the solenoid control circuit, at terminal A15 in the PCM/ECM harness. Does the solenoid operate?		Go to *Step 9*	Go to *Step 10*
8	Check the connections at the solenoid. Is a problem found and corrected?		Go to *Step 14*	Go to *Step 12*
9	Check the connections at the PCM/ECM. Is a problem found and corrected?		Go to *Step 14*	Go to *Step 13*
10	Repair the faulty solenoid control circuit. Is the repair complete?		Go to *Step 14*	
11	Repair the faulty solenoid ignition feed circuit. Is the repair complete?		Go to *Step 14*	
12	Replace the solenoid. Is the repair complete?		Go to *Step 14*	
13	Replace the PCM/ECM. Is the repair complete?		Go to *Step 14*	
14	1. Using the scan tool, clear the Diagnostic Trouble Codes (DTCs). 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 15*	Go to *Step 2*
15	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to applicable DTC table	System OK