Engine Controls Diagnostic (DTC P0491 To DTC P2130) - 5.7L - Corvette

DIAGNOSIS

DTC P0491 OR P0492

Circuit Description

The secondary air injection (AIR) pump system is designed to lower exhaust emission levels on a start up. The AIR pump is timed to remain ON for approximately 1 minute or until Closed Loop is achieved.

The powertrain control module (PCM) commands the AIR pump relay ON by supplying a ground to the AIR pump relay control circuit. This action energizes the AIR pump, forcing fresh air into the exhaust stream. The PCM also commands the AIR solenoid ON which applies engine vacuum to the AIR shut-off valve. With vacuum applied to the AIR shut-off valve, airflow from the AIR pump flows through the pipes/hoses to the exhaust check valves, then enters into the exhaust stream. The air, oxygen, that is introduced into the exhaust system accelerates catalyst operation. When inactive, the check exhaust valves and the shut-off valve prevent air flow in either direction.

The PCM detects a system air flow condition by monitoring the heated oxygen sensors (HO2S) and Short Term Fuel Trim during normal Open Loop AIR system operation. This is a passive test. If the passive test indicates a pass, the PCM takes no further action. If the passive test fails or is inconclusive, the diagnostic will proceed with an intrusive or active test. The PCM will command the AIR system ON during Closed Loop operation under normal operating conditions. The active test will pass or fail based on the response from the HO2S. A lean HO2S response indicates that the AIR system is functioning normally. An increasing Short Term Fuel Trim value also indicates a normal functioning system. The AIR diagnostic consists of the passive test and the active tests. The AIR diagnostic requires failure of the passive and active tests on 2 consecutive key cycles to illuminate the malfunction indicator lamp (MIL) and stores a DTC. If the PCM detects that the HO2S and Short Term Fuel Trim did not respond as expected on one of the engine banks, DTC P0491 for bank 1 or DTC P0492 for bank 2 sets.

Conditions for Running the DTC

- DTCs P0101, P0102, P0103, P0107, P0108, P0112, P0113, P0116, P0117, P0118, P0120, P0125, P0131, P0132, P0133, P0134, P0135, P0136, P0137, P0138, P0140, P0151, P0154, P0155, P0156, P0157, P0158, P0160, P0161, P0171, P0172, P0174, P0175, P0200, P0220, P0300, P0335, P0336, P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358, P0442, P0443, P0446, P0449, P0455, P0496, P1133, P1134, P1153, P1154, P1258, P2135 are not set.
- The mass air flow (MAF) is less than 23 g/s.
- The air/fuel ratio is 14.7:1.
- The engine load is less than 40 percent.
- The ignition voltage is more than 11.7 volts.
- The engine speed is more than 850 RPM.

- The engine coolant temperature (ECT) is between -10 and +110°C (14-230°F).
- The intake air temperature (IAT) is between -10 and +100°C (14-212°F).
- The fuel system is operating in fuel trim cells 1, 2, 4, 5, or 6.
- The engine is not operating in the following Modes:
  - Power Enrichment
  - Decel Fuel Shut-off
  - Catalyst Over-Temperature

Conditions for Setting the DTC

- The HO2S voltage does not decrease to less than 222 mV for 1.3 seconds.

  AND

- The short-term fuel trim does not change more than a predetermined value.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Conditions for Setting the DTC

- The HO2S voltage does not decrease to less than 222 mV for 1.3 seconds.

  OR

- The short-term fuel trim does not change more than a predetermined value.

Diagnostic Aids

- For any test that requires probing the PCM or probing a component harness connector, use the connector test adapter kit. Using this kit prevents damage to the harness or component terminals. Refer to in Wiring Systems.
- Carbon build-up in the exhaust manifold may restrict the amount of air flow necessary to affect the HO2S voltage. If you suspect this condition, remove the air pipe from the manifold and inspect the passage.
- Inspect for the following conditions:
  - Excessive exhaust system back pressure
  - Moisture, water, or debris ingestion into the AIR pump
  - Leaking exhaust check valves will leave traces of exhaust carbon in the AIR system.
  - A check valve that flows in both directions causes heat damage to the AIR system components.

DTC P0491 or P0492

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Powertrain Control Module (PCM) Connector End Views or Engine Controls Connector End Views				
1	Did you perform the Diagnostic System Check-Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	1. Start and idle the engine until Closed Loop is achieved. 2. Turn OFF all the accessories. 3. Monitor the HO2S bank 1 sensor 1 and bank 2 sensor 1 voltage parameters for the applicable bank with a scan tool. 4. Command the secondary air injection (AIR) system ON with a scan tool. 5. Observe the heated oxygen sensor (HO2S) voltage as the AIR system is enabled. Does the HO2S voltage decrease to less than the specified value?	222 mV	Go to Diagnostic Aids	Go to **Step 3**
3	Perform a visual inspection of all pipes/hoses in the AIR system for the following conditions: • Loose or missing clamps on the AIR pipes/hoses • No kinks, holes, or pinched hoses/pipes • Components with evidence of heat damage Did you find and correct a condition?	-	Go to **Step 7**	Go to **Step 4**

4	1. Remove the crossover hose from the applicable check valve. 2. Command the AIR pump system ON with a scan tool. Is air flow present at the hose outlet?	-	Go to **Step 6**	Go to **Step 5**
5	Repair the restriction or the leak for the applicable bank in the AIR crossover pipes/hoses between the exhaust check valve and the AIR shut-off valve. Did you complete the repair?	-	Go to **Step 7**	-
6	**CAUTION:** **Refer to Hot Exhaust System Caution in Cautions and Notices.** Repair the restriction/leak or blockage for the applicable bank in one of the following components: • The exhaust check valve-Refer to **Secondary Air Injection (AIR) Check Valve/Pipe Replacement - Bank 1** or **Secondary Air Injection (AIR) Check Valve/Pipe Replacement - Bank 2** • The exhaust check valve outlet pipe • The exhaust manifold Did you complete the repair?	-	Go to **Step 7**	-
7	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	-	Go to **Step 2**	Go to **Step 8**
8	Observe the Capture Info with a scan tool. Are there any DTCs that you have not yet diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P0496

System Description

This DTC tests for undesired intake manifold vacuum flow to the Evaporative Emission (EVAP) System. The control module seals the EVAP System by commanding the EVAP canister purge solenoid valve Closed and the EVAP canister vent solenoid valve Closed. The control module monitors the fuel tank pressure (FTP) sensor to determine if a vacuum is being drawn on the EVAP System. If vacuum in the EVAP system is more than a predetermined value within a predetermined time, this DTC sets.

The following table illustrates the relationship between the ON and OFF states, and the Open or Closed states of the EVAP canister purge and vent solenoid valves.

DTC P0496

Control Module Command	EVAP Canister Purge Solenoid Valve	EVAP Canister Vent Solenoid Valve
ON	Open	Closed
OFF	Closed	Open

Conditions for Running the DTC

- DTCs P0107, P0108, P0112, P0113, P0116, P0117, P0118, P0125, P0442, P0443, P0449, P0452, P0453, P0455, P1112, P1114, P1115, P1120, P1133, P1134, P1153, P1154, P1220, P1221 are not set.
- The ignition voltage is between 10-18 volts.
- The barometric pressure (BARO) is more than 75 kPa.
- The fuel level is between 15-85 percent.
- The engine coolant temperature (ECT) is between 4-30°C (39-86°F).
- The intake air temperature (IAT) is between 4-30°C (39-86°F).
- The start up ECT and IAT are within 9°C (16°F) of each other.
- The vehicle speed sensor (VSS) is less than 121 km/h (75 mph).

Conditions for Setting the DTC

The control module detects vacuum during a non-purge condition.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.

- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

DTC P0496

Step	Action	Values	Yes	No
Schematic Reference: Evaporative Emissions (EVAP) Hose Routing Diagram				
1	Did you perform the Diagnostic System Check-Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	1. Start the engine. 2. Seal the Evaporative Emission (EVAP) System using the Purge/Seal function with a scan tool. 3. Increase the engine idle to 1,200-1,500 RPM. 4. Observe the fuel tank pressure (FTP) sensor in H2O with a scan tool. Is the fuel tank pressure sensor parameter within the specified value?	-1 to +1 H2O	Go to Diagnostic Aids	Go to **Step 3**
3	1. Turn OFF the ignition. 2. Disconnect the EVAP purge pipe from the EVAP canister purge solenoid valve. 3. Turn ON the ignition, with the engine OFF. 4. Observe the FTP sensor in H2O with a scan tool. Is the fuel tank pressure sensor parameter within the specified range?	-1 to +1 H2O	Go to **Step 4**	Go to **Step 5**
4	Replace the EVAP canister purge solenoid valve. Refer to **Evaporative Emission (EVAP) Canister Purge Solenoid Valve Replacement** . Did you complete the replacement?	-	Go to **Step 6**	-
5	Replace the FTP sensor. Refer to **Fuel Tank Pressure Sensor Replacement** . Did you complete the replacement?	-	Go to **Step 6**	-
	1. Connect all EVAP hardware that was previously disconnected. 2. Seal the EVAP System using the			

6	Purge/Seal function with a scan tool. 3. Start the engine and idle at 1,200-1,500 RPM. 4. Observe the fuel tank pressure sensor parameter with a scan tool. Is the fuel tank pressure sensor parameter within the specified range?	-1 to +1 H2O	Go to **Step 7**	Go to **Step 2**
7	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P0506

Circuit Description

The throttle actuator control (TAC) system uses vehicle electronics and components to calculate and control the position of the throttle plate. In order to decrease idle speed the TAC system closes the throttle plate, reducing air flow into the engine. In order to increase idle speed the TAC system opens the throttle plate allowing more air flow into the engine. If the actual idle RPM does not match the desired idle RPM within a calibrated time, this code sets.

Conditions for Running the DTC

- DTCs P0107, P0108, P0112, P0113, P0117, P0118, P0125, P0171, P0172, P0200, P0300, P0336, P0440, P0442, P0446, P0452, P0453, P0502, P0503, P1120, P1220, P1221, P1514, P1515, P1516, P1635, or P1639 are not set.
- The engine is operating for at least 2 seconds.
- The engine coolant temperature (ECT) is more than -40°C (-40°F).
- The intake air temperature (IAT) is more than -40°C (-40°F).
- The barometric pressure (BARO) is more than 65 kPa.
- The system voltage is between 9-18 volts.
- The vehicle speed is less than 4.8 km/h (3 mph).

Conditions for Setting the DTC

- The actual idle speed is approximately 150 RPM lower than or 100 RPM greater than the desired idle speed.
- All above conditions present for 15 seconds.

Action Taken When the DTC Sets

- The PCM will illuminate the malfunction indicator lamp (MIL) during the second consecutive trip in which the diagnostic test has been run and failed.

- The PCM will store conditions which were present when the DTC set as Freeze Frame/Failure Records data.

Conditions for Clearing the MIL/DTC

- The PCM will turn OFF the malfunction indicator lamp (MIL) during the third consecutive trip in which the diagnostic has run and passed.
- The history DTC will clear after 40 consecutive warm-up cycles have occurred without a malfunction.
- The DTC can be cleared by using a scan tool.

Diagnostic Aids

If the condition is intermittent, refer to **Intermittent Conditions** .

Test Description

The number below refers to the step number on the diagnostic table.

2: This test determines whether the engine can achieve the commanded RPM. If the engine does not reach the commanded RPMs, the test determines whether the RPM is too high or too low.

DTC P0506

Step	Action	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Powertrain Control Module (PCM) Connector End Views and Engine Controls Connector End Views			
1	Did you perform the Diagnostic System Check-Engine Controls?	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	1. Start the engine. 2. Ensure the engine is at operating temperature. 3. Command the engine speed to 1,500 RPM, then to 500 RPM, and back to 1,500 RPM with a scan tool. 4. Exit the RPM control function. Does the engine speed correspond, within 100 RPM, with each command?	Go to **Intermittent Conditions**	Go to **Step 3**
	Inspect for any condition that can reduce idle speed by increasing engine load. The following examples are possible conditions: • Incorrect torque converter clutch (TCC) operation • Accessories that require additional torque to		

3	operate • Restricted exhaust • Mechanical conditions that limit engine speed Did you complete the action?	Go to **Step 4**	-
4	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/failure Records. Did the DTC fail this ignition?	Go to **Step 2**	Go to **Step 5**
5	**IMPORTANT:** **Be aware that repairing 1 individual condition may correct more than 1 DTC.** Observe the Capture Info with a scan tool.Are there any DTCs that have not been diagnosed?	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P0507

Circuit Description

The throttle actuator control (TAC) system uses vehicle electronics and components to calculate and control the position of the throttle plate. In order to decrease idle speed the TAC system closes the throttle plate, reducing air flow into the engine. In order to increase idle speed the TAC system opens the throttle plate allowing more air flow into the engine. If the actual idle RPM does not match the desired idle RPM within a calibrated time, this code sets.

Conditions for Running the DTC

- DTCs P0107, P0108, P0112, P0113, P0117, P0118, P0125, P0171, P0172, P0200, P0300, P0336, P0440, P0442, P0446, P0452, P0453, P0502, P0503, P1120, P1220, P1221, P1514, P1515, P1516, P1635, or P1639 are not set.
- The engine is operating for at least 2 seconds.
- The engine coolant temperature (ECT) is more than -40°C (-40°F).
- The intake air temperature (IAT) is more than -40°C (-40°F).
- The barometric pressure (BARO) is more than 65 kPa.
- The system voltage is between 9-18 volts.
- The vehicle speed is less than 4.8 km/h (3 mph).

Conditions for Setting the DTC

- The actual idle speed is approximately 150 RPM lower than or 100 RPM greater than the desired idle speed.
- All above conditions present for 15 seconds.

Action Taken When the DTC Sets

- The PCM will illuminate the malfunction indicator lamp (MIL) during the second consecutive trip in which the diagnostic test has been run and failed.
- The PCM will store conditions which were present when the DTC set as Freeze Frame/Failure Records data.

Conditions for Clearing the MIL/DTC

- The PCM will turn OFF the malfunction indicator lamp (MIL) during the third consecutive trip in which the diagnostic has run and passed.
- The history DTC will clear after 40 consecutive warm-up cycles have occurred without a malfunction.
- The DTC can be cleared by using a scan tool.

Diagnostic Aids

If the condition is intermittent, refer to **Intermittent Conditions** .

Test Description

The number below refers to the step number in the diagnostic table.

2: This test determines whether the engine can achieve the commanded RPM. If the engine does not reach the commanded RPM, the test determines whether the RPM is too high or too low.

DTC P0507

Step	Action	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Powertrain Control Module (PCM) Connector End Views and Engine Controls Connector End Views			
1	Did you perform the Diagnostic System Check-Engine Controls?	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	1. Start the engine. 2. Command the engine speed to 1,500 RPM, then to 500 RPM, and back to 1,500 RPM with a scan tool. 3. Exit the RPM control function.		

	Does the engine speed correspond, within 175 RPM, with each command?	Go to **Intermittent Conditions**	Go to **Step 3**
3	Inspect for the following conditions: • Vacuum leaks • Excessive deposits in the throttle body • A faulty positive crankcase ventilation (PCV) valve Did you find and correct the condition?	Go to **Step 4**	-
4	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/failure Records. Did the DTC fail this ignition?	Go to **Step 2**	Go to **Step 5**
5	**IMPORTANT:** **Be aware that repairing 1 individual condition may correct more than 1 DTC.** Observe the Capture Info with a scan tool.Are there any DTCs that have not been diagnosed?	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P0601-P0607, P1600, P1621, P1627, P1680, P1681, P1683, OR P2610

Description

This diagnostic applies to internal microprocessor integrity conditions within the powertrain control module (PCM). This diagnostic also addresses if the PCM is not programmed.

Test Description

The number below refers to the step number on the diagnostic table.

2: A DTC P0602 indicates the PCM is not programmed.

DTC P0601-P0607, P1600, P1621, P1627, P1680, P1681, P1683, or P2610

Step	Action	Yes	No
1	Did you perform the Diagnostic System Check-Engine Controls?		Go to **Diagnostic System Check - Engine**

		Go to **Step 2**	**Controls**
2	Is DTC P0602 set?	Go to **Step 3**	Go to **Step 5**
3	Program the PCM. Refer to **Service Programming System (SPS)** in Programming. Does DTC P0602 reset?	Go to **Step 4**	Go to **Step 6**
4	1. Ensure that all tool connections are secure. 2. Ensure that the programming equipment is operating correctly. 3. Ensure that the correct software/calibration package is used. 4. Attempt to program the PCM. Refer to **Service Programming System (SPS)** in Programming. Does DTC P0602 reset?	Go to **Step 5**	Go to **Step 6**
5	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** . Did you complete the replacement?	Go to **Step 6**	-
6	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. Did the DTC fail this ignition?	Go to **Step 2**	Go to **Step 7**
7	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P0641

Circuit Description

The powertrain control module (PCM) provides 5-volts to the following sensors:

- The manifold absolute pressure (MAP) sensor
- The engine oil pressure (EOP) sensor

These 5-volt reference circuits are independent of each other outside the PCM, but are bussed together inside the PCM. Therefore a circuit condition on one sensor 5-volt reference circuit may affect the other sensor 5-volt reference circuits. The PCM monitors the voltage on the 5-volt reference circuit. If the PCM detects that the voltage is out of tolerance, DTC P0641 sets.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

- The PCM detects a voltage out of tolerance condition of the 5-volt reference circuit.
- The above condition is present for longer than 10 seconds.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

DTC P0641

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Powertrain Control Module (PCM) Connector End Views or Engine Controls Connector End Views				
1	Did you perform the Diagnostic System Check-Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	1. Observe the Freeze Frame and/or Failure Records data for the DTC. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Does the DTC fail this ignition?	-	Go to **Step 3**	Go to **Intermittent Conditions**
	1. Turn OFF the ignition.			

3	2. Disconnect the MAP sensor electrical connector. 3. Turn ON the ignition, with the engine OFF. 4. Measure the voltage from the 5-volt reference circuit of the MAP sensor to a good ground with a DMM. Refer to **Circuit Testing** in Wiring Systems. Is the voltage within the specified range?	4.8-5.2 V	Go to **Step 5**	Go to **Step 4**
4	Is the voltage from the previous step more than the specified value?	5.2 V	Go to **Step 8**	Go to **Step 6**
5	1. Reconnect the MAP sensor. 2. Disconnect engine oil pressure (EOP) sensor. 3. Measure the voltage from the 5-volt reference circuit of the EOP sensor to a good ground with a DMM. Refer to **Circuit Testing** in Wiring Systems. Is the voltage within the specified range?	4.8-5.2 V	Go to **Intermittent Conditions**	Go to **Step 9**
6	1. Monitor the DMM while disconnecting the engine oil pressure (EOP) sensor. 2. If voltage changes when the sensor is disconnected, replace the component. Refer to **Engine Oil Pressure Sensor and/or Switch Replacement** in Engine Mechanical 5.7L. Was a component replaced?	-	Go to **Step 12**	Go to **Step 7**
7	1. Turn OFF the ignition. 2. Disconnect the Powertrain control module (PCM). 3. Test the 5-volt reference circuit for a short to ground or any sensor low reference circuit. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 11**
8	1. Turn OFF the ignition. 2. Disconnect the PCM. 3. Turn ON the ignition, with the engine OFF. 4. Test the 5-volt reference circuit for a short	-		

	to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?		Go to **Step 12**	Go to **Step 11**
9	Test the MAP sensor signal circuit for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 10**
10	Replace the MAP sensor. Refer to **Manifold Absolute Pressure (MAP) Sensor Replacement** . Is the action complete?	-	Go to **Step 12**	-
11	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** . Did you complete the replacement?	-	Go to **Step 12**	-
12	1. Use the scan tool in order to clear the DTCs. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC run and pass?	-	Go to **Step 13**	Go to **Step 2**
13	With a scan tool, observe the stored information, Capture Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P0650

Circuit Description

The malfunction indicator lamp (MIL) is located on the instrument panel cluster (IPC). The MIL informs the driver that an emission system fault has occurred and that the engine control system requires service. The control module monitors the MIL control circuit for conditions that are incorrect for the commanded state of the MIL. For example, a failure condition exists if the control module detects low voltage when the MIL is commanded OFF, or high voltage when the MIL is commanded ON. If the control module detects an improper voltage on the MIL control circuit, DTC P0650 will set.

Conditions for Running the DTC

- The engine speed is more than 400 RPM.
- The ignition voltage is between 6-18 volts.

Conditions for Setting the DTC

- The control module detects that the commanded state of the MIL driver and the actual state of the control circuit do not match.
- The conditions are present for a minimum of 5 seconds.

Action Taken When the DTC Sets

The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

Conditions for Clearing the MIL/DTC

- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5: This step tests for a short to ground in the MIL control circuit. With the powertrain control module (PCM) disconnected and the ignition ON, the MIL should be OFF.

6: This step tests for a short to voltage on the MIL control circuit. With the fuse removed, there should be no voltage on the MIL control circuit.

DTC P0650

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics **Connector End View Reference: Powertrain Control Module (PCM) Connector End Views or Engine Controls Connector End Views**				
1	Did you perform the Diagnostic System Check-Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	1. Verify whether the instrument cluster is operational. If the instrument panel (IP) is completely inoperative, refer to **Diagnostic System Check - Instrument Cluster** in Instrument Panel, Gages and Console. 2. Command the MIL ON and OFF with a scan tool.	-		

	Does the MIL turn ON and OFF when commanded with a scan tool?		Go to **Step 3**	Go to **Step 4**
3	1. Observe the Freeze Frame/Failure Records for this DTC. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Does the DTC fail this ignition?	-	Go to **Step 4**	Go to **Intermittent Conditions**
4	Inspect the fuse that supplies battery voltage to the MIL. Is the fuse open?	-	Go to **Step 12**	Go to **Step 5**
5	1. Turn OFF the ignition. 2. Disconnect the powertrain control module (PCM). Refer to **Powertrain Control Module (PCM) Replacement** . 3. Turn ON the ignition. Is the MIL OFF?	-	Go to **Step 6**	Go to **Step 13**
6	1. Turn OFF the ignition. 2. Remove the fuse that supplies voltage to the MIL. 3. Turn ON the ignition, with the engine OFF. 4. Measure the voltage from the MIL control circuit in the PCM to a good ground. Is the voltage less than the specified value?	0.3 V	Go to **Step 7**	Go to **Step 14**
7	1. Turn OFF the ignition. 2. Install the fuse that supplies voltage to the MIL. 3. Turn ON the ignition, with the engine OFF. 4. Connect a 3-amp fused jumper wire between the MIL control circuit of the PCM and a good ground. Is the MIL illuminated?	-	Go to **Step 11**	Go to **Step 8**
	1. Turn OFF the ignition.			

8	2. Remove the instrument panel cluster (IPC). Refer to **Instrument Panel Cluster (IPC) Replacement** in Instrument Panel, Gages, and Console. 3. Probe the MIL battery positive voltage circuit of the IPC harness connector with a test lamp that is connected to a good ground. Does the test lamp illuminate?	-	Go to **Step 9**	Go to **Step 15**
9	Test the MIL control circuit for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct a condition?	-	Go to **Step 18**	Go to **Step 10**
10	Test for an intermittent and for a poor connection at the IPC. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 18**	Go to **Step 16**
11	Test for an intermittent and for a poor connection at the PCM. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 18**	Go to **Step 17**
12	Repair the short to ground in the battery positive voltage circuit. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	-	Go to **Step 18**	-
13	Repair the short to ground in the MIL control circuit. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	-	Go to **Step 18**	-
14	Repair the short to voltage in the MIL control circuit. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	-	Go to **Step 18**	-
15	Repair the open in the MIL battery positive voltage. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	-	Go to **Step 18**	-
16	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** in Instrument Panel, Gages, and Console. Did you complete the replacement?	-	Go to **Step 18**	-
17	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** . Did you complete the replacement?	-	Go to **Step 18**	-
	1. Clear the DTCs with a scan tool.			

18	2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	-	Go to **Step 2**	Go to **Step 19**
19	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P0651

Circuit Description

The powertrain control module (PCM) provides 5 volts to the following sensors:

- The air conditioning (A/C) pressure sensor.
- The fuel tank pressure (FTP) sensor

These 5-volt reference circuits are independent of each other outside the PCM, but are bussed together inside the PCM. Therefore a circuit condition on one sensor 5-volt reference circuit may affect the other sensor 5-volt reference circuits. The PCM monitors the voltage on the 5-volt reference circuit. If the PCM detects that the voltage is out of tolerance, DTC P0651 sets.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

- The PCM detects a voltage out of tolerance condition on the 5-volt reference circuit.
- The above condition is present for longer than 10 seconds.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze

Frame and updates the Failure Records.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Test Description

The number below refers to the step number on the diagnostic table.

9: A short to voltage on the signal circuit of the fuel tank pressure (FTP) sensor will backfeed through the sensor into the 5-volt reference circuit and set this DTC.

DTC P0651

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Powertrain Control Module (PCM) Connector End Views or Engine Controls Connector End Views				
1	Did you perform the Diagnostic System Check-Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	1. Observe the Freeze Frame/Failure Records for this DTC. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Does the DTC fail this ignition?	-	Go to **Step 3**	Go to **Intermittent Conditions**
3	1. Turn OFF the ignition. 2. Disconnect the air conditioning (A/C) pressure sensor. 3. Turn ON the ignition, with the engine OFF. 4. Measure the voltage from the 5-volt reference circuit of the A/C pressure sensor	4.8-5.2 V		

	to a good ground with a DMM. Refer to **Circuit Testing** in Wiring Systems. Is the voltage within the specified range?		Go to **Step 4**	Go to **Step 5**
4	1. Connect the A/C pressure sensor. 2. Disconnect the fuel tank pressure (FTP) sensor. 3. Measure the voltage from the 5-volt reference circuit of the FTP sensor to a good ground with a DMM. Refer to **Circuit Testing** in Wiring Systems. Is the voltage within the specified range?	4.8-5.2 V	Go to **Intermittent Conditions**	Go to **Step 11**
5	Is the voltage measured in step 3 more than the specified value?	5.2 V	Go to **Step 8**	Go to **Step 6**
6	Monitor the DMM while disconnecting the FTP sensor. Does the voltage return to within the specified range when the FTP is disconnected?	4.8-5.2 V	Go to **Step 10**	Go to **Step 7**
7	1. Turn OFF the ignition. 2. Disconnect the powertrain control module (PCM). 3. Test the 5-volt reference circuit for a short to ground or any sensor low reference circuit. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 12**
8	1. Turn OFF the ignition. 2. Disconnect the PCM. 3. Turn ON the ignition, with the engine OFF. 4. Test all 5-volt reference circuits for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 9**
9	Test the FTP sensor signal circuit for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 12**
10	Replace the FTP sensor. Refer to **Fuel Tank Pressure Sensor Replacement** . Did you complete the replacement?	-	Go to **Step 13**	-

11	Replace the A/C pressure sensor. Refer to **Air Conditioning (A/C) Refrigerant Pressure Sensor Replacement** in Heating, Ventilation and Air Conditioning. Did you complete the replacement?	-	Go to **Step 13**	-
12	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** . Did you complete the replacement?	-	Go to **Step 13**	-
13	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	-	Go to **Step 2**	Go to **Step 14**
14	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P1111

Circuit Description

The intake air temperature (IAT) sensor is a variable resistor. The IAT sensor has a signal circuit and a low reference circuit. The IAT sensor measures the temperature of the air entering the engine. The powertrain control module (PCM) supplies 5 volts to the IAT signal circuit and a ground for the IAT low reference circuit. When the IAT sensor is cold, the sensor resistance is high. When the air temperature increases, the sensor resistance decreases. With high sensor resistance, the PCM detects a high voltage on the IAT signal circuit. With lower sensor resistance, the PCM detects a lower voltage on the IAT signal circuit. If the PCM detects an intermittent high IAT signal voltage, indicating a low temperature, DTC P1111 sets.

Conditions for Running the DTC

- DTCs P0101, P0102, P0103, P0113 are not set.
- The engine run time is more than 120 seconds.
- The engine coolant is more than 60°C (140°F).
- The vehicle speed is less than 11 km/h (7 mph).
- The mass air flow is less than 15 g/s.

Conditions for Setting the DTC

The intake air temperature is less than -38°C (-36°F) intermittently for a calibrated amount of time.

Action Taken When the DTC Sets

- The control module stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Failure Records.
- The driver information center, if equipped, may display a message.

Conditions for Clearing the DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- Clear the DTC with a scan tool.

DTC P1111

Step	Action	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Powertrain Control Module (PCM) Connector End Views or Engine Controls Connector End Views			
1	Did you perform the Diagnostic System Check-Engine Controls?	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	Observe the DTC Information with a scan tool. Is DTC P0113 set?	Go to **DTC P0113**	Go to **Step 3**
3	Test for an intermittent and for a poor connection at the IAT sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 8**	Go to **Step 4**
4	Test the IAT signal circuit between the IAT sensor and the PCM for an intermittent open. Refer to **Inducing Intermittent Fault Conditions** , **Circuit Testing** , and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 8**	Go to **Step 5**
5	Test the IAT signal circuit between the IAT sensor and the PCM for an intermittent short to voltage. Refer to **Inducing Intermittent Fault Conditions** , **Circuit Testing** , and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 8**	Go to **Step 6**
6	Test the low reference circuit for an intermittent open. Refer to **Inducing Intermittent Fault Conditions** , **Circuit Testing** , and **Wiring Repairs** in Wiring Systems.		

	Did you find and correct the condition?	Go to **Step 8**	Go to **Step 7**
7	Test for an intermittent and for a poor connection at the PCM. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 8**	Go to **Intermittent Conditions**
8	1. Clear the DTCs with a scan tool. 2. Turn off the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	Go to **Step 2**	Go to **Step 9**
9	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P1112

Circuit Description

The intake air temperature (IAT) sensor is a variable resistor. The IAT sensor has a signal circuit and a low reference circuit. The IAT sensor measures the temperature of the air entering the engine. The powertrain control module (PCM) supplies 5 volts to the IAT signal circuit and a ground for the IAT low reference circuit. When the IAT sensor is cold, the sensor resistance is high. When the air temperature increases, the sensor resistance decreases. With high sensor resistance, the PCM detects a high voltage on the IAT signal circuit. With lower sensor resistance, the PCM detects a lower voltage on the IAT signal circuit. If the PCM detects an intermittent low IAT signal voltage, indicating a high temperature, DTC P1112 sets.

Conditions for Running the DTC

- DTCs P0112, P0500, P0502, P0503 are not set.
- The engine run time is more than 45 seconds.
- The vehicle speed is more than 40 km/h (25 mph).
- The engine coolant temperature (ECT) is less than 125°C (257°F).

Conditions for Setting the DTC

The PCM detects that the intake air temperature sensor parameter is more than 128°C (262°F) intermittently for a calibrated amount of time.

Action Taken When the DTC Sets

- The control module stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Failure Records.
- The driver information center, if equipped, may display a message.

Conditions for Clearing the DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- Clear the DTC with a scan tool.

DTC P1112

Step	Action	Yes	No
Schematic Reference:Engine Controls Schematics **Connector End View Reference:Powertrain Control Module (PCM) Connector End Views** or **Engine Controls Connector End Views**			
1	Did you perform the Diagnostic System Check-Engine Controls?	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	Observe the DTC information with a scan tool. Is DTC P0112 set?	Go to **DTC P0112**	Go to **Step 3**
3	Test for an intermittent and for a poor connection at the IAT sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 5**	Go to **Step 4**
4	Test the IAT signal circuit between the IAT sensor and the PCM for an intermittent short to ground. Refer to **Inducing Intermittent Fault Conditions** , **Circuit Testing** , and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 5**	Go to **Intermittent Conditions**
5	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	Go to **Step 2**	Go to **Step 6**
	Observe the Capture Info with a scan tool.	Go to **Diagnostic**	

6	Are there any DTCs that have not been diagnosed?	**Trouble Code (DTC) List**	System OK

DTC P1114

Circuit Description

The engine coolant temperature (ECT) sensor is a variable resistor, that measures the temperature of the engine coolant. The powertrain control module (PCM) supplies 5 volts to the ECT signal circuit and a ground for the ECT low reference circuit. When the ECT is cold, the sensor resistance is high. When the ECT increases, the sensor resistance decreases. With high sensor resistance, the PCM detects a high voltage on the ECT signal circuit. With lower sensor resistance, the PCM detects a lower voltage on the ECT signal circuit. If the PCM detects an excessively low ECT signal voltage, which is a high temperature indication, DTC P1114 sets.

Conditions for Running the DTC

The engine run time is more than 10 seconds.

Conditions for Setting the DTC

The PCM detects that the ECT sensor parameter is more than 139°C (282°F) intermittently for a calibrated amount of time.

Action Taken When the DTC Sets

- The control module stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Failure Records.
- The driver information center, if equipped, may display a message.

Conditions for Clearing the DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- Clear the DTC with a scan tool.

DTC P1114

Step	Action	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Powertrain Control Module (PCM) Connector End Views or Engine Controls Connector End Views			
1	Did you perform the Diagnostic System Check-Engine Controls?		Go to **Diagnostic System Check -**

		Go to **Step 2**	**Engine Controls**
2	Observe the DTC information with a scan tool. Is DTC P0117 set?	Go to **DTC P0117**	Go to **Step 3**
3	Observe the engine coolant temperature (ECT) sensor parameter with a scan tool while moving the ECT sensor connector and the powertrain control module (PCM) connector. Refer to **Inducing Intermittent Fault Conditions** in Wiring Systems. Does the scan tool indicate an abrupt change in value?	Go to **Step 5**	Go to **Step 4**
4	Observe the ECT parameter with a scan tool while moving the wiring harness at the ECT sensor and the PCM. Refer to **Inducing Intermittent Fault Conditions** in Wiring Systems. Does the scan tool indicate an abrupt change in value?	Go to **Step 6**	Go to **Step 7**
5	Repair the ECT connector or the terminal as necessary. Refer to **Connector Repairs** in Wiring Systems. Did you complete the repair?	Go to **Step 7**	-
6	Repair the ECT wiring or the wiring harness as necessary. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	Go to **Step 7**	-
7	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	Go to **Step 2**	Go to **Step 8**
8	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P1115

Circuit Description

The engine coolant temperature (ECT) sensor is a variable resistor, that measures the temperature of the engine coolant. The powertrain control module (PCM) supplies 5 volts to the ECT signal circuit and a ground for the ECT low reference circuit. When the ECT is cold, the sensor resistance is high. When the ECT increases, the sensor resistance decreases. With high sensor resistance, the PCM detects a high voltage on the ECT signal circuit. With lower sensor resistance, the PCM detects a lower voltage on the ECT signal circuit. If the PCM detects an excessively high signal voltage, which is a low temperature indication, DTC P1115 sets.

Conditions for Running the DTC

The engine run time is more than 60 seconds.

Conditions for Setting the DTC

The PCM detects an ECT of less than -38°C (-36°F) intermittently for a calibrated amount of time.

Action Taken When the DTC Sets

- The control module stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Failure Records.
- The driver information center, if equipped, may display a message.

Conditions for Clearing the DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- Clear the DTC with a scan tool.

DTC P1115

Step	Action	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Powertrain Control Module (PCM) Connector End Views or Engine Controls Connector End Views			
1	Did you perform the Diagnostic System Check-Engine Controls?	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	Observe the DTC information with a scan tool. Is the DTC P0118 set?	Go to **DTC P0118**	Go to **Step 3**
3	Observe the engine coolant temperature (ECT) sensor parameter with a scan tool while moving the ECT sensor connector and the powertrain control module (PCM) connector. Refer to **Inducing Intermittent Fault Conditions** in Wiring Systems. Does the scan tool indicate an abrupt change in value?	Go to **Step 5**	Go to **Step 4**
4	Observe the ECT parameter with a scan tool while moving the wiring harness at the ECT sensor and the PCM. Refer to **Inducing Intermittent Fault Conditions** in Wiring Systems. Does the scan tool indicate an abrupt change in value?	Go to **Step 6**	Go to **Step 7**
5	Repair the ECT connector or the terminal as necessary. Refer to **Connector Repairs** in Wiring Systems. Did you complete the repair?	Go to **Step 7**	-
	Repair the wiring harness or the wiring as necessary. Refer to		

6	**Wiring Repairs** in Wiring Systems. Did you complete the repair?	Go to **Step 7**	-
7	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	Go to **Step 2**	Go to **Step 8**
8	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P1125

Circuit Description

The accelerator pedal position (APP) sensor is mounted on the accelerator pedal assembly. The sensor is actually 3 individual APP sensors within 1 housing. Three separate signal, low reference, and 5-volt reference circuits are used in order to connect the accelerator pedal sensor assembly and the throttle actuator control (TAC) module. If only one APP sensor DTC is set, the redundant APP systems allow the TAC system to continue operating normally. This DTC sets if the powertrain control module (PCM) detects a condition with more than one APP sensor. One APP sensor DTC will not cause the Reduced Engine Power message to be displayed. Two APP sensor DTCs for the same sensor also will not cause the Reduced Engine Power message to be displayed. However, if two or more DTCs are set involving more than 1 APP sensor, this DTC will set and the Reduced Engine Power message is displayed.

Conditions for Running the DTC

- DTCs P2108, or P1518 are not set.
- The ignition switch is in the crank or run position.
- The ignition voltage is greater than 5.23 volts.

Conditions for Setting the DTC

- Two or more APP sensors are out of range, all 3 APP sensors disagree, or 1 APP sensor is out of range and the other 2 APP sensors disagree.
- All of the above conditions present for less than 1 second.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) when the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The control module

stores this information in the Freeze Frame and/or the Failure Records.

- The control module commands the TAC system to operate in the Reduced Engine Power mode.
- A message center or an indicator displays Reduced Engine Power.
- Under certain conditions the control module commands the engine OFF.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Diagnostic Aids

- Inspect the TAC module connectors for signs of water intrusion. When water intrusion occurs, multiple DTCs could be set with no DTC circuit or component conditions found during diagnostic testing.
- The APP sensor 1 and the throttle position (TP) sensor 1 5-volt reference circuits are internally connected within the TAC module.
- The APP sensor 2 and the TP sensor 2 5-volt reference circuits are internally connected within the TAC module.
- When the TAC module detects a condition within the TAC system, more than 1 TAC System related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Keep this in mind when reviewing the DTC Info.
- For an intermittent, refer to **Intermittent Conditions** .

Test Description

The number below refers to the step number on the diagnostic table.

2: When the problems are corrected which are causing the APP sensor DTCs to set, the status of this DTC will change to History.

DTC P1125 - Accelerator Pedal Position (APP) Sensor System

Step	Action	Yes	No
1	Did you perform the Diagnostic System Check-Engine Controls?	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	This DTC indicates that two or more accelerator pedal position (APP) sensor DTCs are also set. Go to the APP sensor DTCs that are set and perform those diagnostic tests.	Go to **Diagnostic Trouble Code (DTC) List**	-

DTC P1133 OR P1153

Circuit Description

Heated oxygen sensors (HO2S) are used for fuel control and post catalyst monitoring. Each HO2S compares the oxygen content of the surrounding air with the oxygen content in the exhaust stream. The HO2S must reach operating temperature to provide an accurate voltage signal. Heating elements inside the HO2S minimize the time required for the sensors to reach operating temperature. The powertrain control module (PCM) supplies the HO2S with a reference, or bias, voltage of about 450 mV. When the engine is first started the PCM operates in open loop, ignoring the HO2S voltage signal. Once the HO2S reaches operating temperature and closed loop is achieved, the HO2S generates a voltage within a range of 0-1,000 mV that fluctuates above and below bias voltage. High HO2S voltage indicates a rich exhaust stream; low HO2S voltage indicates a lean exhaust stream. This diagnostic will only run once per ignition cycle. The PCM monitors the number of rich-to-lean and lean-to-rich transitions. If the PCM detects that the number of transitions were less than a specified value, DTC P1133 sets for HO2S bank 1 sensor 1, or DTC P1153 sets for HO2S bank 2 sensor 1.

Conditions for Running the DTC

- DTCs P0068, P0101, P0102, P0103, P0106, P0107, P0108, P0112, P0113, P0116, P0117, P0118, P0120, P0131, P0132, P0135, P0151, P0152, P0155, P0200, P0220, P0300, P0410, P0442, P0446, P0452, P0453, P0455, P0491, P0492, P0496, P1125, P1258, P1516, P2101, P2108, P2135, U0107 are not set.
- The ECT Sensor parameter is more than 50°C (122°F).
- The EVAP Purge Solenoid Command parameter is more than 1 percent.
- The MAF Sensor parameter is between 20-55 g/s.
- The Engine Speed parameter is between 1,000-2,300 RPM.
- The TP Indicated Angle parameter is 5 percent more than the value observed at idle.
- The Loop Status parameter is closed.
- The Ignition 1 Signal parameter is between 10-18 volts.
- The Fuel Tank Level Remaining parameter is more than 10 percent.
- The Engine Run Time parameter is more than 160 seconds.
- The above conditions are met for 60 seconds.

Conditions for Setting the DTC

The PCM detects that the affected HO2S lean-to-rich or rich-to-lean transitions are less than a calibrated value.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Test Description

The number below refers to the step number on the diagnostic table.

2: If the voltage is varying above and below the specified value, the condition is not present.

DTC P1133 or P1153

Step	Action	Value (s)	Yes	No
Schematic Reference: Engine Controls Schematics **Connector End View Reference: Engine Controls Connector End Views or Powertrain Control Module (PCM) Connector End Views**				
1	Did you perform the Diagnostic System Check-Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	1. Start the engine. 2. Allow the engine to reach operating temperature. Refer to **Scan Tool Data List** . 3. Operate the engine at 1,500 RPM for 30 seconds. 4. Observe the affected heated oxygen sensor (HO2S) voltage parameter with a scan tool. Is the HO2S voltage parameter varying above and below the specified range?	250-625 mV	Go to **Step 3**	Go to **Step 4**
3	1. Observe the Freeze Frame/Failure Records for this DTC. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	-	Go to **Step 4**	Go to **Intermittent Conditions**

4	1. Turn OFF the ignition. 2. Disconnect the affected heated oxygen sensor (HO2S). 3. Turn ON the ignition, with the engine OFF. 4. Observe the HO2S voltage parameter with a scan tool. Is the HO2S voltage parameter less than the specified value?	100 mV	Go to **Step 6**	Go to **Step 5**
5	1. Connect a 3-amp fused jumper wire between the high signal circuit of the HO2S harness connector on the engine harness side and a good ground. 2. Observe the HO2S voltage parameter with a scan tool. Is the HO2S voltage parameter less than the specified value?	100 mV	Go to **Step 8**	Go to **Step 7**
6	Test the HO2S high signal circuit for a short to the HO2S low signal circuit. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 14**	Go to **Step 11**
7	Test the HO2S high signal circuit for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 14**	Go to **Step 11**
8	1. Remove the jumper wire from the previous step. 2. Connect a 3-amp fused jumper wire between the high signal circuit of the HO2S harness connector on the engine harness side and the low signal circuit of the HO2S harness connector on the engine harness side. 3. Observe the HO2S voltage parameter with a scan tool. Is the HO2S voltage parameter less than the specified value?	100 mV	Go to **Step 10**	Go to **Step 9**
9	Test the HO2S low signal circuit for an open, or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 14**	Go to **Step 11**
10	Test for shorted terminals and for poor connections at the HO2S. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector**	-		

	Repairs in Wiring Systems. Did you find and correct the condition?		Go to **Step 14**	Go to **Step 12**
11	Test for shorted terminals and for poor connections at the powertrain control module (PCM). Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 14**	Go to **Step 13**
12	**NOTE:** **Refer to Silicon Contamination of Heated Oxygen Sensors Notice in Cautions and Notices.** **IMPORTANT:** **The HO2S may be damaged due to contamination. Prior to replacing the HO2S inspect for the following sources of contamination:** • A silicon contaminated HO2S • Fuel contamination-Refer to **Alcohol/Contaminants-in-Fuel Diagnosis (without Special Tool)** or **Alcohol/Contaminants-in-Fuel Diagnosis (with Special Tool)** . • Engine oil consumption-Refer to **Oil Consumption Diagnosis** in Engine Mechanical. • Engine coolant consumption-Refer to **Loss of Coolant** in Engine Cooling. Replace the affected HO2S. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1** or **Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1** .Did you complete the replacement?	-	Go to **Step 14**	-
13	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** . Did you complete the replacement?	-	Go to **Step 14**	-
14	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	-	Go to **Step 2**	Go to **Step 15**
	Observe the Capture Info with a scan tool.		Go to	

15	Are there any DTCs that have not been diagnosed?	-	**Diagnostic Trouble Code (DTC) List**	System OK

DTC P1134 OR P1154

Circuit Description

Heated oxygen sensors (HO2S) are used for fuel control and post catalyst monitoring. Each HO2S compares the oxygen content of the surrounding air with the oxygen content in the exhaust stream. The HO2S must reach operating temperature to provide an accurate voltage signal. Heating elements inside the HO2S minimize the time required for the sensors to reach operating temperature. The powertrain control module (PCM) supplies the HO2S with a reference, or bias, voltage of about 450 mV. When the engine is first started the PCM operates in open loop, ignoring the HO2S voltage signal. Once the HO2S reaches operating temperature and closed loop is achieved, the HO2S generates a voltage within a range of 0-1,000 mV that fluctuates above and below bias voltage. High HO2S voltage indicates a rich exhaust stream; low HO2S voltage indicates a lean exhaust stream. This diagnostic will only run once per ignition cycle. The PCM monitors the rich-to-lean and lean-to-rich transition time. A transition is defined as, the HO2S voltage changes from above 625 mV to below 250 mV or from below 250 mV to above 625 mV. If the PCM detects that the difference between the rich-to-lean average transition time and lean-to-rich average transition time is more than a specified value, DTC P1134 sets for HO2S bank 1 sensor 1, or DTC P1154 sets for HO2S bank 2 sensor 1.

Conditions for Running the DTC

- DTCs P0068, P0101, P0102, P0103, P0106, P0107, P0108, P0112, P0113, P0116, P0117, P0118, P0120, P0131, P0132, P0135, P0151, P0152, P0155, P0200, P0220, P0300, P0410, P0442, P0446, P0452, P0453, P0455, P0491, P0492, P0496, P1125, P1258, P1516, P2101, P2108, P2135, U0107 are not set.
- The ECT Sensor parameter is more than 50°C (122°F).
- The EVAP Purge Solenoid Command parameter is more than 1 percent.
- The MAF Sensor parameter is between 20-55 g/s.
- The Engine Speed parameter is between 1,000-2,300 RPM.
- The TP Indicated Angle parameter is 5 percent more than the value observed at idle.
- The Loop Status parameter is closed.
- The Ignition 1 Signal parameter is between 10-18 volts.
- The Fuel Tank Level Remaining parameter is more than 10 percent.
- The Engine Run Time parameter is more than 160 seconds.
- The above conditions are met for 60 seconds.

Conditions for Setting the DTC

The PCM detects that the difference between the HO2S rich-to-lean average transition time and the lean-to-rich average transition time is more than a calibrated value.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Test Description

The number below refers to the step number on the diagnostic table.

2: If the voltage is varying above and below the specified value, the condition is not present.

DTC P1134 or P1154

Step	Action	Value (s)	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Engine Controls Connector End Views or Powertrain Control Module (PCM) Connector End Views				
1	Did you perform the Diagnostic System Check-Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	1. Start the engine. 2. Allow the engine to reach operating temperature. Refer to **Scan Tool Data List** . 3. Operate the engine at 1,500 RPM for 30 seconds. 4. Observe the affected heated oxygen sensor (HO2S) voltage parameter with a scan tool. Is the HO2S voltage parameter varying above and below the specified range?	250-625 mV	Go to **Step 3**	Go to **Step 4**
	1. Observe the Freeze Frame/Failure Records for this DTC.			

3	2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	-	Go to **Step 4**	Go to **Intermittent Conditions**
4	1. Turn OFF the ignition. 2. Disconnect the affected HO2S. 3. Connect a 3-amp fused jumper wire between the high signal circuit of the HO2S harness connector on the engine harness side and a good ground. 4. Turn ON the ignition, with the engine OFF. 5. Observe the HO2S voltage parameter with a scan tool. Is the HO2S voltage parameter less than the specified value?	100 mV	Go to **Step 6**	Go to **Step 5**
5	Test the HO2S high signal circuit for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 9**
6	1. Remove the jumper wire from the previous step. 2. Connect a 3-amp fused jumper wire between the high signal circuit of the HO2S harness connector on the engine harness side and the low signal circuit of the HO2S harness connector on the engine harness side. 3. Observe the HO2S voltage parameter with a scan tool. Is the HO2S voltage parameter less than the specified value?	100 mV	Go to **Step 8**	Go to **Step 7**
7	Test the HO2S low signal circuit for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 9**
8	Test for shorted terminals and for poor connections at the HO2S. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems.	-		

	Did you find and correct the condition?		Go to **Step 12**	Go to **Step 10**
9	Test for shorted terminals and for poor connections at the powertrain control module (PCM). Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 11**
10	**NOTE:** **Refer to Silicon Contamination of Heated Oxygen Sensors Notice in Cautions and Notices.** **IMPORTANT:** **The HO2S may be damaged due to contamination. Prior to replacing the HO2S inspect for the following sources of contamination:** • A silicon contaminated HO2S • Fuel contamination-Refer to **Alcohol/Contaminants-in-Fuel Diagnosis (without Special Tool)** or **Alcohol/Contaminants-in-Fuel Diagnosis (with Special Tool)** . • Engine oil consumption-Refer to **Oil Consumption Diagnosis** in Engine Mechanical. • Engine coolant consumption-Refer to **Loss of Coolant** in Engine Cooling. Replace the affected HO2S. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1** or **Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1** .Did you complete the replacement?	-	Go to **Step 12**	-
11	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** . Did you complete the replacement?	-	Go to **Step 12**	-
12	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	-	Go to **Step 2**	Go to **Step 13**
	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?		Go to **Diagnostic**	

13		-	**Trouble Code (DTC) List**	System OK

DTC P1380

System Description

The powertrain control module (PCM) detects engine misfire events by monitoring variations in the crankshaft rotation speed. Wheel speed changes caused by rough road conditions can cause changes in crankshaft rotation speed. By monitoring the wheel speed sensors, the antilock brake system (ABS) can determine if the vehicle is operating on a rough road. If the ABS is detecting a rough road condition severe enough to effect misfire detection, a rough road signal is sent to the PCM on the serial data circuit. If DTC P0300 is set and the rough road information is not available due to an ABS malfunction, DTC P1380 will set.

Conditions for Running the DTC

- DTCs P0101, P0102, P0103, P0335, P0336, P0742, P1120, P1121, P1220, and P1221 are not set.
- The vehicle speed is more than 16 km/h (10 mph).
- The engine load is less than 60 percent.
- The engine misfire is detected-DTC P0300 set.
- The engine speed is less than 3,200 RPM.

Conditions for Setting the DTC

An ABS malfunction exists preventing the PCM from receiving rough road detection data.

Action Taken When the DTC Sets

- The control module stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Failure Records.
- The driver information center, if equipped, may display a message.

Conditions for Clearing the DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- Clear the DTC with a scan tool.

DTC P1380

Step	Action	Yes	No
1	Did you perform the Diagnostic	Go to **Diagnostic System Check -**	Go to **Diagnostic System**

DTC P1381

System Description

The powertrain control module (PCM) detects engine misfire events by monitoring variations in the crankshaft rotation speed. Wheel speed changes caused by rough road conditions can cause changes in crankshaft rotation speed. By monitoring the wheel speed sensors, the antilock brake system (ABS) can determine if the vehicle is operating on a rough road. If the ABS is detecting a rough road condition severe enough to effect misfire detection, a rough road signal is sent to the PCM on the serial data circuit. If DTC P0300 is set and the rough road information is not available due to an ABS malfunction, DTC P1381 will set.

Conditions for Running the DTC

- The vehicle speed is more than 16 km/h (10 mph).
- The engine speed is less than 3,200 RPM.
- The engine load is less than 60 percent.
- Engine misfire is detected-DTC P0300 set.

Conditions for Setting the DTC

- A serial data malfunction exists preventing the PCM from receiving rough road detection data.
- The above conditions met for 20 seconds.

Action Taken When the DTC Sets

- The control module stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Failure Records.
- The driver information center, if equipped, may display a message.

Conditions for Clearing the DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- Clear the DTC with a scan tool.

Test Description

The number below refers to the step number on the diagnostic table.

1: This step will diagnose a malfunction in the serial data circuits.

DTC P1381

Step	Action	Yes	No
1	Did you perform the Diagnostic System Check-Engine Controls?	Go to **Diagnostic System Check - ABS** in Antilock Brake System	Go to **Diagnostic System Check - Engine Controls**

DTC P1516

Circuit Description

The predicted throttle position is compared to the actual throttle position. The 2 values should be within a calibrated range of each other. Both the powertrain control module (PCM) and the throttle actuator control (TAC) module redundantly monitor the predicted and the actual throttle position. This DTC sets if the TAC detects an out of range condition between the predicted and the actual throttle position.

Conditions for Running the DTC

- DTC P1518 is not set.
- The ignition switch is in the crank or the run position.
- The ignition voltage is greater than 5.23 volts.
- The TAC system is not in the battery saver mode.

Conditions for Setting the DTC

- The TAC module detects that the predicted and actual throttle positions are not within a calibrated range of each other.

  OR

- The PCM and the TAC cannot determine throttle position.

  OR

- Both throttle position (TP) sensors are invalid
- All of the above conditions are met for less than 1 second.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) when the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Freeze Frame and/or the Failure Records.
- The control module commands the TAC system to operate in the Reduced Engine Power mode.
- A message center or an indicator displays Reduced Engine Power.
- Under certain conditions the control module commands the engine OFF.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Diagnostic Aids

- Inspect the TAC module connectors for signs of water intrusion. When water intrusion occurs, multiple DTCs could be set with no DTC circuit or component conditions found during diagnostic testing.
- Ensure that the starting and charging systems are operating properly. Low system voltage can cause this DTC to set.
- When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting components during testing may set additional DTCs. Keep this in mind when reviewing the Stored Capture Info.
- For an intermittent, refer to **Intermittent Conditions** .

Test Description

The numbers below refer to the step numbers on the diagnostic table.

7: If the TP Indicated angle does not follow the movement of the throttle blade, and no TP Sensor DTCs are set, there is a mechanical condition with the throttle shaft or the TP sensor.

18: When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.

DTC P1516

Step	Action	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View References: Powertrain Control Module (PCM) Connector End Views or Engine Controls Connector End Views			
1	Did you perform the Diagnostic System Check-Engine Controls?	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	Are DTCs P1518 and P2135 both set also?	Go to **DTC P2135**	Go to **Step 3**
3	Is DTC P2135 set?	Go to **DTC P2135**	Go to **Step 4**

4	1. Turn OFF the ignition for 15 seconds. 2. Turn ON the ignition, with the engine OFF. 3. Observe the throttle position (TP) sensor 1 and the TP sensor 2 angle parameters. 4. Slowly depress the accelerator pedal to wide open throttle (WOT) and slowly return the pedal to the released position. Does the scan tool indicate both angle parameters increasing as the pedal is depressed to WOT and decreasing as the pedal is released?	Go to Diagnostic Aids	Go to **Step 5**
5	1. Turn OFF the ignition. 2. Disconnect the throttle actuator motor harness connector. 3. Remove the air inlet duct from the throttle body. 4. Inspect the throttle body and the throttle plate for debris, damage, and tampering that could cause the throttle plate to bind. If debris is found, clean the throttle body and repair the source of contamination. If the throttle body and/or throttle plate is damaged, replace the throttle body. Refer to **Throttle Body Assembly Replacement** . Did you find and correct the condition?	Go to **Step 17**	Go to **Step 6**
6	Manually, slowly open the throttle plate to WOT and return the plate back to the closed position several times. Does the throttle plate move smoothly without binding in both directions?	Go to **Step 7**	Go to **Step 14**
7	1. Turn ON the ignition, with the engine OFF. 2. Manually, slowly open the throttle blade to WOT and return the plate to the closed throttle position while observing the TP sensor 1 and TP sensor 2 angle parameters on the scan tool. Does the scan tool indicate both angle parameters increasing as the throttle blade is moved to WOT and decreasing as the throttle blade is moved to the closed position?	Go to **Step 8**	Go to **Step 15**
8	1. Turn OFF the ignition. 2. Disconnect the throttle actuator control (TAC) module harness connector containing the TAC motor circuits. 3. Turn ON the ignition, with the engine OFF. 4. Test the TAC motor circuits for a short to voltage, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems.		

	Did you find and correct the condition?	Go to **Step 17**	Go to **Step 9**
9	Test each TAC motor circuit for an open or for high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 17**	Go to **Step 10**
10	Test each TAC motor circuit for a short to ground, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 17**	Go to **Step 11**
11	1. Disconnect the other TAC module harness connector. 2. Test for a short between each TAC motor circuit and all other TAC module circuits, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 17**	Go to **Step 12**
12	1. Turn OFF the ignition. 2. Reconnect the TAC module. 3. Connect a test lamp between the 2 TAC motor circuits at the TAC motor harness connector. 4. Turn ON the ignition, with the engine OFF and observe the test lamp. Did the test lamp illuminate briefly when the ignition was turned ON?	Go to **Step 13**	Go to **Step 15**
13	Inspect for poor connections at the TAC motor harness connector. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	Go to **Step 17**	Go to **Step 14**
14	Replace the throttle body assembly. Refer to **Throttle Body Assembly Replacement** . Did you complete the replacement?	Go to **Step 17**	-
15	Inspect for poor connections at the TAC module harness connectors. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	Go to **Step 17**	Go to **Step 16**
16	Replace the TAC module. Refer to **Throttle Actuator Control (TAC) Module Replacement** . Did you complete the replacement?	Go to **Step 17**	-
	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine.		

17	4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze/Frame Failure Records. Does the DTC run and pass?	Go to **Step 18**	Go to **Step 2**
18	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P2101

Circuit Description

The commanded throttle position, based on accelerator pedal position and possibly on other limiting factors, is compared to the actual throttle position. The 2 values should be within a calibrated range of each other. Both the powertrain control module (PCM) and the throttle actuator control (TAC) module redundantly monitor the commanded and actual throttle position. If the PCM detects an out-of-range condition between the commanded and the actual pedal position, DTC P2101 sets.

Conditions for Running the DTC

- DTCs P0601, P0602, P0604, P0606, P1516, P2108, U0107 are not set.
- DTCs P0120, P0220 and P2135 are not set at the same time, or DTCs P0120 and P0220 are not set at the same time.
- The ignition switch is in the crank or the run position.
- The ignition voltage is greater than 8.5 volts.
- The TAC system is not in the battery saver mode.

Conditions for Setting the DTC

- The PCM detects that the commanded and the actual throttle positions are not within a calibrated range of each other.
- The above condition is met for less than 1 second.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) when the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Freeze Frame and/or the Failure Records.
- The control module commands the TAC system to operate in the Reduced Engine Power mode.
- A message center or an indicator displays Reduced Engine Power.
- Under certain conditions the control module commands the engine OFF.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Diagnostic Aids

- If you do not find any trouble, inspect for mechanical problems or for binding that may be temperature related. Components may not move freely in extreme heat or cold due to the presence of contaminants or due to ice formation.
- Inspect the TAC module connectors for signs of water intrusion. When water intrusion occurs, multiple DTCs could be set with no circuit or component conditions found during diagnostic testing.
- When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting components during testing may set additional DTCs. Keep this in mind when reviewing the stored information, Capture info.
- For an intermittent, refer to **Intermittent Conditions** .

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5: If the throttle position (TP) Indicated angle does not follow the movement of the throttle blade, and no TP sensor DTCs are set, there is a mechanical condition with the throttle shaft or with the TP sensor.

16: When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting components during testing may set additional DTCs. Keep this in mind when reviewing the stored information, Capture info.

DTC P2101

Step	Action	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View References: Powertrain Control Module (PCM) Connector End Views or Engine Controls Connector End Views			
1	Did you perform the Diagnostic System Check-Engine Controls?	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	Are DTCs P2135 and U0107 both set?	Go to **DTC U0107**	Go to **Step 3**
3	Is DTC P2135 set?	Go to **DTC P2135**	Go to **Step 4**

4	**IMPORTANT:** **The next test must be started within 15 seconds after the ignition is turned ON.** 1. Turn OFF the ignition for 15 seconds. 2. Turn ON the ignition, with the engine OFF. 3. Observe the TP sensor 1 and TP sensor 2 angle parameters with a scan tool. 4. Slowly depress the accelerator pedal to wide open throttle (WOT) and slowly return the pedal to the released position. Does the scan tool indicate both angle parameters increasing as the pedal is depressed to WOT and decreasing as the pedal is moved to the released position?	Go to Diagnostic Aids	Go to **Step 5**
5	1. Turn OFF the ignition. 2. Remove the air duct from the throttle body assembly. 3. Disconnect the throttle actuator control motor harness connector. 4. Turn ON the ignition, with the engine OFF. 5. With your hand, slowly open the throttle blade to WOT and then to the closed throttle position while observing the TP sensor 1 and TP sensor 2 angle parameters on the scan tool. Does the scan tool indicate both angle parameters increasing as the throttle plate is moved to WOT and decreasing as the throttle plate is moved to the closed position?	Go to **Step 6**	Go to **Step 13**
6	1. Turn OFF the ignition. 2. Disconnect the throttle actuator control (TAC) module harness connector containing the throttle actuator control motor circuits. 3. Turn ON the ignition, with the engine OFF. 4. Test the throttle actuator control motor circuits for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 15**	Go to **Step 7**
7	Test each throttle actuator control motor circuit for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 15**	Go to **Step 8**

8	Test each throttle actuator control motor circuit for a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 15**	Go to **Step 9**
9	1. Disconnect the other TAC module harness connector. 2. Test for a short between each throttle actuator control motor circuit and all other TAC module circuits. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 15**	Go to **Step 10**
10	1. Turn OFF the ignition. 2. Connect the TAC module. 3. Connect a test lamp between the two throttle actuator control motor terminals at the throttle actuator control motor harness connector. 4. Turn ON the ignition, with the engine OFF and observe the test lamp. Did the test lamp illuminate briefly when the ignition was turned ON?	Go to **Step 11**	Go to **Step 13**
11	Inspect for poor connections at the throttle actuator control motor harness connector. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	Go to **Step 15**	Go to **Step 12**
12	Replace the throttle body assembly. Refer to **Throttle Body Assembly Replacement** . Did you complete the replacement?	Go to **Step 15**	-
13	Inspect for poor connections at the TAC module harness connectors. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	Go to **Step 15**	Go to **Step 14**
14	Replace the TAC module. Refer to **Throttle Actuator Control (TAC) Module Replacement** . Did you complete the replacement?	Go to **Step 15**	-
15	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the		

	Freeze Frame/Failure Records. Did the DTC fail this ignition?	Go to **Step 2**	Go to **Step 16**
16	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P2108

Circuit Description

The throttle actuator control (TAC) module contains data which is essential for proper TAC system operation. The TAC module continuously tests the integrity of this data. When the TAC module is unable to write or read data to and from random access memory (RAM) or when the TAC module is unable to correctly read data from the flash memory, or when an internal TAC module processor fault is detected, this DTC sets.

Conditions for Running the DTC

- DTC P1518 is not set.
- The ignition switch is in the crank or the run position.
- The ignition voltage is greater than 6 volts.

Conditions for Setting the DTC

- The TAC module determines that an internal data test did not pass.
- All above conditions met for less than 1 second.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) when the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Freeze Frame and/or the Failure Records.
- The control module commands the TAC system to operate in the Reduced Engine Power mode.
- A message center or an indicator displays Reduced Engine Power.
- Under certain conditions the control module commands the engine OFF.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Diagnostic Aids

- Ensure the starting and charging systems are operating properly. Low system voltage can cause this DTC to set.
- Inspect the TAC module connectors for signs of water intrusion. When water intrusion occurs, multiple DTCs could be set with no DTC circuit or component conditions found during diagnostic testing.
- When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting the components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.

Test Description

The number below refers to the step number on the diagnostic table.

4: When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting the components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.

DTC P2108

Step	Action	Yes	No
Schematic Reference: Engine Controls Schematics **Connector End View References: Powertrain Control Module (PCM) Connector End Views , or Engine Controls Connector End Views**			
1	Did you perform the Diagnostic System Check-Engine Controls?	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	Replace the throttle actuator control (TAC) Module. Refer to **Throttle Actuator Control (TAC) Module Replacement** . Did you complete the replacement?	Go to **Step 3**	-
3	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze/Frame Failure Records. Does the DTC run and pass?	Go to **Step 4**	Go to **Step 2**
4	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P2120

Circuit Description

The accelerator pedal position (APP) sensor is mounted on the accelerator pedal assembly. The sensor is actually 3 individual APP sensors within 1 housing. Three separate signal, low reference and 5-volt reference circuits connect the APP sensor assembly to the throttle actuator control (TAC) module. Each sensor has a unique functionality. The APP sensor 1 signal is pulled up to the reference voltage as the accelerator pedal is depressed, from below 1 volt at 0 percent pedal travel, with the pedal at rest, to above 2 volts at 100 percent pedal travel, with the pedal fully depressed. The APP sensor 2 signal is pulled down to the low reference from above 4 volts at 0 percent pedal travel to below 2.9 volts at 100 percent pedal travel. The APP sensor 3 signal is pulled down to low reference from above 3.8 volts at 0 percent pedal travel to below 3.1 volts at 100 percent pedal travel. Throttle position (TP) sensor 1 and APP sensor 1 share a 5 volt reference circuit that is connected within the TAC module. TP sensor 2 and APP sensor 2 share a 5-volt reference circuit that is connected within the TAC module. If only 1 APP sensor DTC is set, the redundant APP systems allow the TAC system to continue operating normally. One APP sensor DTC will not cause the Reduced Engine Power message to be displayed. Two APP sensor DTCs for the same sensor also will not cause the Reduced Engine Power message to be displayed. If an out of range condition is detected with this APP sensor, this DTC will be set.

Conditions for Running the DTC

- DTCs P0601, P0602, P0606, P2108, or P1518 are not set.
- The ignition switch is in the crank or the run position.
- The ignition voltage is greater than 5.23 volts.

Conditions for Setting the DTC

- APP sensor 1 voltage ranges between 0.25-4.22 volts.
- All of the above conditions present for less than 1 second.

Action Taken When the DTC Sets

- The control module stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Failure Records.
- If one or more APP sensor DTCs are set for a single APP sensor, the following occurs:
    - The control module will not command Reduced Engine Power mode.
    - The control module will use the remaining two APP sensors to calculate throttle response.
- If certain multiple APP sensor DTCs are set for more than one APP sensor, the following occurs:
    - The control module commands Reduced Engine Power mode.
    - The APP indicated angle is limited to a predetermined value to limit the amount of throttle control.
    - The message center displays Reduced Engine Power.
- If all three APP sensors are out of range, the following occurs:

- The control module commands Reduced Engine Power mode.
- The APP indicated angle is limited to 0 percent. The control module only allows the engine to idle.
- The message center displays Reduced Engine Power.

Conditions for Clearing the DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- Clear the DTC with a scan tool.

Diagnostic Aids

- Inspect the TAC module connectors for signs of water intrusion. When water intrusion occurs, multiple DTCs could be set with no DTC circuit or component conditions found during diagnostic testing.
- When the TAC module detects throttle movement with a DTC P2120 set, a DTC P2121 also sets.
- When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.
- For an intermittent, refer to **Intermittent Conditions**

Test Description

The numbers below refer to the step numbers on the diagnostic table.

12: This test isolates whether the short is to another TAC system circuit in the harness or within the TAC module.

26: When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.

DTC P2120

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View References: Powertrain Control Module (PCM) Connector End Views or Engine Controls Connector End Views				
1	Did you perform the Diagnostic System Check-Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
	IMPORTANT: **If DTC P1518 or P0120 is also set, refer to the appropriate DTC for further diagnosis.**			

2	1. Turn ON the ignition, with the engine OFF and your foot OFF the accelerator pedal. 2. Observe the accelerator pedal position (APP) sensor 1 voltage, with a scan tool. Does the scan tool indicate APP sensor 1 voltage within the specified values?	0.25-2.2 V	Go to **Step 3**	Go to **Step 6**
3	Depress the accelerator pedal to the wide open throttle (WOT) position. Does the scan tool indicate APP sensor 1 voltage within the specified values?	2.24-4.2 V	Go to **Step 4**	Go to **Step 6**
4	1. Turn OFF the ignition for 30 seconds. 2. Turn ON the ignition, with the engine OFF 3. Select the DTC option on the scan tool. 4. Lightly touch and move the related engine wiring harnesses and the connectors, while monitoring the DTC Information. Did this DTC fail this ignition, during the above test ?	-	Go to **Step 24**	Go to **Step 5**
5	1. Continue to observe the DTC Information. 2. Depress the accelerator pedal to WOT and then return the pedal to the released position. Did this DTC fail this ignition, during the above test ?	-	Go to **Step 19**	Go to Diagnostic Aids
6	Disconnect the APP sensor harness connector. Does the scan tool indicate APP sensor 1 voltage at the specified value?	0 V	Go to **Step 7**	Go to **Step 11**
7	Connect a test lamp between the APP sensor 1 signal circuit and B+. Does the scan tool indicate APP sensor 1 voltage at the specified value?	5 V	Go to **Step 8**	Go to **Step 13**
8	Test the APP sensor 1 5-volt reference circuit for voltage, with a DMM. Does the DMM indicate voltage within the specified values?	4.6-5.4 V	Go to **Step 10**	Go to **Step 9**
	1. Turn OFF the ignition. 2. Disconnect the throttle actuator motor harness connector. 3. Remove the air inlet duct from the throttle body assembly.			

9	4. Turn ON the ignition. 5. Manually rotate the throttle blade to WOT and hold. 6. Test the APP sensor 1 5-volt reference circuit for voltage, with a DMM. Does the DMM indicate voltage within the specified values?	4.6-5.4 V	Go to **Step 21**	Go to **Step 16**
10	1. Connect a fused jumper between the APP sensor 1 low reference circuit and the APP sensor 1 5-volt reference circuit. 2. Observe the throttle position (TP) sensor 1 voltage parameter, with a scan tool. Does the scan tool indicate the TP sensor 1 voltage is at the specified value?	0 V	Go to **Step 19**	Go to **Step 17**
11	1. Turn OFF the ignition. 2. Disconnect the throttle actuator control (TAC) module harness connector containing the APP sensor circuits. 3. Turn ON the ignition with the engine OFF. 4. Test the APP sensor 1 signal circuit for a short to voltage, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 12**
12	1. Turn OFF the ignition. 2. Disconnect the other TAC module harness connector. 3. Test for a short between the APP sensor 1 signal circuit and all other TAC module circuits, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 22**
13	1. Turn OFF the ignition. 2. Disconnect the TAC module harness connector containing the APP sensor circuits. 3. Test the APP sensor 1 signal circuit for an open or for high resistance, with a DMM.	-		

	Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?		Go to **Step 25**	Go to **Step 14**
14	Test the APP sensor 1 signal circuit for a short to ground, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 15**
15	1. Turn OFF the ignition. 2. Disconnect the other TAC module harness connector. 3. Test for a short between the APP sensor 1 signal circuit and all other TAC module circuits, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 22**
16	1. Turn OFF the ignition. 2. Disconnect the TAC module connector containing the APP sensor circuits. 3. Test the APP sensor 1 5-volt reference circuit for an open or for high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 22**
17	1. Disconnect the TAC module connector containing the APP sensor circuits. 2. Test the APP sensor 1 low reference circuit for an open or for high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 18**
18	Test the TAC module ground circuit for an open or for high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 22**
19	Inspect for poor connections at the harness connector of the APP sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems.	-		

	Did you find and correct the condition?		Go to **Step 25**	Go to **Step 20**
20	Replace the APP sensor assembly. Refer to **Accelerator Pedal Position (APP) Sensor Replacement** . Did you complete the repair?	-	Go to **Step 25**	-
21	Did DTC P1120 set while performing step 9?	-	Go to **DTC P0120**	Go to **Step 22**
22	Inspect for poor connections at the harness connector of the TAC module. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 23**
23	Replace the TAC module. Refer to **Throttle Actuator Control (TAC) Module Replacement** . Did you complete the repair?	-	Go to **Step 25**	-
24	Repair the intermittent condition as necessary. Refer to **Connector Repairs** and **Wiring Repairs** in Wiring Systems. Did you complete the repair?	-	Go to **Step 25**	-
25	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze/Frame Failure Records. Does the DTC run and pass?	-	Go to **Step 26**	Go to **Step 2**
26	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P2121

Circuit Description

The accelerator pedal position (APP) sensor is mounted on the accelerator pedal assembly. The sensor is actually 3 individual APP sensors within 1 housing. Three separate signal, low reference and 5-volt reference circuits connect the APP sensor assembly to the throttle actuator control (TAC) module. Each sensor has a unique functionality. The APP sensor 1 signal is pulled up to the reference voltage as the accelerator pedal is depressed, from below 1 volt at 0 percent pedal travel, with the pedal at rest. To above 2 volts at 100 percent pedal travel, with the pedal fully depressed. The APP sensor 2 signal is pulled down to the low reference from

above 4 volts at 0 percent pedal travel to below 2.9 volts at 100 percent pedal travel. The APP sensor 3 signal is pulled down to low reference from above 3.8 volts at 0 percent pedal travel to below 3.1 volts at 100 percent pedal travel. TP sensor 1 and APP sensor 1 share a 5 volt reference circuit that is connected within the TAC module. TP sensor 2 and APP sensor 2 share a 5-volt reference circuit that is connected within the TAC module. If only 1 APP sensor DTC is set, the redundant APP systems allow the TAC system to continue operating normally. One APP sensor DTC will not cause the Reduced Engine Power message to be displayed. Two APP sensor DTCs for the same sensor also will not cause the Reduced Engine Power message to be displayed. If an out of range condition is detected with the APP sensors, DTC 2121 sets.

Conditions for Running the DTC

- DTCs P0606, P2108, or U0107 are not set.
- The ignition switch is in the crank or run position.
- The ignition voltage is greater than 5.23 volts.

Conditions for Setting the DTC

- APP sensor 1 disagrees with APP sensor 2 by more than 10.5 percent and APP sensor 1 disagrees with APP sensor 3 by more than 13 percent.
- All of the above conditions are present for less than 1 second.

Action Taken When the DTC Sets

- The control module stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Failure Records.
- If one or more APP sensor DTCs are set for a single APP sensor, the following occurs:
  - The control module will not command Reduced Engine Power mode.
  - The control module will use the remaining two APP sensors to calculate throttle response.
- If certain multiple APP sensor DTCs are set for more than one APP sensor, the following occurs:
  - The control module commands Reduced Engine Power mode.
  - The APP indicated angle is limited to a predetermined value to limit the amount of throttle control.
  - The message center displays Reduced Engine Power.
- If all three APP sensors are out of range, the following occurs:
  - The control module commands Reduced Engine Power mode.
  - The APP indicated angle is limited to 0 percent. The control module only allows the engine to idle.
  - The message center displays Reduced Engine Power.

Conditions for Clearing the DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other

non-emission related diagnostic.

- Clear the DTC with a scan tool.

Diagnostic Aids

- Inspect the TAC module connectors for signs of water intrusion. When water intrusion occurs, multiple DTCs could be set with no DTC circuit or component conditions found during diagnostic testing.
- When the TAC module detects throttle movement with a DTC P2120 set, a DTC P2121 also sets.
- When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.
- For an intermittent, refer to **Intermittent Conditions** .

Test description

The numbers below refer to the steps numbers in the diagnostic table.

2: This step determines if a communication condition exists.

5: This step isolates an internal APP sensor failure. The condition may only occur at a certain accelerator pedal position. Monitoring the APP angles for sensor 2 and sensor 3 is an accurate way of verifying the actual position of the pedal. The APP angles for all 3 sensors should be within a few percentages of each other. When the pedal is at rest, the APP angle for all 3 sensors should be 0 percent. When the pedal is fully depressed, all APP angles should be 100 percent.

6: The APP sensor 1 shares a common 5-volt reference circuit with the TP sensor 1. Monitoring the TP sensor 1 voltage aids in diagnosing the APP sensor 5-volt reference and the low reference circuits. If the scan tool displays near 0 volts then the circuits are OK.

9: With the TAC module still connected, this test will help determine a short to the signal circuit either within the TAC module or the wiring.

10: This step determines whether the TAC module or a shorted circuit is causing the condition.

19: When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting the components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.

DTC P2121

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View References: Powertrain Control Module (PCM) Connector End Views , or Engine Controls Connector End Views				
1	Did you perform the Diagnostic System Check-Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	Is DTC U0107 also set?	-	Go to **DTC**	

			U0107	Go to **Step 3**
3	**IMPORTANT:** **Do not depress the accelerator pedal.** 1. Turn OFF the ignition for 15 seconds. 2. Start the engine. 3. Observe the DTC Information, with a scan tool. Did any other throttle actuator control (TAC) module or accelerator pedal position (APP) sensor DTC set except P1125?	-	Go to **Diagnostic Trouble Code (DTC) List**	Go to **Step 4**
4	Observe the APP sensor Agree/Disagree parameters, with a scan tool. Does the scan tool indicate Disagree for any of the APP Agree/Disagree parameters?	-	Go to **Step 6**	Go to **Step 5**
5	1. Turn OFF the ignition. 2. Turn ON the ignition with the engine OFF. 3. Observe the APP sensor angles for all 3 APP sensors, with a scan tool. 4. Slowly depress the accelerator pedal, stopping at 25, 50, 75, and 100 percent. 5. Slowly release the accelerator pedal, stopping at 75, 50, 25, and 0 percent. Does the scan tool indicate APP sensor 1 angle within 10.5 percent of the APP sensor 2 angle and APP sensor 1 angle within 13 percent of the APP sensor 3 angle during the above test?	-	Go to Diagnostic Aids	Go to **Step 6**
6	1. Turn OFF the ignition. 2. Disconnect the APP sensor harness connector. 3. Connect a fused jumper between the APP sensor 1 5-volt reference circuit and ground. 4. Turn ON the ignition with the engine OFF. 5. Observe the throttle position (TP) sensor 1 voltage parameter, with a scan tool. Does the scan tool indicate TP sensor 1 voltage at the specified value?	0.0 V	Go to **Step 7**	Go to **Step 11**
7	1. Connect a fused jumper between the APP sensor 1 5-volt reference circuit and the APP sensor 1 low reference circuit. 2. Observe the TP sensor 1 voltage parameter.	0.0 V		

	Does the scan tool indicate TP sensor 1 voltage at specified value?		Go to **Step 8**	Go to **Step 12**
8	1. Connect a fused jumper between the APP sensor 1 signal circuit and the APP sensor 1 5-volt reference circuit. 2. Observe the APP sensor 1 voltage parameter, with a scan tool. Does the scan tool indicate APP sensor 1 voltage near the specified value?	5.0 V	Go to **Step 14**	Go to **Step 9**
9	Test for a short between the APP sensor 1 signal circuit and all other APP circuits at the APP sensor harness connector, with a DMM. Does the DMM indicate a short to another circuit?	-	Go to **Step 10**	Go to **Step 13**
10	1. Turn OFF the ignition. 2. Disconnect both of the TAC module harness connectors. 3. Test for a short between the APP sensor 1 signal circuit and all other APP circuits at the APP sensor harness connector, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 18**	Go to **Step 15**
11	1. Turn OFF the ignition. 2. Disconnect the TAC module harness connector containing the APP circuits. 3. Test the APP sensor 1 5-volt reference circuit for an open or the high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 18**	Go to **Step 15**
12	1. Turn OFF the ignition. 2. Disconnect the TAC module harness connector containing the APP circuits. 3. Test the APP sensor 1 low reference circuit for an open or high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 18**	Go to **Step 15**

13	1. Turn OFF the ignition. 2. Disconnect the TAC module harness connector containing the APP circuits. 3. Test the APP sensor 1 signal circuit for an open or the high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find an open or high resistance?	-	Go to **Step 18**	Go to **Step 15**
14	Inspect for poor connections at the harness connector of the APP sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 18**	Go to **Step 16**
15	Inspect for poor connections at the harness connectors of the TAC Module. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 18**	Go to **Step 17**
16	Replace the APP sensor assembly. Refer to **Accelerator Pedal Position (APP) Sensor Replacement** . Did you complete the replacement?	-	Go to **Step 18**	-
17	Replace the TAC module. Refer to **Throttle Actuator Control (TAC) Module Replacement** . Did you complete the replacement?	-	Go to **Step 18**	-
18	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze/Frame Failure Records. Did the DTC fail this ignition?	-	Go to **Step 2**	Go to **Step 19**
19	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P2125

Circuit Description

The accelerator pedal position (APP) sensor is mounted on the accelerator pedal assembly. The sensor is actually 3 individual APP sensors within 1 housing. Three separate signal, low reference and 5-volt reference circuits connect the APP sensor assembly to the throttle actuator control (TAC) module. Each sensor has a unique functionality. The APP sensor 1 signal is pulled up to the reference voltage as the accelerator pedal is depressed, from below 1 volt at 0 percent pedal travel, with the pedal at rest, to above 2 volts at 100 percent pedal travel, with the pedal fully depressed. The APP sensor 2 signal is pulled down to the low reference from above 4 volts at 0 percent pedal travel to below 2.9 volts at 100 percent pedal travel. The APP sensor 3 signal is pulled down to low reference from above 3.8 volts at 0 percent pedal travel to below 3.1 volts at 100 percent pedal travel. Throttle position (TP) sensor 1 and APP sensor 1 share a 5-volt reference circuit that is connected within the TAC module. TP sensor 2 and APP sensor 2 share a 5-volt reference circuit that is connected within the TAC module. If only 1 APP sensor DTC is set, the redundant APP systems allow the TAC system to continue operating normally. One APP sensor DTC will not cause the Reduced Engine Power message to be displayed. Two APP sensor DTCs for the same sensor also will not cause the Reduced Engine Power message to be displayed. If an out of range condition is detected with this APP sensor, this DTC will be set.

Conditions for Running the DTC

- DTCs P0601, P0602, P0606, P2108, or P1518 are not set.
- The ignition switch is in the crank or the run position.
- The ignition voltage is greater than 5.23 volts.

Conditions for Setting the DTC

- The APP sensor 2 voltage is less than 0.83 volts or greater than 4.81 volts.
- All of the above conditions are present for less than 1 second.

Action Taken When the DTC Sets

- The control module stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Failure Records.
- If one or more APP sensor DTCs are set for a single APP sensor, the following occurs:
    - The control module will not command Reduced Engine Power mode.
    - The control module will use the remaining two APP sensors to calculate throttle response.
- If certain multiple APP sensor DTCs are set for more than one APP sensor, the following occurs:
    - The control module commands Reduced Engine Power mode.
    - The APP indicated angle is limited to a predetermined value to limit the amount of throttle control.
    - The message center displays Reduced Engine Power.
- If all three APP sensors are out of range, the following occurs:
    - The control module commands Reduced Engine Power mode.
    - The APP indicated angle is limited to 0 percent. The control module only allows the engine to idle.
    - The message center displays Reduced Engine Power.

Conditions for Clearing the DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- Clear the DTC with a scan tool.

Diagnostic Aids

- Inspect the TAC module connectors for signs of water intrusion. When water intrusion occurs, multiple DTCs could be set with no DTC circuit or component conditions found during diagnostic testing.
- When the TAC module detects throttle movement with a DTC P2120 set, a DTC P2121 also sets.
- When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.
- For an intermittent, refer to **Intermittent Conditions** .

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: TP sensor 2 and the APP sensor 2 share a common 5-volt reference source. Diagnose DTC P0220 first, if this DTC is also set.

18: This test determines whether the TAC module can recognize a change in signal voltage.

19: There are 3 separate 5-volt reference sources within the TAC module. TP sensor 1 and APP sensor 1 share one 5-volt reference source, TP sensor 2 and APP sensor 2 share another common 5-volt reference source and APP sensor 3 uses the third by itself. This test determines whether the signal circuit is shorted to any one of the 5-volt reference circuits. If a short exists, the corresponding sensor voltage will be pulled low.

20: The previous step found the signal circuit and a 5-volt reference circuit shorted together. This test isolates whether the short is in the harness or within the TAC module.

26: When the TAC module detects a condition within the TAC System, more than 1 TAC System related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.

DTC P2125

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Powertrain Control Module (PCM) Connector End Views , or Engine Controls Connector End Views				
1	Did you perform the Diagnostic System Check-Engine Controls?	-		Go to **Diagnostic System Check -**

			Go to **Step 2**	**Engine Controls**
2	**IMPORTANT:** **If DTC P1518 or P0220 is also set, refer to Diagnostic Trouble Code (DTC) List and diagnose the applicable DTC first.** 1. Turn ON the ignition, with the engine OFF. 2. Observe the accelerator pedal position (APP) sensor 2 voltage parameter, with a scan tool. Does the scan tool indicate APP sensor 2 voltage is within the specified values?	3.90-4.81 V	Go to **Step 3**	Go to **Step 6**
3	Fully depress the accelerator pedal to the wide open throttle (WOT) position. Does the scan tool indicate APP sensor 2 voltage is within the specified values?	0.83-2.9 V	Go to **Step 4**	Go to **Step 6**
4	1. Turn OFF the ignition for 15 seconds. 2. Turn ON the ignition, with the engine OFF. 3. Observe the DTC Info with a scan tool. 4. Lightly touch and move the related engine wiring harnesses and the connectors for the APP sensor while observing the DTC status. 5. If the scan tool indicates this DTC failed this ignition during the above test, repair the intermittent condition as necessary. Refer to **Wiring Repairs** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 5**
5	Slowly depress the accelerator pedal to WOT and then slowly return the pedal to closed throttle while observing the DTC status. Did the scan tool indicator this DTC failed this ignition during the above test?	-	Go to **Step 21**	Go to Diagnostic Aids
6	1. Disconnect the APP sensor harness connector. 2. Test the APP sensor 2 signal circuit for voltage, with a DMM. Does the DMM indicate APP sensor 2 signal voltage within the specified values?	3.94-6.06 V	Go to **Step 11**	Go to **Step 7**
	1. Turn OFF the ignition. 2. Disconnect the throttle actuator control (TAC) module harness connector containing the APP			

7	sensor circuits. 3. Turn ON the ignition, with the engine OFF. 4. Test the APP sensor 2 signal circuit for a short to voltage, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 8**
8	Test the APP sensor 2 signal circuit for an open or for high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 9**
9	Test the APP sensor 2 signal circuit for a short to ground, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 10**
10	Test for a short between the APP sensor 2 signal circuit and all other TAC module circuits, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 23**
11	Test the APP sensor 2 5-volt reference circuit for voltage, with a DMM. Does the DMM indicate voltage within the specified values?	3.94-6.06 V	Go to **Step 16**	Go to **Step 12**
12	1. Turn OFF the ignition. 2. Disconnect the TAC module harness connector containing the APP sensor circuits. 3. Turn ON the ignition, with the engine OFF. 4. Test the APP sensor 2 5-volt reference circuit for a short to voltage, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 13**
13	Test the APP sensor 2 5-volt reference circuit for an open or high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 14**
14	Test the APP sensor 2 5-volt reference circuit for a short to ground, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 15**

15	Test for a short between the APP sensor 2 5-volt reference circuit and all other TAC module circuits, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 23**
16	With a DMM connected between the APP sensor 2 low reference circuit and the APP sensor 1 low reference circuit, measure resistance. Does the DMM indicate resistance within the specified values?	0-5 ohm	Go to **Step 18**	Go to **Step 17**
17	1. Turn OFF the ignition. 2. Disconnect the TAC module harness connector containing the APP sensor circuits. 3. Test the APP sensor 2 low reference circuit for an open or for high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 23**
18	1. Connect a fused jumper between the APP sensor 2 signal circuit and the APP sensor 2 low reference circuit at the APP sensor harness connector. 2. Observe the APP sensor 2 voltage parameter, with a scan tool. Does the scan tool indicate APP sensor 2 voltage at the specified value?	0 V	Go to **Step 19**	Go to **Step 23**
19	1. Observe the APP sensor 1, APP sensor 3 and throttle position (TP) sensor 2 voltage parameters, with a scan tool. 2. Connect a fused jumper between the APP sensor 2 signal circuit and the APP sensor 2 low reference circuit at the APP sensor harness connector. Did the scan tool indicate a change in voltage in any of the parameters observed during the above test?	-	Go to **Step 20**	Go to **Step 21**
20	1. Turn OFF the ignition. 2. Disconnect the TAC module harness connectors. 3. Test for a short between the APP sensor 2 signal circuit and all other TAC module	-		

	circuits, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?		Go to **Step 25**	Go to **Step 23**
21	Inspect for poor connections at the harness connector of the APP sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 22**
22	Replace the APP sensor assembly. Refer to **Accelerator Pedal Position (APP) Sensor Replacement** . Did you complete the replacement?	-	Go to **Step 25**	-
23	Inspect for poor connections at the harness connector of the TAC module. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 24**
24	Replace the TAC module. Refer to **Throttle Actuator Control (TAC) Module Replacement** . Did you complete the replacement?	-	Go to **Step 25**	-
25	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze/Frame Failure Records. Does the DTC run and pass?	-	Go to **Step 26**	Go to **Step 2**
26	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P2126

Circuit Description

The accelerator pedal position (APP) sensor is mounted on the accelerator pedal assembly. The sensor is actually 3 individual APP sensors within 1 housing. Three separate signal, low reference and 5-volt reference circuits connect the APP sensor assembly to the throttle actuator control (TAC) module. Each sensor has a unique functionality. The APP sensor 1 signal is pulled up to the reference voltage as the accelerator pedal is

depressed, from below 1 volt at 0 percent pedal travel, with the pedal at rest, to above 2 volts at 100 percent pedal travel, with the pedal fully depressed. The APP sensor 2 signal is pulled down to the low reference from above 4 volts at 0 percent pedal travel to below 2.9 volts at 100 percent pedal travel. The APP sensor 3 signal is pulled down to low reference from above 3.8 volts at 0 percent pedal travel to below 3.1 volts at 100 percent pedal travel. Throttle position (TP) sensor 1 and APP sensor 1 share a 5-volt reference circuit that is connected within the TAC module. TP sensor 2 and APP sensor 2 share a 5-volt reference circuit that is connected within the TAC module. If only 1 APP sensor DTC is set, the redundant APP systems allow the TAC system to continue operating normally. One APP sensor DTC will not cause the Reduced Engine Power message to be displayed. Two APP sensor DTCs for the same sensor also will not cause the Reduced Engine Power message to be displayed. If an out of range condition is detected with this APP sensor, this DTC will be set.

Conditions for Running the DTC

- DTCs P0606, P2108, or U0107 are not set.
- The ignition switch is in the crank or the run position.
- The ignition voltage is greater than 5.23 volts.

Conditions for Setting the DTC

- APP sensor 2 disagrees with APP sensor 1 by more than 10.5 percent and APP sensor 2 disagrees with APP sensor 3 by more than 13 percent.
- All of the above conditions present for less than 1 second.

Action Taken When the DTC Sets

- The control module stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Failure Records.
- If one or more APP sensor DTCs are set for a single APP sensor, the following occurs:
  - The control module will not command Reduced Engine Power mode.
  - The control module will use the remaining two APP sensors to calculate throttle response.
- If certain multiple APP sensor DTCs are set for more than one APP sensor, the following occurs:
  - The control module commands Reduced Engine Power mode.
  - The APP indicated angle is limited to a predetermined value to limit the amount of throttle control.
  - The message center displays Reduced Engine Power.
- If all three APP sensors are out of range, the following occurs:
  - The control module commands Reduced Engine Power mode.
  - The APP indicated angle is limited to 0 percent. The control module only allows the engine to idle.
  - The message center displays Reduced Engine Power.

Conditions for Clearing the DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- Clear the DTC with a scan tool.

Diagnostic Aids

- Inspect the TAC module connectors for signs of water intrusion. When water intrusion occurs, multiple DTCs could be set with no DTC circuit or component conditions found during diagnostic testing.
- When the TAC module detects throttle movement with a DTC P2120 set, a DTC P2121 also sets.
- When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.
- For an intermittent, refer to **Intermittent Conditions** .

Test Description

The numbers below refer to the steps numbers in the diagnostic table.

2: This step determines if a communication condition exists.

5: This step isolates an internal APP sensor failure. The condition may only occur at a certain accelerator pedal position. Monitoring the APP angles for sensor 1 and sensor 3 is an accurate way of verifying the actual position of the pedal.

6: The APP sensor 2 shares a common 5-volt reference circuit with the TP sensor 2. Monitoring the TP sensor 2 voltage aids in diagnosing the APP sensor 5-volt reference and low reference circuits. If the scan tool displays near 0 volts then the circuits are OK.

18: When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.

DTC P2126

Step	Action	Values	Yes	No
Schematic Reference:Engine Controls Schematics **Connector End View References:Powertrain Control Module (PCM) Connector End Views** or **Engine Controls Connector End Views**				
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	Is DTC U0107 also set?	-	Go to **DTC U0107**	Go to **Step 3**
	IMPORTANT: **Do not depress the accelerator pedal.**			

3	1. Turn OFF the ignition for 15 seconds. 2. Start the engine. 3. Observe the DTC Info, with a scan tool. Did any other throttle actuator control (TAC) module or accelerator pedal position (APP) sensor DTCs set except P1125?	-	Go to **Diagnostic Trouble Code (DTC) List**	Go to **Step 4**
4	Observe the APP sensor Agree/Disagree parameters, with a scan tool. Does the scan tool indicate Disagree for any of the APP sensors Agree/Disagree parameters?	-	Go to **Step 6**	Go to **Step 5**
5	1. Turn OFF the ignition. 2. Turn ON the ignition, with the engine OFF. 3. Observe the APP sensor angles for all 3 APP sensors, with a scan tool. 4. Slowly depress the accelerator pedal, stopping at 25, 50, 75, and 100 percent. 5. Slowly release the accelerator pedal, stopping at 75, 50, 25, and 0 percent. Does the scan tool indicate that the APP sensor 2 angle is within 10.5 percent of the APP sensor 1 angle, and that the APP sensor 2 angle is within 13 percent of the APP sensor 3 angle during the above test?	-	Go to Diagnostic Aids	Go to **Step 6**
6	1. Turn OFF the ignition. 2. Disconnect the APP sensor harness connector. 3. Connect a fused jumper between the APP sensor 2 5-volt reference circuit and ground. 4. Turn ON the ignition, with the engine OFF. 5. Observe the throttle position (TP) sensor 2 voltage parameter, with a scan tool. Does the scan tool indicate TP sensor 2 voltage at the specified value?	0 V	Go to **Step 7**	Go to **Step 11**
7	1. Connect a fused jumper between the APP sensor 2 5-volt reference circuit and the APP sensor 2 low reference circuit. 2. Observe the TP sensor 2 voltage parameter, with a scan tool. Does the scan tool indicate TP sensor 2 voltage at	0 V		

	specified value?		Go to **Step 8**	Go to **Step 11**
8	1. Turn OFF the ignition. 2. Disconnect the TAC module harness connector containing the APP circuits. 3. Test the APP sensor 2 signal circuit for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 9**
9	1. Turn OFF the ignition. 2. Test for a short between the APP sensor 2 signal circuit and all other APP circuits at the APP sensor harness connector. Does the DMM indicate a short to another circuit?	-	Go to **Step 10**	Go to **Step 13**
10	1. Disconnect the TAC module harness connector containing the APP sensor circuits. 2. Test for a short between the APP sensor 2 signal circuit and all other APP circuits at the APP sensor harness connector. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 13**
11	1. Turn OFF the ignition. 2. Disconnect the TAC module harness connector containing the APP circuits. 3. Test the APP sensor 2 5-volt reference circuit for an open or for high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 12**
12	Test the APP sensor 2 low reference circuit for an open or for high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 14**
13	Inspect for poor connections at the harness connector of the APP sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 15**
	Inspect for poor connections at the harness			

14	connectors of the TAC module. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 16**
15	Replace the accelerator pedal assembly. Refer to **Accelerator Pedal Position (APP) Sensor Replacement** . Did you complete the replacement?	-	Go to **Step 17**	-
16	Replace the TAC module. Refer to **Throttle Actuator Control (TAC) Module Replacement** . Did you complete the replacement?	-	Go to **Step 17**	-
17	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze/Frame Failure Records. Did the DTC fail this ignition?	-	Go to **Step 2**	Go to **Step 18**
18	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List**	System OK

DTC P2130

Circuit Description

The accelerator pedal position (APP) sensor is mounted on the accelerator pedal assembly. The sensor is actually 3 individual APP sensors within 1 housing. Three separate signal, low reference and 5-volt reference circuits connect the APP sensor assembly and the throttle actuator control (TAC) module. Each sensor has a unique functionality. The APP sensor 1 signal increases as the accelerator pedal is depressed, from below 1 volt at 0 percent pedal travel, with the pedal at rest, to above 2 volts at 100 percent pedal travel, with the pedal fully depressed. The APP sensor 2 signal decreases from above 4 volts at 0 percent pedal travel to below 2.9 volts at 100 percent pedal travel. The APP sensor 3 signal decreases from around 3.8 volts at 0 percent pedal travel to below 3.1 volts at 100 percent pedal travel. Notice that the signal circuits for APP sensor 2 and APP sensor 3 pull up to 5 volts and the APP sensor 1 signal circuit is referenced to low reference within the TAC module.

Conditions for Running the DTC

- DTCs P0606, P2108, or P1518 are not set.
- The ignition switch is in the crank or the run position.
- The ignition voltage is greater than 5.23 volts.

Conditions for Setting the DTC

- APP sensor 3 voltage is less than 01.63 volts or greater than 4.28 volts.
- All above conditions present for less than 1 second.

Action Taken When the DTC Sets

- The control module stores the DTC information into memory when the diagnostic runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Failure Records.
- If one or more APP sensor DTCs are set for a single APP sensor, the following occurs:
  - The control module will not command Reduced Engine Power mode.
  - The control module will use the remaining two APP sensors to calculate throttle response.
- If certain multiple APP sensor DTCs are set for more than one APP sensor, the following occurs:
  - The control module commands Reduced Engine Power mode.
  - The APP indicated angle is limited to a predetermined value to limit the amount of throttle control.
  - The message center displays Reduced Engine Power.
- If all three APP sensors are out of range, the following occurs:
  - The control module commands Reduced Engine Power mode.
  - The APP indicated angle is limited to 0 percent. The control module only allows the engine to idle.
  - The message center displays Reduced Engine Power.

Conditions for Clearing the DTC

- A current DTC Last Test Failed clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other non-emission related diagnostic.
- Clear the DTC with a scan tool.

Diagnostic Aids

- Inspect the TAC module connectors for signs of water intrusion. When water intrusion occurs, multiple DTCs could be set with no DTC circuit or component conditions found during diagnostic testing.
- When the TAC module detects throttle movement with a DTC P2130 set, a DTC P2131 also sets.
- When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.
- For an intermittent, refer to **Intermittent Conditions** .

Test Description

The number below refers to the step number on the diagnostic table.

26: When the TAC module detects a condition within the TAC system, more than 1 TAC system related DTC may set. This is due to the many redundant tests that run continuously on this system. Locating and repairing 1 individual condition may correct more than 1 DTC. Disconnecting the components during testing may set additional DTCs. Keep this in mind when reviewing the Capture Info.

DTC P2130

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View References: Powertrain Control Module (PCM) Connector End Views , or Engine Controls Connector End Views				
1	Did you perform the Diagnostic System Check-Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls**
2	**IMPORTANT:** **If DTC P1518 or P0220 is also set, refer to Diagnostic Trouble Code (DTC) List for further diagnosis.** 1. Turn ON the ignition, with the engine OFF. 2. Observe the accelerator pedal position (APP) sensor 3 voltage parameter. Does the scan tool indicate APP sensor 3 voltage within the specified values?	3.29-4.28 V	Go to **Step 3**	Go to **Step 6**
3	Fully depress the accelerator pedal to the wide open throttle (WOT) position. Does the scan tool indicate APP sensor 3 voltage within the specified values?	1.63-3.1 V	Go to **Step 4**	Go to **Step 6**
4	1. Turn OFF the ignition for 15 seconds. 2. Turn ON the ignition, with the engine OFF. 3. Observe the DTC Info with a scan tool. 4. Lightly touch and move the related engine wiring harnesses and connectors for the accelerator pedal position (APP) sensor while monitoring the DTC info status. Did this DTC fail this ignition during the above test?	-	Go to **Step 20**	Go to **Step 5**
5	Slowly depress the accelerator pedal to WOT. Slowly return the accelerator pedal to the released position. Did this DTC fail this ignition during the above test?	-	Go to **Step 21**	Go to Diagnostic Aids
	1. Disconnect the APP sensor harness connector.			

6	2. Test the APP sensor 3 signal circuit for voltage, with a DMM. Does the DMM indicate APP sensor 3 signal voltage within the specified values?	3.94-6.06 V	Go to **Step 11**	Go to **Step 7**
7	1. Turn OFF the ignition. 2. Disconnect the throttle actuator control (TAC) module harness connector containing the APP Sensor circuits. 3. Turn ON the ignition, with the engine OFF. 4. Test the APP sensor 3 signal circuit for a short to voltage, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 8**
8	Test the APP sensor 3 signal circuit for an open or for high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 9**
9	Test the APP sensor 3 signal circuit for a short to ground, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 10**
10	1. Disconnect the other TAC module harness connector. 2. Test for a short between the APP sensor 3 signal circuit and all other TAC module circuits, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 23**
11	Test the APP sensor 3 5-volt reference circuit for voltage, with a DMM. Does the DMM indicate voltage within the specified values?	3.94-6.06 V	Go to **Step 16**	Go to **Step 12**
12	1. Turn OFF the ignition. 2. Disconnect the TAC module harness connector containing the APP Sensor circuits. 3. Turn ON the ignition, with the engine OFF. 4. Test the APP sensor 3 5-volt reference circuit for a short to voltage, with a DMM. Refer to	-		

	Circuit Testing and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?		Go to **Step 25**	Go to **Step 13**
13	Test the APP sensor 3 5-volt reference circuit for an open or for high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 14**
14	Test the APP sensor 3 5-volt reference circuit for a short to ground, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 15**
15	Test for a short between the APP sensor 3 5-volt reference circuit and all other TAC module circuits, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 23**
16	With a DMM connected between the APP sensor 3 low reference circuit and the APP sensor 1 low reference circuit, measure the resistance. Does the DMM indicate resistance within the specified values?	0-5 ohm	Go to **Step 18**	Go to **Step 17**
17	1. Turn OFF the ignition. 2. Disconnect the TAC module harness connector containing the APP sensor circuits. 3. Test the APP sensor 3 low reference circuit for an open or for high resistance, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 23**
18	1. Observe the APP sensor 3 voltage parameter, with a scan tool. 2. Connect a fused jumper between the APP sensor 3 signal circuit and the APP sensor 3 low reference circuit at the APP sensor harness connector. Does the scan tool indicate APP sensor 3 voltage at the specified value?	0 V	Go to **Step 19**	Go to **Step 24**
	1. Turn OFF the ignition. 2. Disconnect the TAC module harness connectors.			

19	3. Test for a short between the APP sensor 3 signal circuit and all other TAC module circuits, with a DMM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 21**
20	Repair the intermittent connection as necessary. Refer to **Wiring Repairs** in Wiring Systems. Did you complete the repair?	-	Go to **Step 25**	-
21	Inspect for poor connections at the harness connector of the APP sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 22**
22	Replace the APP sensor assembly. Refer to **Accelerator Pedal Position (APP) Sensor Replacement** . Did you complete the replacement?	-	Go to **Step 25**	-
23	Inspect for poor connections at the harness connector of the TAC module. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Repairing Connector Terminals** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 25**	Go to **Step 24**
24	Replace the TAC module. Refer to **Throttle Actuator Control (TAC) Module Replacement** . Did you complete the replacement?	-	Go to **Step 25**	-
25	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze/Frame Failure Records. Does the DTC run and pass?	-	Go to **Step 26**	Go to **Step 2**
26	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List**	System OK