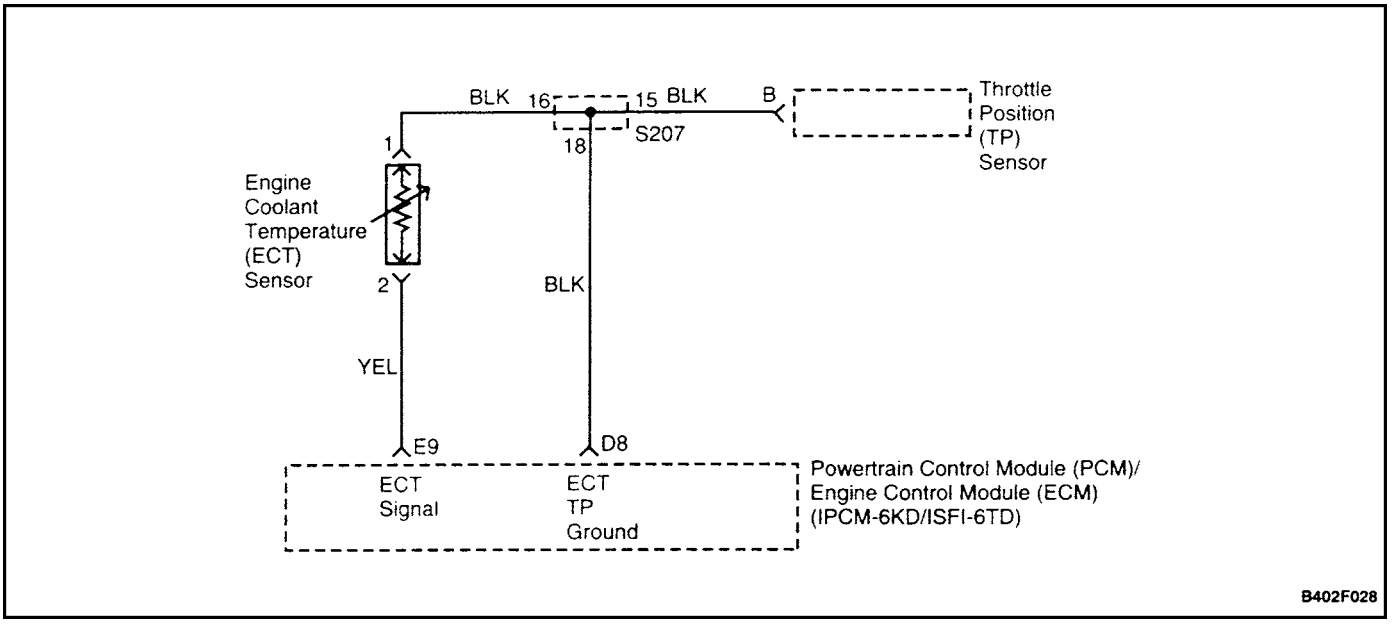


DIAGNOSTIC TROUBLE CODE (DTC) P0117

ENGINE COOLANT TEMPERATURE LOW VOLTAGE

Circuit Description

The Engine Coolant Temperature (ECT) Sensor uses a thermistor to control the signal voltage to the powertrain control module (PCM)/engine control module (ECM). The PCM/ECM supplies a voltage on the signal circuit to the sensor. When the air is cold, the resistance is high; therefore the ECT signal voltage will be high.

As the engine warms, the sensor resistance becomes less and the voltage drops. At normal engine operating temperature, the voltage will be between 1.5 and 2.0 volts at the ECT signal terminal.

The ECT sensor is used to control the following items:

- Fuel delivery.
- Torque Converter Clutch (TCC).
- Ignition.
- Evaporative (EVAP) Emission canister purge valve.
- Idle Air Control (IAC) valve.
- Electric cooling fan.

Conditions for Setting the DTC

- Engine run time is greater than 3 seconds.

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 Diagnostic Trouble Code (DTC) is stored.
- Coolant fan turns on.
- The PCM will default to 20˚C(68˚F) for the first 60 seconds of engine run time and then to 92˚C(198˚F). The scan tool may show the defaulted value.

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 using the scan tool.

Diagnostic Aids

After the engine has started, the ECTshould rise steadily to about 90˚C(194˚F) then stabilize when the thermostat opens.

Use the Temperature vs. Resistance Values table to evaluate the possibility of a skewed sensor. Refer to ”Temperature vs. Resistance” in this section.

Test Description

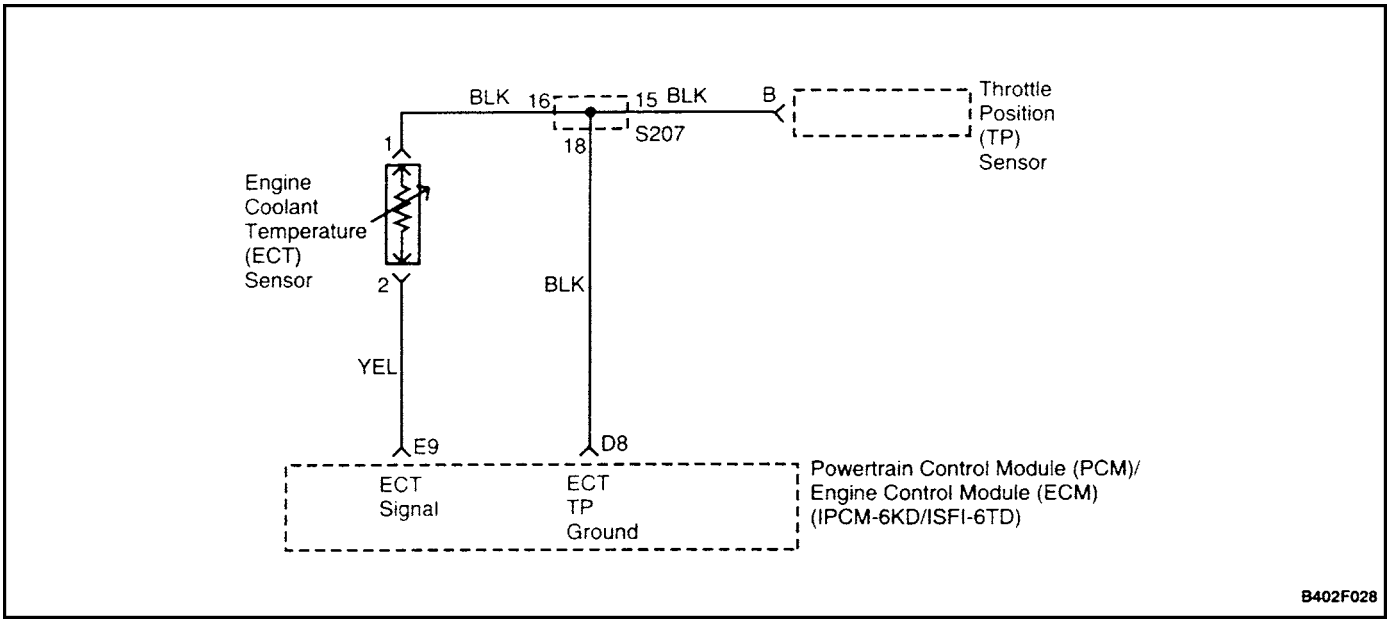
Number(s) below refer to the step number(s) on the Diagnostic Table.

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. This step simulates a DTC P0118 condition. If the PCM/ECM senses the change, then the PCM/ECM and the ECT wiring are OK.

7. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.

DTC P0117 Engine Coolant Temperature 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 switch ON with the engine OFF. 2. Install a scan tool. Is the Engine Coolant Temperature (ECT) sensor value greater than the specified value?	130˚C(266˚F)	Go to *Step 4*	Go to *Step 3*
3	1. Turn the ignition switch ON with the engine OFF. 2. Review 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 ECT sensor value greater than the specified value?	130˚C(266˚F)	Go to *Step 4*	Go to ”Diagnostic Aids”
4	Disconnect the ECT sensor electrical connector. Is the ECT sensor value less than the specified value?	–30˚C(–22˚F)	Go to *Step 6*	Go to *Step 5*
5	Check the ECT sensor signal circuit at terminal B for a short to ground and repair as necessary. Is a repair necessary?		Go to *Step 8*	Go to *Step 7*
6	Replace the ECT sensor. Is the action complete?		Go to *Step 8*	
7	Replace the powertrain control module (PCM)/engine control module (ECM). Is the action complete?		Go to *Step 8*	
8	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 9*	Go to *Step 2*
9	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) P0118

ENGINE COOLANT TEMPERATURE HIGH VOLTAGE

Circuit Description

The Engine Coolant Temperature (ECT) Sensor uses a thermistor to control the signal voltage to the powertrain control module (PCM)/engine control module (ECM). The PCM/ECM supplies a voltage on the signal circuit to the sensor. When the air is cold, the resistance is high; therefore the ECT signal voltage will be high.

As the engine warms, the sensor resistance becomes less and the voltage drops. At normal engine operating temperature, the voltage will be between 1.5 and 2.0 volts at the ECT signal terminal.

The ECT sensor is used to control the following items:

- Fuel delivery.
- Torque Converter Clutch (TCC).
- Ignition.
- Evaporative (EVAP) Emission canister purge valve.
- Idle Air Control (IAC) valve.
- Electric cooling fan.

Conditions for Setting the DTC

- Engine run time is greater 16 seconds.
- The ECT sensor indicates that the engine coolant temperature is less than –40˚C(–40˚F).

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 Diagnostic Trouble Code (DTC) is stored.
- Coolant fan turns on.
- The PCM/ECM will default to 20˚C(68˚F) for the first 60 seconds of engine run time and then to 92˚C(198˚F). The scan tool may show the defaulted value.

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 using the scan tool.

Diagnostic Aids

Normal operating temperature for the engine cooling system is between 90˚C(194˚F) and 95˚C(203˚F).

Use the Temperature vs. Resistance Values table to evaluate the possibility of a skewed sensor. Refer to ”Temperature vs. Resistance” in this section.

Test Description

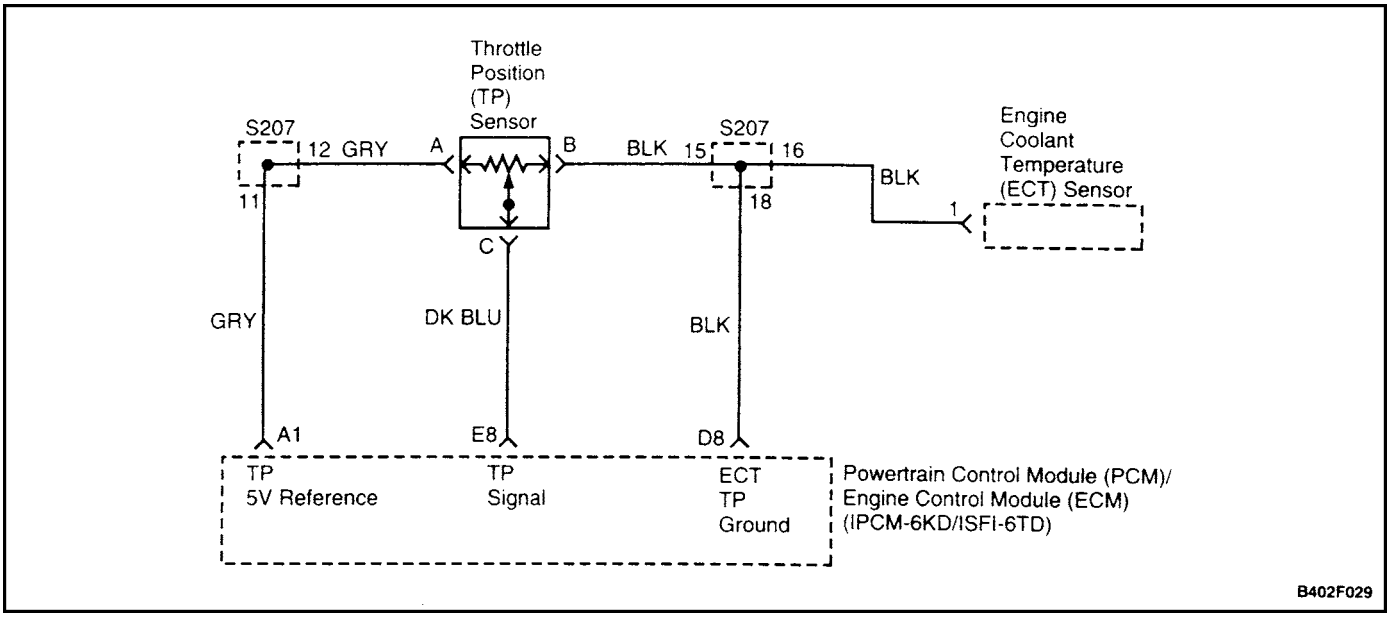
Number(s) below refer to the step number(s) on the Diagnostic Table.

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. This step simulates a DTC P0117 condition. If the PCM/ECM senses the change, then the PCM/ECM and the ECT wiring are OK.
11. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.

DTC P0118 Engine Coolant Temperature 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 Engine Coolant Temperature (ECT) sensor value less than the specified value?	–30˚C(–22˚F)	Go to *Step 4*	Go to *Step 3*
3	1. Turn the ignition switch ON with the engine OFF. 2. Review 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 ECT sensor value less than the specified value?	–30˚C(–22˚F)	Go to *Step 4*	Go to ”Diagnostic Aids”
4	1. Disconnect the ECT sensor electrical connector. 2. Jumper the ECT sensor signal circuit at terminal 2 and the ECT sensor ground circuit at terminal 1 together at the ECT electrical connector. Is the ECT sensor value greater than the specified value?	130˚C(266˚F)	Go to *Step 6*	Go to *Step 5*
5	Jumper the ECT sensor signal circuit at terminal B to chassis ground. Is the ECT sensor value greater than the specified value?	130˚C(266˚F)	Go to *Step 7*	Go to *Step 8*
6	Check for poor connections at the ECT sensor and repair as necessary. Is a repair necessary?		Go to *Step 12*	Go to *Step 10*
7	Check the ECT sensor ground circuit for an open and repair as necessary. Is a repair necessary?		Go to *Step 12*	Go to *Step 9*
8	Check the ECT sensor signal circuit for an open and repair as necessary. Is a repair necessary?		Go to *Step 12*	Go to *Step 9*
9	Check for a poor ECT sensor ground circuit at terminal D8 or a poor ECT sensor signal circuit at terminal E9 connection at the powertrain control module (PCM)/engine control module (ECM) and replace the terminals if necessary. Do any of the terminal(s) need to be replaced?		Go to *Step 12*	Go to *Step 11*
10	Replace the ECT sensor. Is the action complete?		Go to *Step 12*	
11	Replace the PCM/ECM. Is the action complete?		Go to *Step 12*	

Step	Action	Value(s)	Yes	No
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 *Step 13*	Go to *Step 2*
13	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) P0121

THROTTLE POSITION SENSOR RATIONALITY

Circuit Description

The powertrain control module (PCM)/engine control module (ECM) supplies a 5 volt reference signal and a ground to the Throttle Position (TP) sensor. The TP sensor sends a voltage signal back to the PCM/ECM relative to the throttle plate opening. The voltage signal will vary from approximately 0.45 volt at closed throttle, to over 4.5 volt at wide open throttle (WOT). The PCM/ECM can detect if the TP sensor is out of range while cruising by waiting for a Manifold Air Pressure (MAP) change. Then it checks if the TP sensor has changed as expected by calculating what the TP signal should be at a given rpm and engine load. During idle conditions, the PCM/ECM verifies that the engine is stable and at idle, and ensures that the TP signal is below a given percent. The TP sensor is considered stuck when the MAP is low while the TP sensor position is greater than a certain value which will cause MAP to exceed the low (<35 kPa).

Conditions for Setting the DTC

- DTC(s) P0107, P0108, P0117, P0118, P0122, P0123, P0201, P0202, P0203, P0204, P0300, P0351, P0352, P0402, P0404, P0405, P0406, P0443, P0506, P0507, P1404, P1441 and P1627 are not set.
- Engine running.
- Change in MAP is less than 10 kPa for greater or equal to 2 second prior to first enable or less than 8 kPa cycle to cycle.
- Idle Air Control (IAC) is between 30 and 100 cfs.
- Coolant temperature is greater than –40˚C (40˚F).

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 Diagnostic Trouble Code (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

A TP sensor that is stuck will attempt auto zero itself every time the engine runs. It will not display as high a percentage as it would normally when it has auto zeroed at a higher than normal voltage.

A normal TP sensor that displays 0% will not display higher than 1 volt and is possibly stuck.

If a DTC P0121 cannot be duplicated, the information included in the Freeze Frame/Failure Records data can be useful. Use the scan tool DTC information data to determine the status of the DTC.

A DTC P0121 may set while attempting to start a vehicle that has run out of fuel.

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

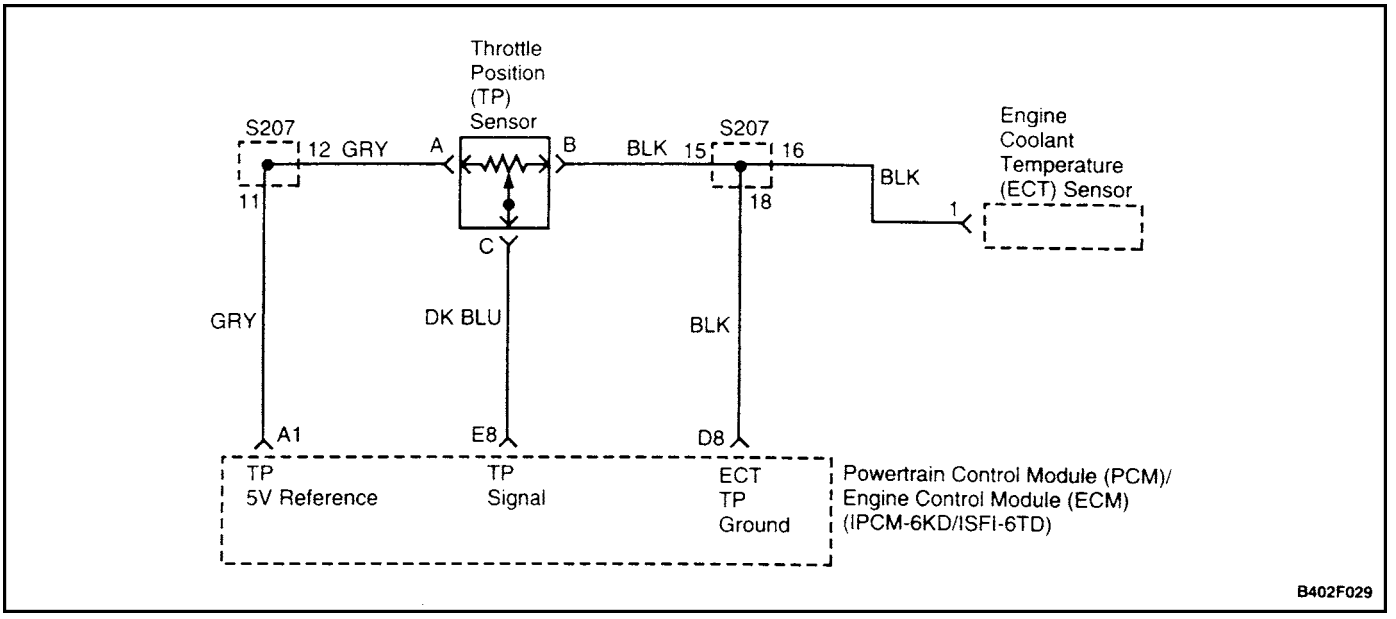
creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.

2. The TP sensor has an auto zeroing feature. If the voltage reading is between 0.2 to 0.9 volts, the PCM/ECM will assume the TP sensor is at a closed throttle position (0%). If the reading is out of the auto zeroing range at closed throttle, look for a binding or damaged linkage.
3. Normal TP voltage when the throttle plates are fully closed is near 0.5 volts. A sensor will display a higher voltage when the sensor is stuck or a circuit is faulty.
5. A disconnected TP sensor should not display a voltage reading on the scan tool. An amount less than the specified value is normal.
6. When the test light is connected to the ground circuit, the light should glow brightly if the ground circuit is OK but could have a small amount of resistance in the circuit. The voltmeter is used to detect the small amounts of resistance using the voltage drop method. If the test light glows dimly or not at all, then resistance in the circuit is present and using the voltmeter is not necessary.
7. In order for DTC P0121 to set with a short voltage in the TP signal circuit, the voltage must be minimal enough to not set a DTC P0123, and more than 0.5 volts.
13. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.
15. If no faults have been found at this point and no additional DTCs were set, refer to ”Diagnostic Aids”for additional checks and information.

DTC P0121 Throttle Position Sensor 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 switch ON with the engine OFF. 2. Install a scan tool. 3. Select the Throttle Position (TP) angle parameter on the scan tool. 4. Monitor the scan tool while pressing the accelerator pedal to the floor and then slowly releasing the pedal (repeat the procedure several times). Does the TP angle value increase steadily when the accelerator pedal is depressed to greater than the specified value and decrease steadily when the pedal is released to less than the specified value?	98% 1%	Go to *Step 3*	Go to *Step 5*
3	Does the scan tool display a TP voltage below the specified value when the throttle is fully closed?	0.80 v	Go to *Step 4*	Go to *Step 5*
4	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 TP angle vs. rpm value greater than the specified value in the Conditions for Setting The DTC?		Go to *Step 5*	Go to *Step 12*
5	Disconnect the TP sensor electrical connector. Is the TP sensor voltage less than the specified value?	0.5 v	Go to *Step 6*	Go to *Step 7*

Step	Action	Value(s)	Yes	No
6	1. Connect a test light to the ground circuit and B+ at terminal B. 2. Connect a voltmeter to the ground circuit and ground. Does the voltmeter read a voltage greater than the specified value?	0.5 v	Go to *Step 8*	Go to *Step 9*
7	Check the TP sensor signal circuit, terminal C for a short to voltage and repair as necessary. Is a repair necessary?		Go to *Step 14*	Go to *Step 13*
8	Check the TP sensor ground circuit, terminal B for a poor connection or resistance at the TP sensor connector and repair as necessary. Is a repair necessary?		Go to *Step 14*	Go to *Step 13*
9	With a digital voltmeter (DVM) connected to ground, probe the 5 volt reference circuit at terminal A1. Does the DVM display a voltage near the specified value?	5 v	Go to *Step 13*	Go to *Step 10*
10	Check for a short to voltage in the 5 volt reference circuit, terminal A1 and repair if necessary. Is a repair necessary?		Go to *Step 14*	Go to *Step 13*
11	Replace the TP sensor. Is the action complete?		Go to *Step 14*	
12	Check the powertrain control module (PCM)/engine control module (ECM) electrical connectors for a poor connection or resistance and repair as necessary. Is a repair necessary?		Go to *Step 14*	Go to *Step 13*
13	Replace the PCM/ECM. Is the action 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) P0122

THROTTLE POSITION SENSOR LOW VOLTAGE

Circuit Description

The powertrain control module (PCM)/engine control module (ECM) supplies a 5 volt reference signal and a ground to the Throttle Position (TP) sensor. The TP sensor sends a voltage signal back to the PCM/ECM relative to the throttle plate opening. The voltage signal will vary from approximately 0.45 volt at closed throttle, to over 4.5 volts at wide open throttle (WOT).

Conditions for Setting the DTC

- Engine is running.
- TP sensor is less than 0.14 volts for 5 seconds.

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 Diagnostic Trouble Code (DTC) is stored.
- Coolant fan turns on.
- The TP angle will default to 0% when the vehicle speed is less than 2 mph (3 km/h) and 10% when the vehicle speed is greater than 2 mph (3 km/h). (The scan tool will display the defaulted value.)

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 using the scan tool.

Diagnostic Aids

If a DTC P0122 cannot be duplicated, the information included in the Freeze Frame data can be useful. Use the scan tool DTC information data to determine the status of the DTC. If the DTC occurs intermittently, using the DTC P0121 Diagnostic table may help isolate the problem.

Test Description

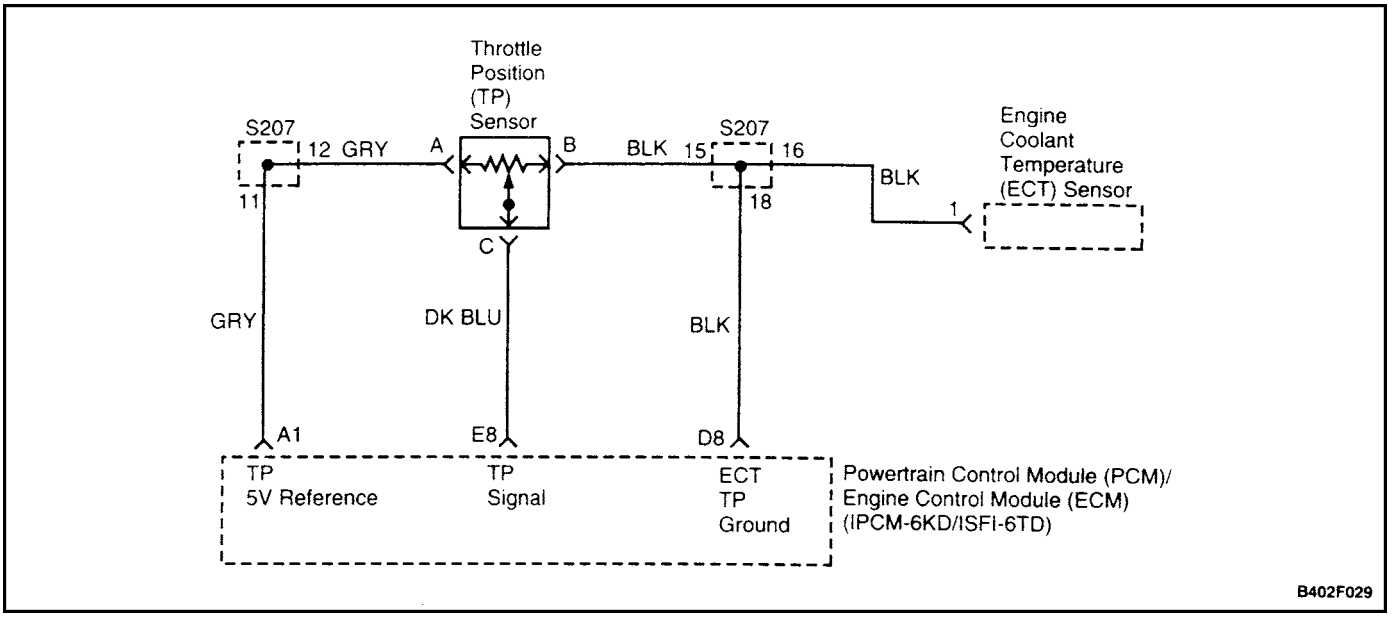
Number(s) below refer to the step number(s) on the Diagnostic Table.

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.
2. The TP sensor has an auto zeroing feature. If the voltage reading is between 0.2 to 0.9 volts, the PCM/ECM will assume the TP sensor is at a closed throttle position (0%).
4. Simulates a high voltage signal which will identify an open in the signal circuit.
5. If additional DTCs are set, check the 5v reference circuits for a short to ground.
6. If the test light illuminates while probing the TP signal circuit, then the TP signal circuit is shorted to ground.
8. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.
11. If no faults have been found at this point and no additional DTCs were set, refer to ”Diagnostic Aids” for additional checks and information.

DTC P0122 Throttle Position 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 *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 Throttle Position (TP) sensor voltage below the specified value?	0.20 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 TP sensor voltage below the specified value?	0.20 v	Go to *Step 4*	Go to *Step 12*
4	1. Disconnect the TP sensor electrical connector. 2. Jumper the 5 volt reference circuit, terminal A and the TP sensor signal circuit, terminal C together at the TP sensor electrical connector. Is the TP sensor voltage above the specified value.	4 v	Go to *Step 10*	Go to *Step 5*
5	Connect a test light between B+ and the TP sensor signal circuit at terminal C. Is the TP sensor voltage greater than the specified value?	4 v	Go to *Step 6*	Go to *Step 8*
6	Check the 5 volt reference circuit for an open or short to ground and repair as necessary. Is the repair complete?		Go to *Step 12*	Go to *Step 7*
7	• Check the 5 volt reference circuit for a poor connection at the powertrain control module (PCM)/engine control module (ECM), terminal A1. • Repair the terminals as necessary. Is a repair necessary?		Go to *Step 12*	Go to *Step 11*
8	Check the TP sensor signal circuit, terminal E8 for an open, or a short to ground and repair as necessary. Is a repair necessary?		Go to *Step 12*	Go to *Step 9*
9	Check the TP sensor signal circuit, terminal E8 for a poor connection at the PCM/ECM and repair as necessary. Is the action complete?		Go to *Step 12*	Go to *Step 11*
10	Replace the TP sensor. Is the action complete?		Go to *Step 12*	
11	Replace the PCM/ECM. Is the action complete?		Go to *Step 12*	

Step	Action	Value(s)	Yes	No
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 *Step 13*	Go to *Step 2*
13	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) P0123
THROTTLE POSITION SENSOR HIGH VOLTAGE

Circuit Description

The powertrain control module (PCM)/engine control module (ECM) supplies a 5 volt reference signal and a ground to the Throttle Position (TP) sensor. The TP sensor sends a voltage signal back to the PCM/ECM relative to the throttle plate opening. The voltage signal will vary from approximately 0.45 volts at closed throttle, to over 4.5 volts at wide open throttle (WOT).

Conditions for Setting the DTC

- Engine is running.
- TP sensor voltage is greater than 4.9 volts for 5 seconds.

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 Diagnostic Trouble Code (DTC) is stored.
- Coolant fan turns on.
- The TP angle will default to 0% when the vehicle speed is less than 2 mph (3 km/h) and 10% when the vehicle speed is greater than 2 mph (3 km/h). (The scan tool will display the defaulted value.)

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 using the scan tool.

Diagnostic Aids

If a DTC P0123 cannot be duplicated, the information included in the Freeze Frame data can be useful. Use the scan tool DTC information data to determine the status of the DTC. If the DTC occurs intermittently, using the DTC P0121 diagnostic table may help isolate the problem.

With the ignition ON and the throttle at closed position, the voltage should read between 0.20 volts and 0.90 volts and increase steadily to over 4.5 volts at WOT.

DTCs P0123 and P0113 stored at the same time could be the result of an open sensor ground circuit.

Test Description

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

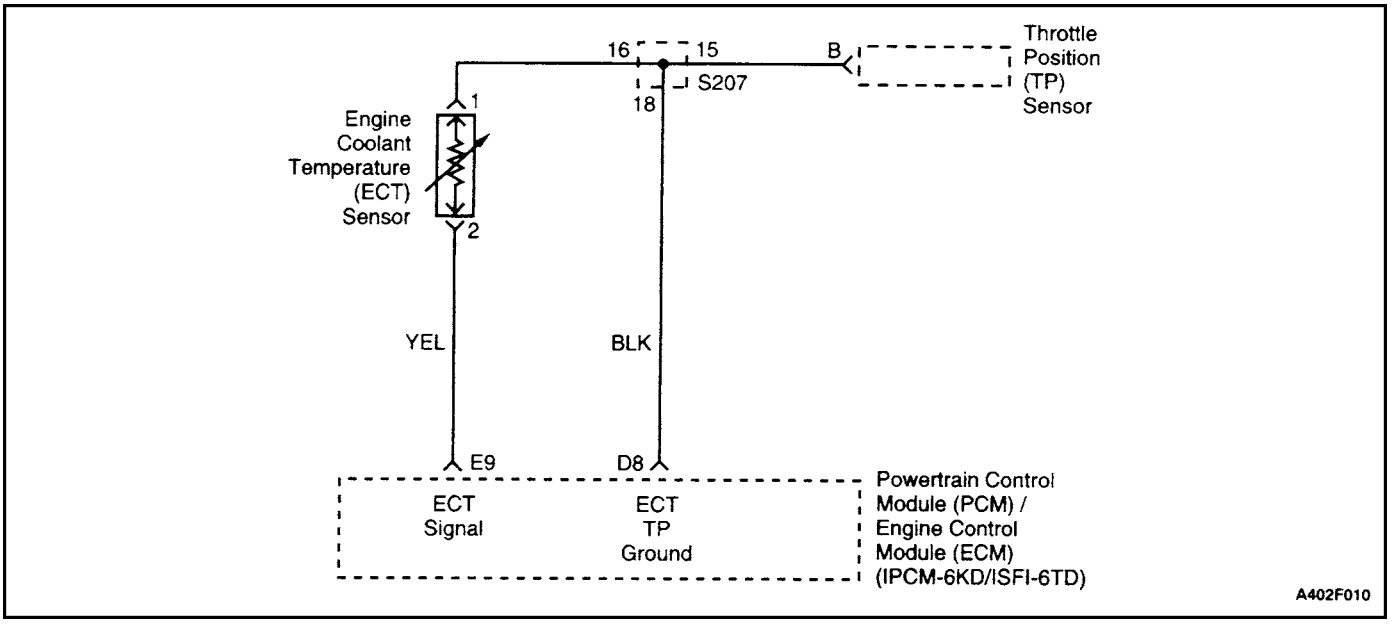
1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
2. With the throttle closed, the TP sensor voltage should read less than 0.90 volts. If the TP sensor voltage does not read less than 0.90 volts check for a binding or sticking throttle cable.
4. With the TP sensor disconnected, the TP sensor voltage should be less than 0.2 volts if the PCM/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 P0123 to set.
7. A shorted 5 volt reference circuit will also set additional DTCs.

11. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.

DTC P0123 Throttle Position Sensor High Voltage

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the check completed?		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 Throttle Position (TP) sensor voltage greater than the specified value?	1 volt	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 TP sensor voltage greater than the specified value?	3.9 volts	Go to *Step 4*	Go to *Step 12*
4	Disconnect the TP sensor electrical connector. Is the TP sensor voltage less than the specified value.	0.2 volts	Go to *Step 5*	Go to *Step 6*
5	Probe the TP sensor ground circuit, terminal B at the TP 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 TP sensor signal circuit, terminal C 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 volt reference circuit, terminal A for a short to B+ and repair as necessary.. Is a repair necessary?		Go to *Step 12*	Go to *Step 8*
8	Check the TP sensor electrical connector for a poor connection and repair the terminals as necessary. Is a repair necessary?		Go to *Step 12*	Go to *Step 10*
9	Check the TP sensor ground circuit for an open and repair as necessary?. Is a repair necessary?		Go to *Step 12*	Go to *Step 11*
10	Replace the TP sensor. Is the action complete?		Go to *Step 12*	
11	Replace the powertrain control module (PCM)/engine control module (ECM). Is the action complete?		Go to *Step 12*	

Step	Action	Value(s)	Yes	No
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 *Step 13*	Go to *Step 2*
13	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) P0125

ENGINE COOLANT TEMPERATURE INSUFFICIENT FOR CLOSED LOOP FUEL CONTROL

Circuit Description

When the vehicle is first started, it operates in Open Loop, ignoring the oxygen sensor (O2S 1) signal and calculating the fuel/air ratio based on inputs from the Engine Coolant Temperature (ECT), throttle position (TP) and manifold absolute pressure (MAP) sensors only. The powertrain control module (PCM)/engine control module (ECM) will begin using the O2S 1 signal for controlling fuel delivery (Closed Loop) when the following conditions are met:

- The engine has run a minimum amount of time based on ECT at engine start up.
- The O2S 1 has a varying voltage output showing that it is hot enough to operate properly.
- The ECT has increased a minimum amount based on ECT at engine start up.

Conditions for Setting the DTC

- If ambient temperature is greater than 10˚C(50˚F) the time for coolant to reach a stabilized closed loop value (12˚C) is less than or equal to 2 minutes.
- If ambient temperature is between –7˚C(20˚F) and 10˚C(50˚F) the time for coolant to reach a stabilized closed loop value (12˚C) is less than or equal to 5 minutes.
- If ambient temperature is between –30˚C(21.8˚F) and –7˚C(20˚C) the time for coolant to reach a stabilized closed loop value (12˚C) is less than or equal to 15 minutes.
- Engine running.
- DTCs P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0121, P0122, P0123, P0201, P0202, P0203, P0204, P0351, P0352, P0502 and P1627 are not set.
- Maximum start–up coolant temperature is 35˚C.
- If the ambient temperature is greater than or equal 10˚C(50˚F) the accumulated airflow is greater than 1200 grams and accumulated idle time is less than 90 seconds.
- If ambient temperature is between –7˚C(20˚F) and 10˚C(50˚F) the accumulated airflow is greater than 3000 grams and accumulated idle time is less than 225 seconds.
- If ambient temperature is between –30˚C(21.8˚F) and –7˚C(20˚C) the accumulated airflow is greater than 5000 grams and accumulated idle time is less than 375 seconds.

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 Diagnostic Trouble Code (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

When DTC P0125 is set, a skewed ECT sensor or a stuck–open thermostat is indicated.

An intermittent may be caused by a poor connection, rubbed–through wire insulation or a wire broken inside the insulation.

Check for a poor connection or damaged PCM/ECM harness. Inspect the ECT sensor signal circuit and ground circuit terminals for the following conditions:

- Improper mating
- Broken locks
- Improperly formed
- Damaged terminals
- Poor terminal–to–wire connection
- Damaged harness

Perform an intermittent test. If connections and harness check OK, monitor a digital voltmeter connected between ECT sensor signal circuit and ground circuit terminals while moving related connectors and wiring harness. If a fault is induced, the resistance reading will change. This may help to isolate the location of the malfunction.

Use the Temperature vs. Resistance table to evaluate the possibility of a skewed sensor.

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. The engine must be allowed to cool fully before the ECT and IAT sensors will read close to the ambient temperature in order to check for a possible skewed sensor.
3. Measure the engine coolant temperature with a thermometer to determine the actual value the ECT sensor should be. Take into consideration if the engine has been run and the engine coolant has been warmed without opening the thermostat.
5. This step simulates a DTC P0118. If the PCM/ECM senses the change, the PCM/ECM and wiring are OK.
6. The ECT sensor, PCM/ECM and wiring have checked OK at this point. Check for a proper thermostat and cooling fan operation.
8. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.

DTC P0125 Engine Coolant Temperature Insufficient For Closed Loop Fuel Control

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. Allow the engine to cool fully to ambient temperature. 2. Turn the ignition switch ON with the engine OFF. 3. Install a scan tool. 4. Compare the Engine Coolant Temperature (ECT) sensor reading to the Intake Air Temperature (IAT) sensor readings. Are the temperature readings close?		Go to *Step 4*	Go to *Step 3*
3	1. Disconnect the ECT sensor electrical connector. 2. Using a digital voltmeter (DVM), measure the resistance across the ECT sensor terminals A and B. 3. Check the ECT sensor value to actual coolant temperature using the Temperature vs. Resistance table. Does the ECT sensor accurately reflect the actual engine coolant temperature?		Go to *Step 4*	Go to *Step 9*

Step	Action	Value(s)	Yes	No
4	Disconnect the ECT sensor electrical connector. Is the ECT sensor value less than the specified value?	–30˚C(–22˚F)	Go to *Step 5*	Go to *Step 8*
5	Jumper the ECT sensor signal circuit, terminal B and the sensor ground circuit, terminal A together at the ECT sensor connector. Is the ECT sensor value greater than the specified value?	130˚C(266˚F)	Go to *Step 6*	Go to *Step 7*
6	Check for proper cooling system operation and repair as necessary. Is a repair necessary?		Go to *Step 10*	Go to ”Diagnostic Aids”
7	Check the ECT sensor electrical connector terminals A and B and the powertrain control module (PCM)/engine control module (ECM) electrical connector terminals E9 and D8 for poor connectors or malfunctioning terminals and repair as necessary. Is a repair necessary?		Go to *Step 10*	Go to *Step 8*
8	Replace the PCM/ECM. Is the repair complete?		Go to *Step 10*	
9	Replace the ECT sensor. Is the action complete?		Go to *Step 10*	
10	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 11*	Go to *Step 2*
13	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to applicable DTC table	System OK