

C402F026

DIAGNOSTIC TROUBLE CODE (DTC) P0452

FUEL TANK PRESSURE SENSOR LOW VOLTAGE

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 line
- 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 sys-

tem. After the desired vacuum level has been achieved, the EVAP canister purge valve is turned OFF, sealing the system.

The ECM supplies a 5 v reference signal and a ground to the Fuel Tank Pressure sensor. The fuel tank pressure sensor sends a voltage signal back to the ECM relative to the fuel tank pressure. The voltage signal will vary from 0.2 v to 4.8 v.

Conditions for Setting the DTC

- AD TKS are less than 5A/D counts.
- 200 counts out of 400 counts continuous 12.5 seconds.

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 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

If a DTC P0452 cannot be duplicated, the information included in the Freeze Frame data can be useful. Use the scan tool information data to determine the status of the DTC. If the DTC occurs intermittently, using the Diagnostic table may help isolate the problem.

Test Description

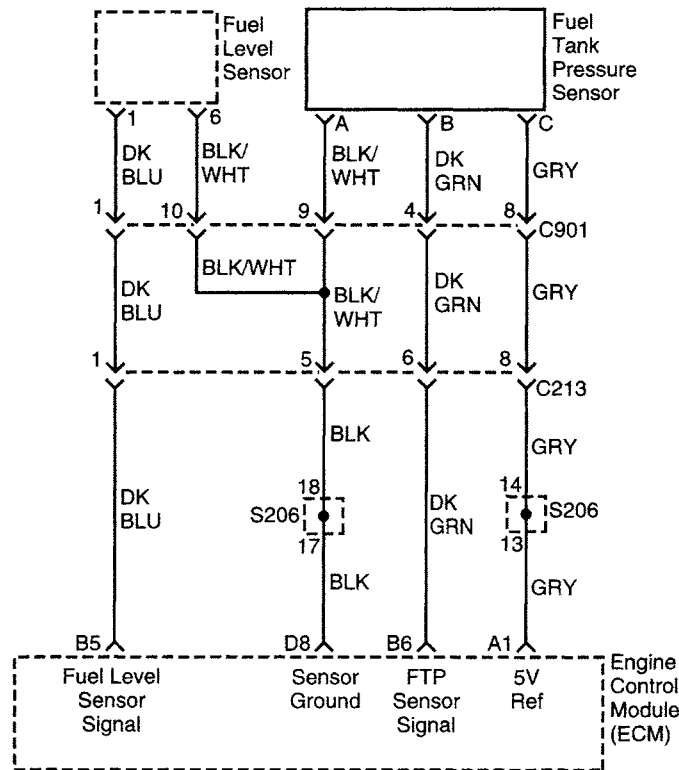
Number(s) below refer to the step number(s) on the Diagnostic Table.

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.
4. Simulates a high voltage signal which will identify an open in the signal circuit.
5. If additional DTCs are set, check the 5 v reference circuits for a short to ground.
6. If the test light illuminates while probing the fuel tank pressure signal circuit, then the fuel tank pressure signal circuit is shorted to ground.
8. The replacement ECM must be reprogrammed. Refer to the latest Techline procedure for ECM reprogramming.
11. If no faults have been found at this point and no additional DTCs were set, refer to "Diagnostic Aids" in this section for additional checks and information.

DTC P0452 Fuel Tank Pressure Sensor Low Voltage

Step	Action	Value(s)	Yes	No
1	Perform an On-Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to <i>Step 2</i>	Go to "On-Board Diagnostic System Check"
2	1. Turn the ignition switch ON with the engine OFF. 2. Install a scan tool. Is the fuel tank pressure sensor voltage below the specified value?	0.03 v	Go to <i>Step 4</i>	Go to <i>Step 3</i>
3	1. Turn the ignition switch ON with the engine OFF. 2. Review the Freeze Frame data and note the parameters. 3. Operate the vehicle within the Freeze Frame conditions and Conditions for Setting The DTC as noted. Is the fuel tank pressure sensor voltage below the specified value?	0.03 v	Go to <i>Step 4</i>	Go to <i>Step 12</i>
4	1. Disconnect the fuel tank pressure sensor electrical connector. 2. Jumper the 5 volt reference circuit, at terminal C and the fuel tank pressure sensor signal circuit, at terminal B together at the fuel tank pressure sensor electrical connector. Is the fuel tank pressure sensor voltage below the specified value.	4 v	Go to <i>Step 10</i>	Go to <i>Step 5</i>
5	Connect a test light between B+ and the fuel tank pressure sensor signal circuit at terminal B at the fuel tank pressure sensor electrical connector. Is the fuel tank pressure sensor voltage greater than the specified value?	4 v	Go to <i>Step 6</i>	Go to <i>Step 8</i>

Step	Action	Value(s)	Yes	No
6	Check the 5 v reference circuit 120/42 for an open or short to ground and repair as necessary. Is a repair necessary?		Go to <i>Step 12</i>	Go to <i>Step 7</i>
7	Check the 5 v reference circuit for a poor connection at the engine control module (ECM) terminal A1 and repair the terminals as necessary. Is a repair necessary?		Go to <i>Step 12</i>	Go to <i>Step 11</i>
8	Check the fuel tank pressure sensor signal circuit, at terminal B for an open or a short to ground and repair as necessary. Is a repair necessary?		Go to <i>Step 12</i>	Go to <i>Step 9</i>
9	Check the fuel tank pressure sensor signal circuit for a poor connection at the ECM terminal B6 and repair as necessary. Is the action complete?		Go to <i>Step 12</i>	Go to <i>Step 11</i>
10	Replace the fuel tank pressure sensor. Is the action complete?		Go to <i>Step 12</i>	
11	Replace the ECM. Is the action complete?		Go to <i>Step 12</i>	
12	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 <i>Step 13</i>	Go to <i>Step 2</i>
13	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to "Applicable DTC table"	System OK



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DIAGNOSTIC TROUBLE CODE (DTC) P0453

FUEL TANK PRESSURE SENSOR HIGH VOLTAGE

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 sys-

tem. After the desired vacuum level has been achieved, the EVAP canister purge valve is turned OFF, sealing the system.

The ECM supplies a 5 v reference signal and a ground to the Fuel Tank Pressure sensor. The fuel tank pressure sensor sends a voltage signal back to the ECM relative to the fuel tank pressure. The voltage signal will vary from 0.2 v to 4.8 v.

Conditions for Setting the DTC

- AD TKS are more than 252 A/D counts.
- 200 counts out of 400 counts continuous 12.5 seconds.

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 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

If a DTC P0452 cannot be duplicated, the information included in the Freeze Frame data can be useful. Use the scan tool information data to determine the status of the DTC. If the DTC occurs intermittently, using the diagnostic table may help isolate the problem.

Test Description

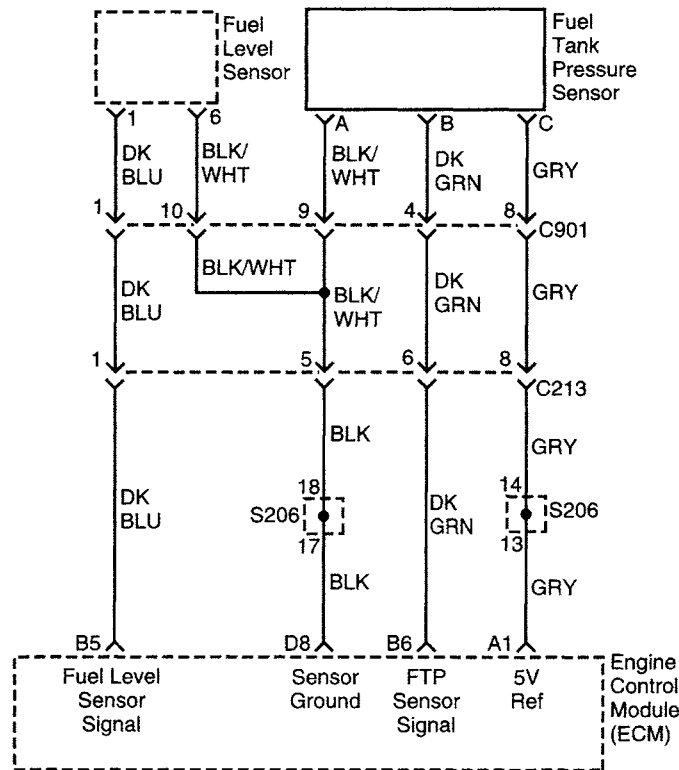
Number(s) below refer to the step number(s) on the Diagnostic Table.

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.
4. With the fuel tank pressure sensor disconnected, the fuel tank pressure sensor voltage should be less than 0.2 v if the ECM and wiring are OK.
5. Probing the ground circuit with a test light checks the circuit for high resistance which will cause a DTC P0453 to set.
7. A shorted 5 volt reference circuit will also set additional DTCs.
11. The replacement ECM must be reprogrammed. Refer to the latest Techline procedure for ECM reprogramming.

DTC P0453 Fuel Tank Pressure Sensor High Voltage

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 switch ON with the engine OFF. 2. Install a scan tool. Is the fuel tank pressure sensor voltage greater than the specified value?	4.97 v	Go to Step 4	Go to Step 3
3	1. Turn the ignition switch ON with the engine OFF. 2. Review the Freeze Frame data and note the parameters. 3. Operate the vehicle within the Freeze Frame conditions and Conditions for Setting The DTC as noted. Is the fuel tank pressure sensor voltage greater than the specified value?	4.97 v	Go to Step 4	Go to Step 12
4	Disconnect the fuel tank pressure sensor electrical connector. Is the fuel tank pressure sensor voltage less than the specified value.	0.2 v	Go to Step 5	Go to Step 6
5	Probe the fuel tank pressure sensor ground circuit, at terminal A at the fuel tank pressure sensor harness connector with a test light connected to B+. Does the test light illuminate?		Go to Step 7	Go to Step 9
6	Check the fuel tank pressure sensor signal circuit, at terminal B for a short to voltage and repair as necessary. Is a repair necessary?		Go to Step 12	Go to Step 11
7	Check the 5 v reference circuit, at terminal C for a short to B+ and repair as necessary. Is a repair necessary?		Go to Step 12	Go to Step 8

Step	Action	Value(s)	Yes	No
8	Check the fuel tank pressure sensor electrical connector for a poor connection and repair the terminals as necessary. Is a repair necessary?		Go to <i>Step 12</i>	Go to <i>Step 10</i>
9	Check the fuel tank pressure sensor ground circuit, at terminal D8 for an open and repair as necessary?. Is a repair necessary?		Go to <i>Step 12</i>	Go to <i>Step 11</i>
10	Replace the fuel tank pressure sensor. Is the action complete?		Go to <i>Step 12</i>	
11	Replace the engine control module (ECM). Is the action complete?		Go to <i>Step 12</i>	
12	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 <i>Step 13</i>	Go to <i>Step 2</i>
13	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to "Applicable DTC table"	System OK



C402F026

DIAGNOSTIC TROUBLE CODE (DTC) P0461

FUEL LEVEL RATIONALITY

Circuit Description

The engine control module (ECM) uses the fuel level input from the Fuel Level Sensor to calculate expected vapor pressures within the fuel system. Vapor pressures vary as the fuel level changes. Vapor pressure is critical in determining if the evaporative emission (EVAP) system is operating properly. Fuel level is also used to determine if the fuel level is too high or too low to be able to accurately detect EVAP system faults. This Diagnostic Trouble Code (DTC) detects a stuck fuel level sender.

Conditions for Setting the DTC

- Raw fuel level sender output change is less than 5 A/D counts (5%) within 250 km.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will not illuminate.
- The Malfunction Indicator Lamp (MIL) will not illuminate.
- A history DTC is stored.

Conditions for Clearing the MIL/DTC

- 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

If DTC P0463 is also displayed, go to DTC P0463 first.

Inspect harness connectors for backed-out terminal, improper mating, broken locks, improperly formed or damaged terminals, and poor terminal-to-wire connection.

Inspect the wiring harness for damage.

A stuck fuel level sensor may cause the DTC to set.

If DTC P0461 cannot be duplicated, the information included in the Freeze Frame data can be useful in determining vehicle operating conditions when the DTC was first set.

Resistance checks for the fuel level sensor:

- Empty = 100 ohms or over.
- Half Full = about 32.5 ohms
- Full = 10 ohms or less.

Test Description

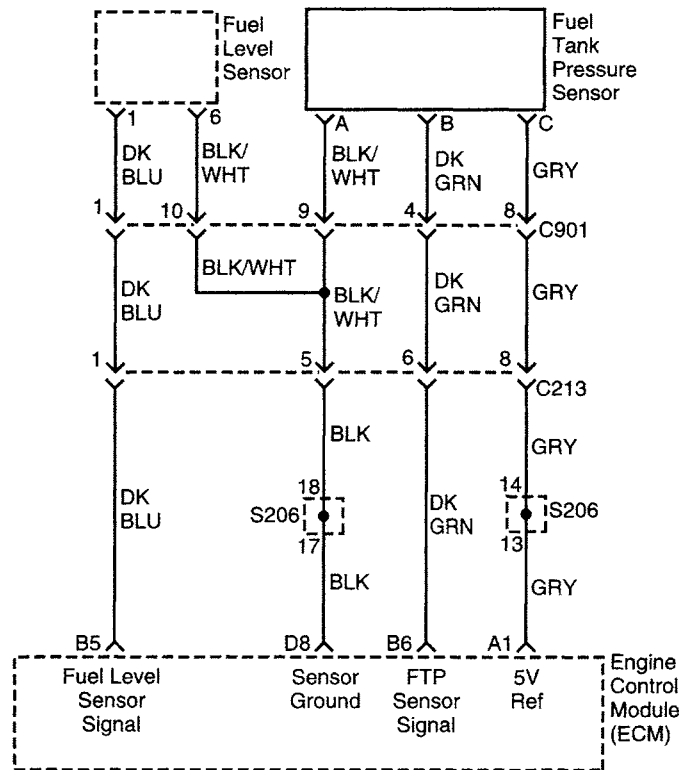
The number(s) below refer to step(s) on the diagnostic table.

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. Determine if fault is present. Reviews Freeze Frame data to determine when the DTC set. Always record this information.

DTC P0461 Fuel Level Rationality

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. 2. Install the scan tool 3. Operate the vehicle within Freeze Frame conditions as noted. Is Diagnostic Trouble Code (DTC) P0461 set?		Go to Step 3	Go to "Diagnostic Aids"
3	1. Disconnect the fuel pump electrical connector from the fuel pump. 2. Using a digital voltmeter (DVM), measure the voltage in the signal circuit at terminal 1. Is the voltage within the specified value?	0.4 – 4.5 v	Go to Step 4	Go to Step 6
4	Check for a proper ground connection at the fuel tank and repair as necessary. Is a repair necessary?		Go to Step 11	Go to Step 5
5	1. Remove the fuel pump from the fuel tank. 2. Reconnect the fuel pump electrical connector. 3. Monitor the fuel level sensor parameter on the scan tool while moving the fuel level sensor float from the empty position to the full position. 4. Repeat the procedure several times. Does the fuel level sensor value on the scan tool increase and then decrease steadily when the float is moved?		Go to "Diagnostic Aids"	Go to Step 8
6	Check for an open or short to ground in the fuel level sensor circuit and repair as necessary. Is a repair necessary?		Go to Step 11	Go to Step 8
7	Repair the open or short to ground in the fuel level sensor circuit between the fuel level sensor harness connector and the fuel level sensor. Is the repair complete?		Go to Step 11	
8	Replace the fuel pump assembly. Is the repair complete?		Go to Step 11	
9	1. Connect the fuel pump electrical connector. 2. Disconnect the engine control module (ECM) connector 1 (red) from the ECM. 3. Using a DVM measure the voltage in the signal circuit, at terminal B5. Does the DVM read within the specified value?	0.4 – 4.5 v	Go to Step 10	Go to Section 9E, Instrumentation/Driver Information
10	Replace the ECM. Is the repair complete?		Go to Step 11	

Step	Action	Value(s)	Yes	No
11	<ol style="list-style-type: none">1. Using the scan tool, clear the 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. <p>Does the scan tool indicate that this diagnostic ran and passed?</p>		Go to <i>Step 12</i>	Go to <i>Step 2</i>
12	<p>Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?</p>		Go to "Applicable DTC table"	System OK



C402F026

DIAGNOSTIC TROUBLE CODE (DTC) P0462

FUEL LEVEL LOW VOLTAGE

Circuit Description

The engine control module (ECM) uses the fuel level input from the Fuel Level Sensor to calculate expected vapor pressures within the fuel system. Vapor pressures vary as the fuel level changes. Vapor pressure is critical in determining if the Evaporative Emission (EVAP) system is operating properly. Fuel level is also used to determine if the fuel level is too high or too low to be able to accurately detect EVAP system faults. This Diagnostic Trouble Code (DTC) detects a continuous short to low or open in either the signal circuit of the fuel level sender.

Conditions for Setting the DTC

- Raw fuel level sender output change is less than 10 A/D counts (0.2 v) for 12.5 seconds out of 25 seconds.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will not 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.

Conditions for Clearing the MIL/DTC

- 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

Inspect harness connectors for backed-out terminal, improper mating, broken locks, improperly formed or damaged terminals, and poor terminal-to-wire connection.

Inspect the wiring harness for damage.

A stuck fuel level sensor may cause the DTC to set.

If DTC P0463 cannot be duplicated, the information included in the Freeze Frame data can be useful in determining vehicle operating conditions when the DTC was first set.

Resistance checks for the fuel level sensor:

- Empty=100 ohms or over.
- Half Full=about 32.5 ohms
- Full=10 ohms or less.

Test Description

The number(s) below refer to step(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 re-

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. Determine if fault is present. Review Freeze Frame data to determine when the DTC set. Always record this information.

DTC P0462 Fuel Level Low Voltage

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. 2. Install the scan tool. 3. Operate the vehicle within Freeze Frame conditions as noted. Is Diagnostic Trouble Code (DTC) P0462 set?		Go to Step 3	Go to "Diagnostic Aids"
3	1. Disconnect the fuel pump electrical connector from the fuel pump. 2. Using a digital voltmeter (DVM), measure the voltage in the signal circuit at terminal 1. Is the voltage within the specified value?	0.4 – 4.5 v	Go to Step 4	Go to Step 6
4	Check for a proper ground connection at the fuel tank and repair as necessary. Is a repair necessary?		Go to Step 11	Go to Step 5
5	1. Remove the fuel pump from the fuel tank. 2. Reconnect the fuel pump electrical connector. 3. Monitor the fuel level sensor parameter on the scan tool while moving the fuel level sensor float from the empty position to the full position. 4. Repeat the procedure several times. Does the fuel level sensor value on the scan tool increase and then decrease steadily when the float is moved?		Go to "Diagnostic Aids"	Go to Step 8
6	Check for an open or short to ground in the fuel level sensor circuit and repair as necessary. Is a repair necessary?		Go to Step 11	Go to Step 9
7	Repair the open or short to ground in the fuel level sensor circuit between the fuel level sensor harness connector and the fuel level sensor. Is the repair complete?		Go to Step 11	
8	Replace the fuel pump assembly. Is the repair complete?		Go to Step 11	
9	1. Connect the fuel pump electrical connector. 2. Disconnect the engine control module (ECM) connector 1 (red) from the ECM. 3. Using a DVM measure the voltage in the signal circuit, at terminal B5. Does the DVM read within the specified value?	0.4 – 4.5 v	Go to Step 10	Go to Section 9E, Instrumentation/Driver Information
10	Replace the ECM. Is the repair complete?		Go to Step 11	

Step	Action	Value(s)	Yes	No
11	<ol style="list-style-type: none">Using the scan tool, clear the DTCs.Start the engine and idle at normal operating temperature.Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. <p>Does the scan tool indicate that this diagnostic ran and passed?</p>		Go to <i>Step 12</i>	Go to <i>Step 2</i>
12	<p>Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?</p>		Go to "Applicable DTC table"	Go to <i>System OK</i>

Test Description

The number(s) below refer to step(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 re-

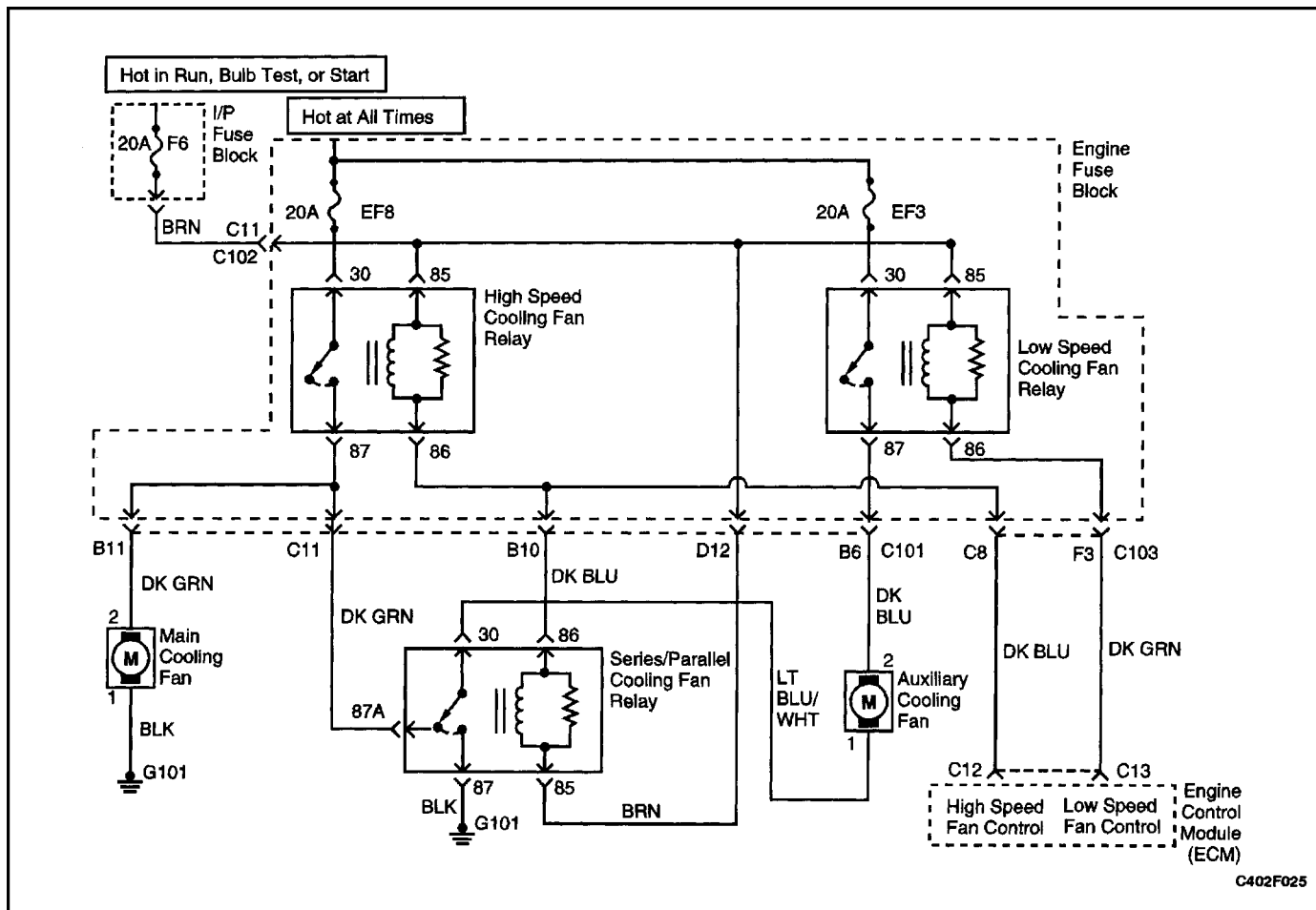
conds data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.

2. Determine if fault is present. Review Freeze Frame data to determine when the DTC set. Always record this information.

DTC P0463 Fuel Level High Voltage

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. 2. Install the scan tool. 3. Operate the vehicle within Freeze Frame conditions as noted. Is Diagnostic Trouble Code (DTC) P0463 set?		Go to Step 3	Go to "Diagnostic Aids"
3	1. Disconnect the fuel pump electrical connector from the fuel pump. 2. Using a digital voltmeter (DVM), measure the voltage in the signal circuit at terminal 1. Is the voltage within the specified value?	0.4 – 4.5 v	Go to Step 4	Go to Step 6
4	Check for a proper ground connection at the fuel tank and repair as necessary. Is a repair necessary?		Go to Step 11	Go to Step 5
5	1. Remove the fuel pump from the fuel tank. 2. Reconnect the fuel pump electrical connector. 3. Monitor the fuel level sensor parameter on the scan tool while moving the fuel level sensor float from the empty position to the full position. 4. Repeat the procedure several times. Does the fuel level sensor value on the scan tool increase and then decrease steadily when the float is moved?		Go to "Diagnostic Aids"	Go to Step 8
6	Check for an open or short to ground in the fuel level sensor circuit and repair as necessary. Is a repair necessary?		Go to Step 11	Go to Step 9
7	Repair the open or short to ground in the fuel level sensor circuit between the fuel level sensor harness connector and the fuel level sensor. Is the repair complete?		Go to Step 11	
8	Replace the fuel pump assembly. Is the repair complete?		Go to Step 11	
9	1. Connect the fuel pump electrical connector. 2. Disconnect the engine control module (ECM) connector 1 (red) from the ECM. 3. Using a DVM measure the voltage in the signal circuit, at terminal B5. Does the DVM read within the specified value?	0.4 – 4.5 v	Go to Step 10	Go to Section 9E, Instrumentation/Driver Information
10	Replace the ECM. Is the repair complete?		Go to Step 11	

Step	Action	Value(s)	Yes	No
11	<ol style="list-style-type: none">1. Using the scan tool, clear the 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 <i>Step 12</i>	Go to <i>Step 2</i>
12	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) P0480

COOLING FAN RELAY 1 FAN CONTROL CIRCUIT FAULT

Circuit Description

Ignition voltage is supplied directly to the cooling fan relay coil. The engine control module (ECM) controls the relay by grounding the control circuit via an internal switch called a driver. The primary function of the driver is to supply the ground for the component being controlled. Each driver has a fault line which is monitored by the ECM. When the ECM is commanding a component ON, the voltage of the control circuit should be low (near 0 volts). When the ECM is commanding the control circuit to a component OFF, the voltage potential of the circuit should be high (near battery voltage). If the fault detection circuit senses a voltage other than what is expected, the fault line status will change causing the Diagnostic Trouble Code (DTC) to set.

The relay is used to control the high current flow to the cooling fan motors. This allows the ECM driver to only have to handle the relatively low current used by the relay.

Conditions for Setting the DTC

- DTCs P0117, P0118 not set.
- Ignition ON.
- Ignition voltage is greater than 10 volts.
- Engine run time is greater than 5 seconds.

Action Taken When the DTC Sets

- The ECM will not illuminate the Malfunction Indicator Lamp (MIL).
- The ECM will record operating conditions at the time the diagnostic fails. This information will be stored in the Freeze Frame and/or Failure Records.

Conditions for Clearing the MIL/DTC

- A history DTC will clear after forty consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- ECM battery voltage is interrupted.
- 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 Pass Counter can also be used to determine how many ignition cycles the diagnostic reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions (rpm, load, vehicle speed, temperature, etc.) that are noted. This will isolate when the DTC failed.

Test Description

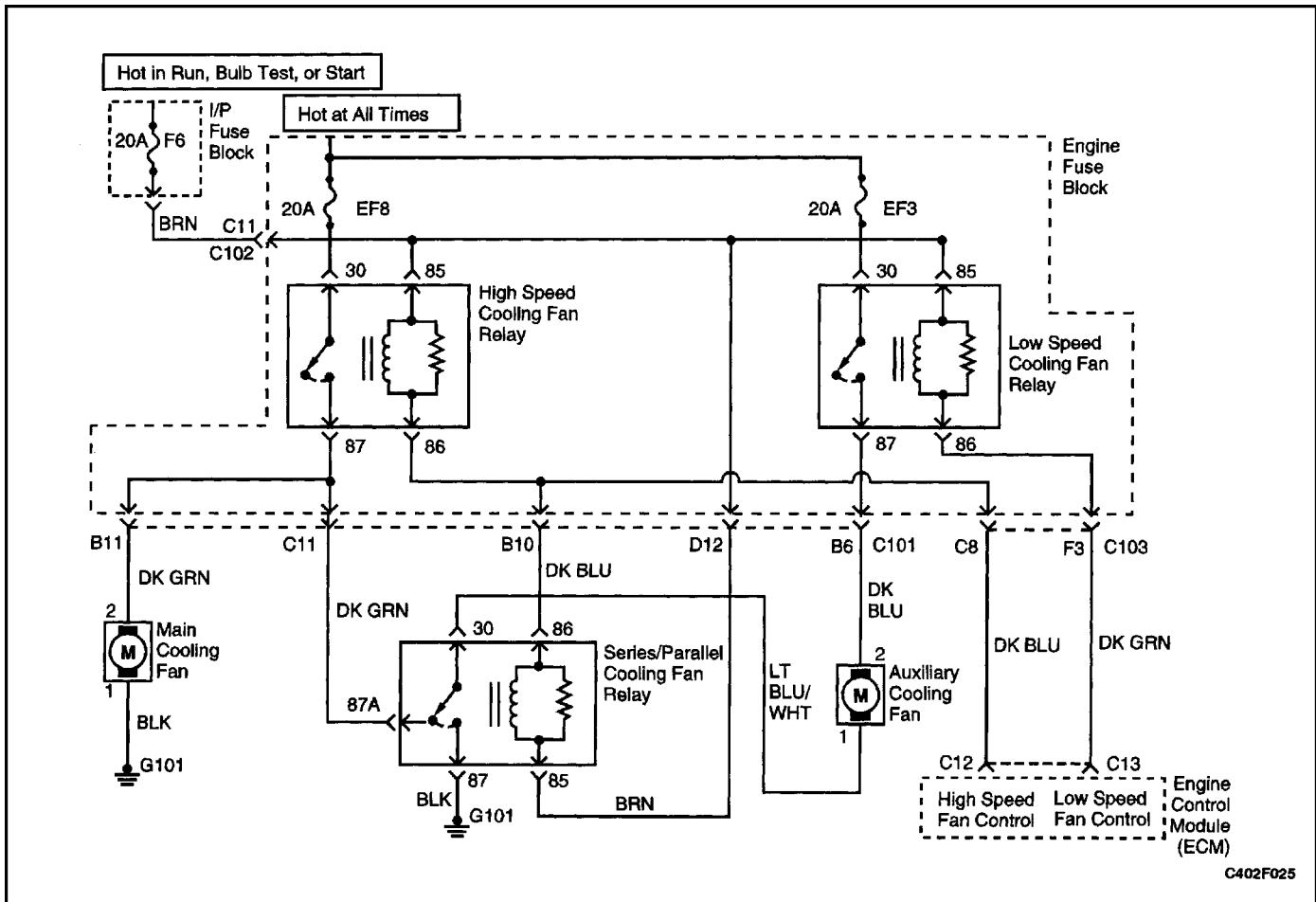
The number(s) below refer to step(s) on the diagnostic table.

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 relay operates.
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 or short.
5. It is important to identify and test the relay coil terminals to avoid improper diagnosis.
13. If no trouble is found in the control circuit or the connection at the ECM, the ECM may be faulty. However, this is extremely unlikely. The replacement ECM must be reprogrammed. Refer to the latest Techline procedure for ECM reprogramming.

DTC P0480 Cooling Fan Relay 1 Fan Control 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 <i>Step 2</i>	Go to "On–Board Diagnostic System Check"
2	1. Turn the ignition ON with engine OFF. 2. Install the scan tool. 3. Command the relay ON and OFF.. Does the relay turn ON and OFF when commanded?		Go to <i>Step 3</i>	Go to <i>Step 5</i>
3	1. Turn the ignition OFF. 2. Disconnect the engine control module (ECM) connector 2 (white) from the ECM. 3. Turn the ignition ON. 4. Using a digital voltmeter (DVM), measure the current in relay A control circuit, at terminal C13 to ground for 2 minutes. Does the amperage measure less than the specified value?	0.75 amps	Go to "Diagnostic Aids"	Go to <i>Step 4</i>
4	1. Turn the ignition OFF. 2. Disconnect the relay. 3. Using a DVM, measure the resistance from the relay control circuit in the ECM harness connector to ground. Does the DVM display infinite resistance?		Go to <i>Step 12</i>	Go to <i>Step 10</i>
5	1. Turn the Ignition OFF. 2. Disconnect the relay. 3. Connect a test light between the relay coil terminals 86 and 85 in the relay harness connector. 4. Turn the ignition ON. 5. Using the scan tool, command the relay ON and OFF. Does the test light turn ON and OFF with each command?		Go to <i>Step 8</i>	Go to <i>Step 6</i>
6	With the test light connected to ground, probe the ignition feed circuit in the relay harness connector. Does the test light illuminate?		Go to <i>Step 7</i>	Go to <i>Step 11</i>

Step	Action	Value(s)	Yes	No
7	1. Turn the ignition OFF. 2. Reconnect the relay. 3. Disconnect the ECM connector containing the relay control circuit. 4. Turn the ignition ON. 5. With a fused jumper wire connected to ground, probe the relay control circuit at terminal C12 in the ECM harness connector. Does the relay operate?		Go to <i>Step 9</i>	Go to <i>Step 10</i>
8	Check the connections at the relay. Is a problem found and corrected?		Go to <i>Step 14</i>	Go to <i>Step 12</i>
9	Check the connections at the ECM. Is a problem found and corrected?		Go to <i>Step 14</i>	Go to <i>Step 13</i>
10	Repair the faulty relay control circuit. Is the repair complete?		Go to <i>Step 14</i>	
11	Repair the faulty relay ignition feed circuit. Is the repair complete?		Go to <i>Step 14</i>	
12	Replace the relay. Is the repair complete?		Go to <i>Step 14</i>	
13	Replace the ECM. Is the repair complete?		Go to <i>Step 14</i>	
14	1. Using the scan tool, clear the Diagnostic Trouble Codes (DTC)s. 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 <i>Step 15</i>	Go to <i>Step 2</i>
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) P0481

COOLING FAN RELAY 2 FAN CONTROL CIRCUIT FAULT

Circuit Description

Ignition voltage is supplied directly to the cooling fan relay coil. The engine control module (ECM) controls the relay by grounding the control circuit via an internal switch called a driver. The primary function of the driver is to supply the ground for the component being controlled. Each driver has a fault line which is monitored by the ECM. When the ECM is commanding a component ON, the voltage of the control circuit should be low (near 0 volts). When the ECM is commanding the control circuit to a component OFF, the voltage potential of the circuit should be high (near battery voltage). If the fault detection circuit senses a voltage other than what is expected, the fault line status will change causing the Diagnostic Trouble Code (DTC) to set.

The relay is used to control the high current flow to the cooling fan motors. This allows the ECM driver to only have to handle the relatively low current used by the relay.

Conditions for Setting the DTC

- DTCs P0117, P0118 not set.
- Ignition ON.
- Ignition voltage is greater than 10 volts.
- Engine run time is greater than 5 seconds.

Action Taken When the DTC Sets

- The ECM will not illuminate the Malfunction Indicator Lamp (MIL).
- The ECM will record operating conditions at the time the diagnostic fails. This information will be stored in the Freeze Frame and/or Failure Records.

Conditions for Clearing the MIL/DTC

- A history DTC will clear after forty consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- ECM battery voltage is interrupted.
- 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 Pass Counter can also be used to determine how many ignition cycles the diagnostic reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions (rpm, load, vehicle speed, temperature, etc.) that are noted. This will isolate when the DTC failed.

Test Description

The number(s) below refer to step(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 relay operates.

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 or short.
5. It is important to identify and test the relay coil terminals to avoid improper diagnosis.
13. If no trouble is found in the control circuit or the connection at the ECM, the ECM may be faulty. However, this is extremely unlikely. The replacement ECM must be reprogrammed. Refer to the latest Techline procedure for ECM reprogramming.

DTC P0481 Cooling Fan Relay 2 Fan Control 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 <i>Step 2</i>	Go to "On–Board Diagnostic System Check"
2	1. Turn the ignition ON, with engine OFF. 2. Install the scan tool. 3. Command the high speed cooling fan relay ON and OFF. Does the relay turn ON and OFF when commanded?		Go to <i>Step 3</i>	Go to <i>Step 5</i>
3	1. Turn the ignition OFF. 2. Disconnect the Engine Control Module (ECM) connector 2 (white) from the ECM. 3. Turn the ignition ON. 4. Using a Digital Voltmeter (DVM), measure the current in high speed cooling fan relay control circuit, at terminal C12 to ground for 2 minutes. Does the amperage measure less than the specified value?	0.75 amps	Go to "Diagnostic Aids"	Go to <i>Step 4</i>
4	1. Turn the ignition OFF. 2. Disconnect the relay. 3. Using a DVM, measure the resistance from the relay control circuit in the ECM harness connector to ground. Does the DVM display infinite resistance?		Go to <i>Step 12</i>	Go to <i>Step 10</i>
5	1. Turn the Ignition OFF. 2. Disconnect the relay. 3. Connect a test light between the relay coil terminals 86 and 85 in the relay harness connector. 4. Turn the ignition ON. 5. Using the scan tool, command the relay ON and OFF. Does the test light turn ON and OFF with each command?		Go to <i>Step 8</i>	Go to <i>Step 6</i>
6	With the test light connected to ground, probe the ignition feed circuit, at terminal 86 in the relay harness connector. Does the test light illuminate?		Go to <i>Step 7</i>	Go to <i>Step 11</i>

Step	Action	Value(s)	Yes	No
7	1. Turn the ignition OFF. 2. Reconnect the relay. 3. Disconnect the ECM connector containing the relay control circuit. 4. Turn the ignition ON. 5. With a fused jumper wire connected to ground, probe the relay control circuit, at terminal C12 in the ECM harness connector. Does the relay operate?		Go to <i>Step 9</i>	Go to <i>Step 10</i>
8	Check the connections at the relay. Is a problem found and corrected?		Go to <i>Step 14</i>	Go to <i>Step 12</i>
9	Check the connections at the ECM. Is a problem found and corrected?		Go to <i>Step 14</i>	Go to <i>Step 13</i>
10	Repair the faulty relay control circuit. Is the repair complete?		Go to <i>Step 14</i>	
11	Repair the faulty relay ignition feed circuit. Is the repair complete?		Go to <i>Step 14</i>	
12	Replace the relay. Is the repair complete?		Go to <i>Step 14</i>	
13	Replace the ECM. Is the repair complete?		Go to <i>Step 14</i>	
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 <i>Step 15</i>	Go to <i>Step 2</i>
15	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to "Applicable DTC table"	System OK