DIAGNOSTIC TROUBLE CODE (DTC) P0440

EVAPORATIVE EMISSION SYSTEM LARGE LEAK/LOW TANK VACUUM

Circuit Description

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

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

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

At the appropriate time, the EVAP canister purge valve and the EVAP vent solenoid are turned on, allowing the engine to draw a small vacuum on the entire EVAP system. After the desired vacuum level has been achieved, the EVAP 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 purge line.
- Disconnected or faulty EVAP Canister Purge Valve.
- Disconnected or faulty EVAP vent solenoid.
- Open ignition feed circuit to the EVAP vent or purge solenoid.
- Damaged EVAP canister.
- Leaking fuel sender assembly O–ring.
- Leaking fuel tank or fuel filler neck.

Any of the above conditions can set Diagnostic Trouble Code (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.
- Engine Coolant Temperature (ECT) and Intake Air Temperature (IAT) are between 4˚C (40˚F) and 32˚C (90˚F) at engine start up.
- Intake Air Temperature (IAT) is not more than 6.25˚C (43.3˚F) greater than the ECT at engine start up.
- Engine Coolant Temperature (ECT) is net more than 6.25˚C (43.3˚F) greater than Intake Air Temperature (IAT) at engine start up.
- Barometric Pressure (BARO) is greater than 72.3 kPa.
- Vehicle speed is less than or equal to 144.8 km/h (90 mph).
- Fuel tank level is between 10% and 90%. The Throttle Position (TP) sensor is less than or equal to 100%.
- 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 is between 15% and 85%.
- System voltage is between 11 v and 16 v.
- The EVAP 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 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 40 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 purge line canister fittings.
- Cracked or punctured EVAP canister.
- Damaged source vacuum line, EVAP purge line, EVAP vent hose or fuel tank vapor line.
- Poor connection at the ECM. Inspect the 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 vent solenoid, EVAP canister purge valve, and the fuel tank pressure sensor for an intermittent open or short circuit.
- Kinked, pinched or plugged vacuum source, EVAP 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 EVAP canister purge valve electrical malfunction is present, the purge system will not operate correctly.
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 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 system pressure changes.
11. Ensures that sufficient source vacuum is present at the EVAP canister purge valve.
12. Checks for a stuck, closed EVAP 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 the scan tool. 2. Command the Evaporative Emission (EVAP) canister purge valve and vent solenoid ON and OFF with the scan tool. Do the purge valve and vent solenoid click when commanded ON and OFF?		Go to *Step 4*	Go to ”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 Pressure and Vacuum gauges on the EVAP pressure/purge cart J–41413. Also read the temperature variation instruction card. 1. Reinstall the fuel cap. 2. Using the scan tool, command the EVAP vent solenoid ON (closed). 3. Connect the EVAP pressure/purge cart J–41413 to the EVAP service port. 4. Attempt to pressurize the EVAP system to the specified value using the EVAP pressure/purge cart J–41413. Monitor the pressure using the gauge an 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 purge line from the EVAP canister. 2. Block the fuel tank vapor line fitting on the canister. 3. Connect a hand vacuum pump to the EVAP purge line fitting on the canister. 4. Ensure that the EVAP 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 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 canister purge valve. 2. Connect a hand vacuum pump to the EVAP canister purge valve vacuum source fitting. 3. Apply the specified amount of vacuum to the EVAP canister purge valve. 4. Command the EVAP purge ON, using the scan tool. Does the EVAP 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 J–41413 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	Visually/physically check for the following conditions: • Vent hose disconnected or damaged. • EVAP canister damaged. If a problem is found, repair as necessary. Is a repair necessary?		Go to *Step 19*	Go to *Step 18*
14	Visually/physically check for the following conditions: • Malfunctioning fuel cap. • Leaking fuel tank vapor line. • Damaged EVAP purge line. 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 Vent Solenoid ON. 2. With the cart connected to the EVAP service port continuously attempt to pressurize the EVAP 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 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 Canister Purge Valve. Is the repair complete?		Go to *Step 19*	
17	Locate and repair the cause of no source vacuum to the EVAP canister purge valve. Is the repair complete?		Go to *Step 19*	

Step	Action	Value(s)	Yes	No
18	Replace the EVAP vent solenoid. Is the repair complete?		Go to *Step 19*	
19	**Important :** Review the temperature variation instructions included with the J–41413 before performing this step. 1. Turn the ignition ON, with the engine OFF. 2. Using the scan tool, command the EVAP vent solenoid ON (closed). 3. Pressurize the EVAP system to the specified value using the EVAP pressure/purge cart J–41413 (monitor the pressure using the gauge on the cart). 4. Switch the rotary switch on the cart to HOLD and observe the EVAP 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 Emission (EVAP) system includes the following components:

- Fuel tank
- EVAP vent solenoid
- Fuel tank pressure sensor
- Fuel pipes and hoses
- Fuel vapor lines
- Fuel cap
- EVAP canister
- Purge lines
- EVAP Canister Purge Valve
- EVAP service port

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

At the appropriate time, the EVAP canister purge valve and the EVAP 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 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) and engine coolant Temperature (ECT) are between 4˚C (40˚F) and 32˚C (90˚F) at engine start up.
- Barometric Pressure (BARO) is greater than 72.3 kPa.
- ECT is not more than 6.25˚C (43.3˚F) greater than the intake air temperature at engine start up.
- Intake Air Temperature (IAT) is not more than 6.25˚C (43.3˚F) greater than the Engine Coolant Temperature (ECT) at engine start up.
- Intake Air Temperature (IAT) and Engine Coolant Temperature (ECT) are between 40˚F (4˚C) and 95˚F (35˚C) at engine 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 0.152 in H2O/sec.
- System voltage is between 11 v and 16 v.
- 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 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 40 consecutive warmup 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, 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 purge line canister fittings.
- Cracked or punctured EVAP canister.
- Damaged source vacuum line, EVAP purge line, EVAP vent hose or fuel tank vapor line.
- Poor connection at 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 Vent Solenoid, EVAP 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.

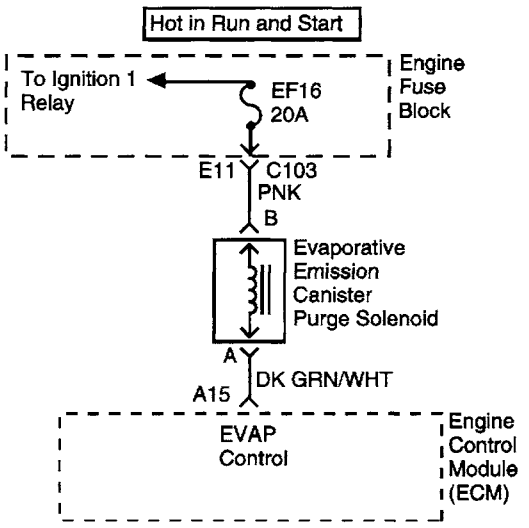
1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
2. If a vent solenoid or EVAP 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 fuel tank pressure sensor to re–zero.
6. Verifies that the fuel tank pressure sensor accurately reacts to EVAP 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 the scan tool. 2. Command the evaporative emission (EVAP) 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 ”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?	1.56 volts (±0.1 volts)	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 Pressure and Vacuum gauges on the EVAP pressure/purge cart J–41413. Also read the temperature variation instruction card. Reinstall the fuel cap. 1. Using the scan tool, command the EVAP Vent Solenoid ON (closed). 2. Connect the EVAP pressure/purge cart J–41413 to EVAP service port. 3. Pressurize the EVAP system to the specified value using the EVAP pressure/purge cart J–41413 (monitor the pressure using the gauge an the cart with the switch in the HOLD position. . 4. Observe the Fuel Tank Pressure on the scan tool Is the Fuel Tank Pressure at the second 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 J–41413 before performing this step. 1. Turn the ignition switch ON with the engine OFF. 2. Using the scan tool, command the EVAP vent solenoid ON (closed). 3. Pressurize the EVAP system to the specified value using the EVAP pressure/purge cart J–41413 (monitor the pressure using the gauge on the cart). 4. Switch the rotary switch on the cart to HOLD and observe the EVAP 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 purge line from the EVAP canister. 2. Block the fuel tank vapor line fitting on the canister. 3. Connect a hand vacuum pump to the EVAP purge line fitting on the canister. 4. Ensure that the EVAP 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 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 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 purge line. 2. If a problem is found, repair as necessary. Was a problem found?		Go to *Step 13*	Go to *Step 12*

Step	Action	Value(s)	Yes	No
12	1. Using the scan tool, command the EVAP vent solenoid ON (closed). 2. With the EVAP pressure/purge cart J–41413 connected to the EVAP system by leaving the cart control knob in the pressurized position. 3. Using the ultrasonic leak detector J–41416, locate and repair the leak in the EVAP 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 J–41413 before performing this step. 1. Turn the ignition switch ON, with the engine OFF. 2. Using the scan tool, command the EVAP vent solenoid ON (closed). 3. Pressurize the EVAP system to the specified value using the EVAP pressure/purge cart J–41413 (monitor the pressure using the gauge on the cart). 4. Switch the rotary switch on the cart to HOLD and observe the EVAP 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 emission (EVAP) system includes the following components:

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

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

At the appropriate time, the EVAP canister purge valve and the EVAP 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 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 sec.
- The 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 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 ECM, the ECM may be faulty, but this is an extremely unlikely failure. The replacement ECM must be reprogrammed. Refer to the latest Techline procedure for ECM reprogramming.

DTC P0443 Evaporative Emission System Purge Control Circuit

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, with the engine OFF. 2. Install a scan tool. 3. Command the Evaporative Emission (EVAP) 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 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 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 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 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 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 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 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 Emission (EVAP) system includes the following components:

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

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

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

A restricted or blocked EVAP canister vent path is detected by drawing a vacuum on the EVAP system, turning OFF the EVAP vent solenoid and the EVAP canister purge valve (EVAP vent solenoid Open, EVAP purge pulse width modulation 0%) and monitoring the fuel tank vacuum sensor input. With the EVAP 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 Vent Solenoid (stuck closed).
- Plugged kinked or pinched vent hose.
- Shorted EVAP Vent Solenoid driver circuit.
- Plugged evaporative canister.
- If any of these conditions are present, Diagnostic Trouble Code (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 v and 16 v.
- Intake Air Temperature (IAT) and Engine Coolant Temperature (ECT) are between 4˚C and 34˚C (39 ˚F and 93˚F) at engine start up
- Barometric Pressure (BARO) is greater than 72.3 kPa.
- Engine Coolant Temperature (ECT) is not more than 6.25˚C (43.3˚F) greater than the intake at temperature (IAT) at engine start up.
- Intake Air Temperature (IAT) is not more than 6.25˚C (43.3˚F) greater than the Engine Coolant Temperature (ECT) at engine start up.
- Fuel tank level is between 15% and 85%.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will illuminate.
- The 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 40 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 ”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 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 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 vent solenoid is not restricted.

Test Description

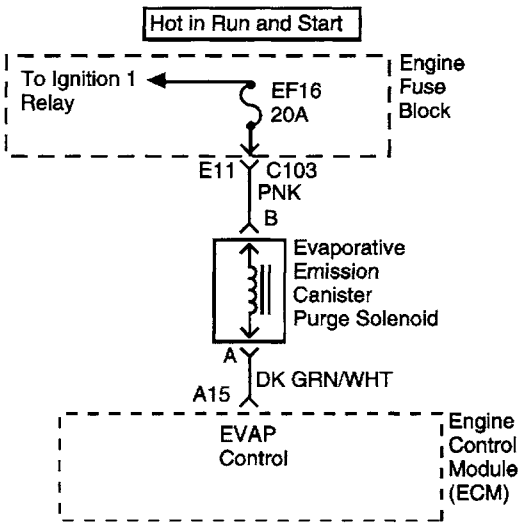
Number(s) below refer to the step number(s) on the Diagnostic Table.

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.
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 system pressure changes.
8. Checks for a blocked EVAP canister.
12. Duplicates the OBD II 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 the scan tool. 2. Command the evaporative emission (EVAP) 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 ”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?	1.56 volts (±0.1 volts)	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 Pressure and Vacuum gauges on the EVAP pressure/purge cart J–41413. Also read the temperature variation instruction card. 1. Reinstall the fuel cap. 2. Using the scan tool, command the EVAP Vent Solenoid ON (closed). 3. Connect the EVAP pressure/purge cart J–41413 to the EVAP service port. 4. Pressurize the EVAP system to the specified value using the EVAP pressure/purge cart J–41413 (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	Go to *Step 7*	Go to ”EVAP Control System Diagnosis”

Step	Action	Value(s)	Yes	No
7	1. Maintain the specified EVAP pressure. 2. Using the scan tool, command the EVAP vent solenoid OFF (open) while observing the EVAP pressure gauge on the cart J–41413. Does the EVAP pressure return to the specified value within 5 seconds?	5 in. H2O	Refer to"Diagnostic Aids"	Go to *Step 8*
8	1. Disconnect the large vent hose (marked air) from the EVAP canister. 2. Switch the rotary switch on the cart J–41413 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 vent hose between the EVAP canister and the EVAP 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 vent solenoid. Is the repair complete?		Go to *Step 12*	
11	Replace the EVAP canister. Is the repair complete?		Go to *Step 12*	
12	1. Using the scan tool, command the EVAP vent solenoid ON (closed). 2. Pressurize the EVAP system to the specified value. 3. Switch the rotary switch on the cart J–41413 to HOLD. 4. Using the scan tool, command the EVAP vent solenoid OFF (open) while observing the EVAP pressure gauge on the cart J–41413. Does the EVAP 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 Emission (EVAP) system includes the following components:

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

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

At the appropriate time, the EVAP canister purge valve and the EVAP vent solenoid are turned ON, allowing the engine to draw a small vacuum on the entire EVAP system. After the desired vacuum level has been achieved, the EVAP 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 sec.
- The 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 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 ECM, the ECM may be faulty. However, this is an extremely unlikely failure. The replacement ECM must be reprogrammed. Refer to the latest Techline procedure for 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, with the engine OFF. 2. Install a scan tool. 3. Command the EVAP Vent 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 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 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 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, with the engine OFF. 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 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 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 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 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