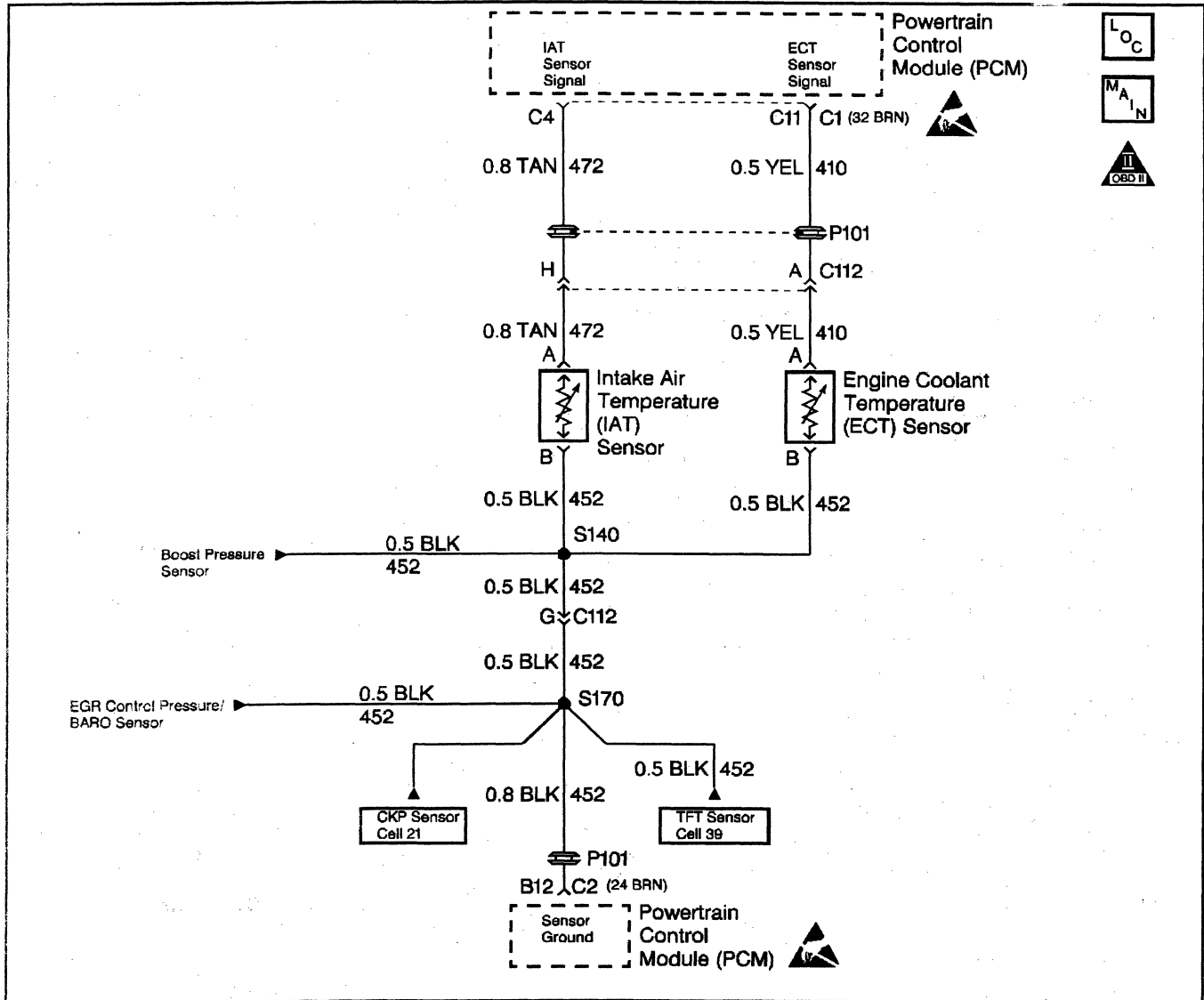


DTC P0112 IAT Sensor Circuit Low Voltage



29578

Circuit Description

The Intake Air Temperature (IAT) sensor is a thermister that controls signal voltage to the PCM. When the air is cold, the sensor resistance is high, therefore the PCM will see a high signal voltage. As air warms, sensor resistance becomes less and voltage drops. This is a type B DTC.

Conditions for Setting the DTC

- Engine coolant temperature less than 42.5 °C (109 °F).
- Intake air temperature greater than or equal to 151 °C (304 °F).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

A possible poor performance problem may exist during cold weather operation.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

Check harness routing for a potential short to ground in the signal circuit. Scan Tool displays intake air temperature in degrees centigrade. Refer to *Intermittents*. A skewed sensor could result in poor driveability complaints.

Test Description

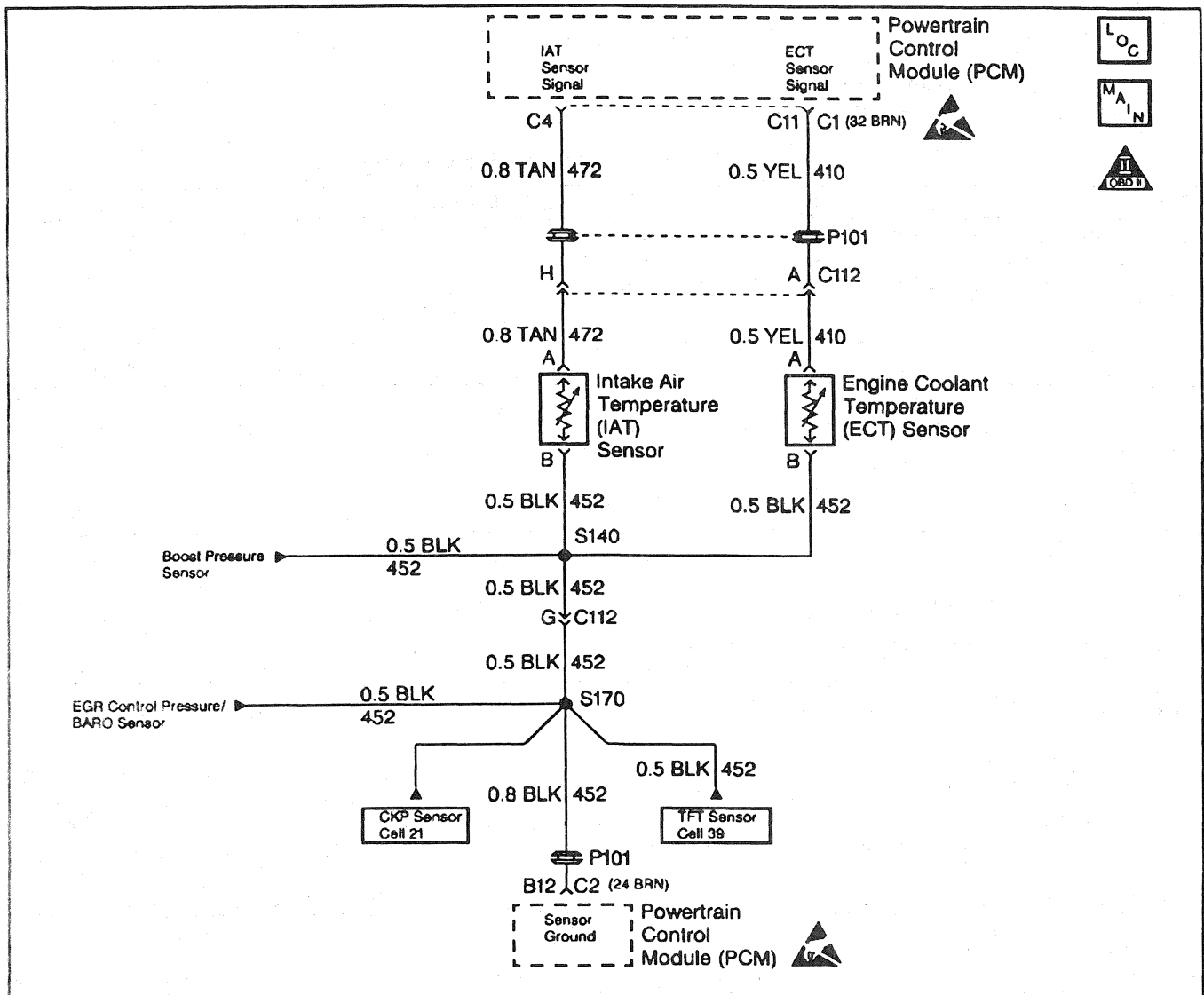
Number(s) below refer to the Step number(s) on the Diagnostic Table.

2. This Step determines if P0112 is a hard failure or an intermittent condition.
3. This test will determine if the PCM can recognize an open sensor.

DTC P0112 IAT Sensor Circuit Low Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the Scan Tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the Powertrain On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan tool connected. 2. Start the engine. 3. Monitor the IAT display on Scan Tool. Is the IAT display greater than or equal to the specified value?	151 °C (304 °F)	Go to Step 3	Go to Step 5
3	1. Turn the engine OFF. 2. Turn the ignition ON. 3. Disconnect the IAT sensor connector. Is the IAT display less than or equal to the specified value?	−40 °C (−40 °F)	Go to Step 7	Go to Step 4
4	1. Turn the ignition OFF. 2. Using the <i>J 39200</i> , measure the resistance across the IAT sensor harness connector. Is the resistance at the specified value?	Infinite	Go to Step 8	Go to Step 6
5	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to those table(s). Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
6	Repair the short to ground in the IAT signal circuit. Is the action complete?	—	Go to Step 9	—
7	Replace the IAT sensor. Refer to <i>IAT Sensor</i> . Is the action complete?	—	Go to Step 9	—
8	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 9	—
9	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 10	Go to Step 2
10	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0113 IAT Sensor Circuit High Voltage



29578

Circuit Description

The Intake Air Temperature (IAT) sensor is a thermistor that controls signal voltage to the PCM. When the air is cold, the sensor resistance is high, therefore the PCM will see a high signal voltage. As air warms, sensor resistance becomes less and voltage drops. This is a type B DTC.

Conditions for Setting the DTC

- Engine operating for 8 minutes.
- IAT less than or equal to -40°C (-40°F).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

A possible poor performance problem may exist during cold weather operation.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

The scan tool displays intake air temperature in degrees centigrade. Refer to *Intermittent Symptoms*. A skewed sensor could result in poor driveability complaints.

Test Description

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

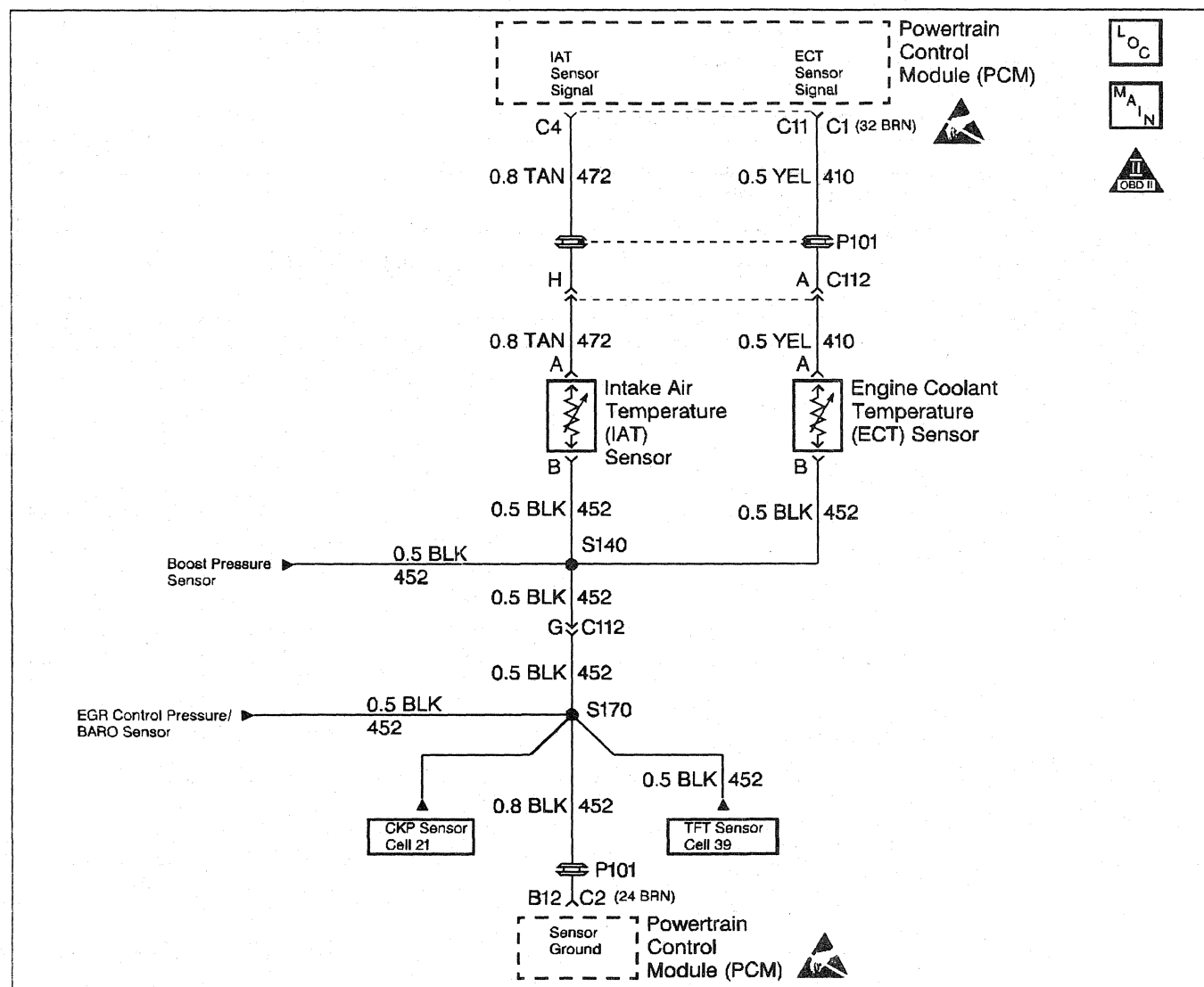
2. This Step determines if P0113 is a hard failure or an intermittent condition.
3. This Step will determine if there is a wiring problem or a faulty PCM.

DTC P0113 IAT Sensor Circuit High Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan tool connected. 2. Start the engine. 3. Monitor the IAT display on scan tool. Does the IAT display less than or equal to the specified value?	-40 °C (-40 °F)	Go to Step 3	Go to Step 5
3	1. Turn the engine OFF. 2. Turn the ignition ON. 3. Disconnect the IAT sensor connector. 4. Jumper the IAT harness terminals together. Does the scan tool display IAT greater than or equal to the specified value?	151 °C (304 °F)	Go to Step 6	Go to Step 4
4	Jumper the IAT sensor signal circuit to a known good ground. Does the scan tool display a IAT greater than or equal to the specified value?	151 °C (304 °F)	Go to Step 7	Go to Step 8
5	DTC is intermittent. If no other DTCs are stored, refer to Diagnostic Aids. Are there any other DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
6	Inspect the sensor connector and PCM connector for a proper connection. Was a problem found?	—	Go to Step 9	Go to Step 10
7	Check the IAT sensor ground circuit for an open between the IAT sensor and the PCM. Was a problem found?	—	Go to Step 9	Go to Step 11
8	Check the IAT sensor signal circuit for an open between the IAT sensor and the PCM. Was a problem found?	—	Go to Step 9	Go to Step 11
9	Repair the circuit as necessary. Is the action complete?	—	Go to Step 12	—
10	Replace the faulty IAT sensor. Refer to <i>IAT Sensor</i> Is the action complete?	—	Go to Step 12	—
11	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> Is the action complete?	—	Go to Step 12	—

DTC P0113 IAT Sensor Circuit High Voltage (cont'd)

Step	Action	Value(s)	Yes	No
12	<ol style="list-style-type: none">1. Using the Scan Tool, select DTC, Clear Info.2. Start engine and idle at normal operating temperature.3. Select DTC, Specific, then enter the DTC number which was set.4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 13	—
13	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0117 ECT Sensor Circuit Low Voltage

29578

Circuit Description

The Engine Coolant Temperature (ECT) sensor is a thermistor that controls signal voltage to the PCM. When the engine is cold, the sensor resistance is high, therefore the PCM will see high signal voltage. As the engine warms, sensor resistance becomes less and voltage drops. The voltage measured across the thermistor is interpreted as a temperature. This is a type B DTC.

Conditions for Setting the DTC

Engine coolant temperature greater than or equal to 151 °C (304 °F) for 2 seconds.

Action Taken When the DTC Sets

- High idle
- No TCC
- Shift schedules will be affected.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

A vacuum leak or a pinched vacuum line may cause a DTC P0236. Check all vacuum lines and components connected to the hoses for leaks or sharp bends. Check vacuum source. A possible EGR DTC will store if there is a problem with the vacuum source. Also check for proper vacuum line routing. This diagnostic checks for a skewed sensor.

Test Description

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

2. If the fault is still present, the engine coolant voltage will greater than 151 °C (304 °F).

3. This test simulates a DTC P0117. If the PCM recognizes the high signal voltage (low temperature) the PCM and the wiring are okay.

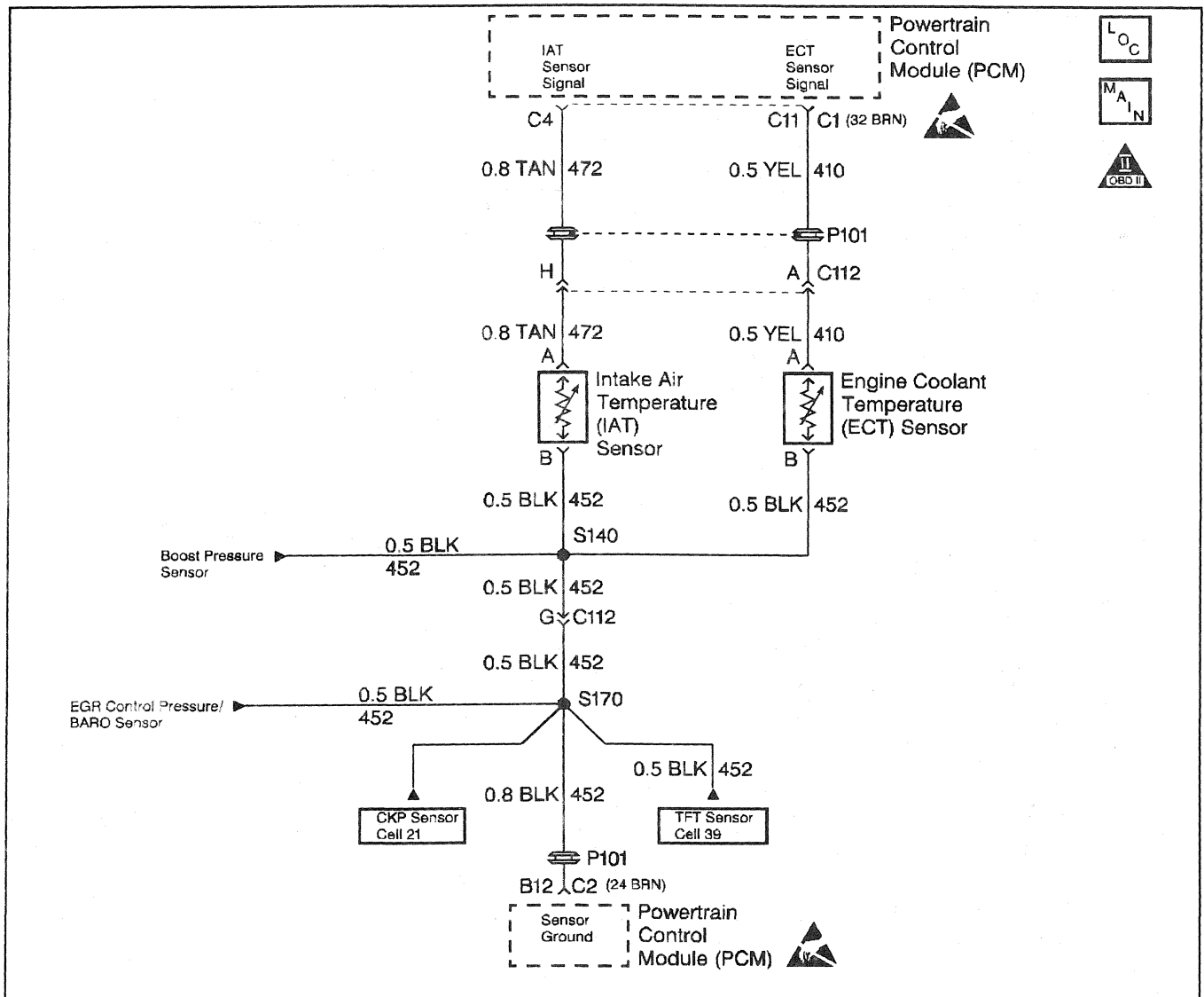
DTC P0117 ECT Sensor Circuit Low Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing the DTCs, use the scan tool to record the Freeze Frame and the Failure Records for reference. This data will be lost when the Clear Info function is used. Was the Powertrain On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Connect the scan tool. 2. Start the engine. 3. Monitor the Engine Coolant Temperature (ECT) display on scan tool. Does the scan tool display an ECT greater than the specified value?	151 °C (304 °F)	Go to Step 3	Go to Step 5
3	1. Turn off the engine. 2. Turn ON the ignition. 3. Disconnect the ECT sensor connector. Does the scan tool display an ECT less than or equal to the specified value?	-40 °C (-40 °F)	Go to Step 7	Go to Step 4
4	1. Turn off the ignition. 2. Using the <i>J 39200</i> , check the resistance across the ECT sensor harness connector. Is the resistance at the specified value?	∞	Go to Step 8	Go to Step 6
5	The DTC is intermittent. If no additional DTCs are stored, refer to the Diagnostic Aids. If the additional DTCs are stored, refer to those tables first.	—	Go to The Applicable DTC Table	Go to Step 6
6	Repair the short to the ground in the ECT signal circuit. Refer to <i>Wiring Repairs</i> in Engine Electrical. Is the action complete?	—	Go to Step 9	—
7	Replace the ECT sensor. Refer to <i>ECT Sensor</i> . Is the replacement complete?	—	Go to Step 9	—
8	Replace the PCM. Important: If the PCM is faulty, reprogram the PCM. Refer to <i>PCM Replacement/Programming</i> . Is the replacement complete?	—	Go to Step 9	—

DTC P0117 ECT Sensor Circuit Low Voltage (cont'd)

Step	Action	Value(s)	Yes	No
9	1. Using the scan tool, select the DTC and the Clear Info. 2. Start the Engine. 3. Idle the Engine at the normal operating temperature. 4. Select the DTC and the Specific. 5. Enter the DTC number which was set. 6. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?	—	Go to Step 10	Go to Step 2
10	Using the scan tool, select the Capture Info and the Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to The Applicable DTC Table	System OK

DTC P0118 ECT Sensor Circuit High Voltage



29578

Circuit Description

The Engine Coolant Temperature (ECT) sensor is a thermistor that controls signal voltage to the PCM. When the engine is cold, the sensor resistance is high, therefore the PCM will see high signal voltage. As the engine warms, sensor resistance becomes less and voltage drops. The voltage measured across the thermistor is interpreted as a temperature. This is a type B DTC.

Conditions for Setting the DTC

- Engine running for at least 8 minutes.
- ECT less than -40°C (-40°F).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

Idle increase.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

Check harness routing for a potential short to ground. After engine is started, the ECT temperature should rise steady to about 85°C (185°F). A mis-scaled sensor could result in poor driveability complaints.

Test Description

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

2. This test determines if P0118 is an intermittent condition.
3. This test will determine if signal circuit is open, or a faulty PCM.

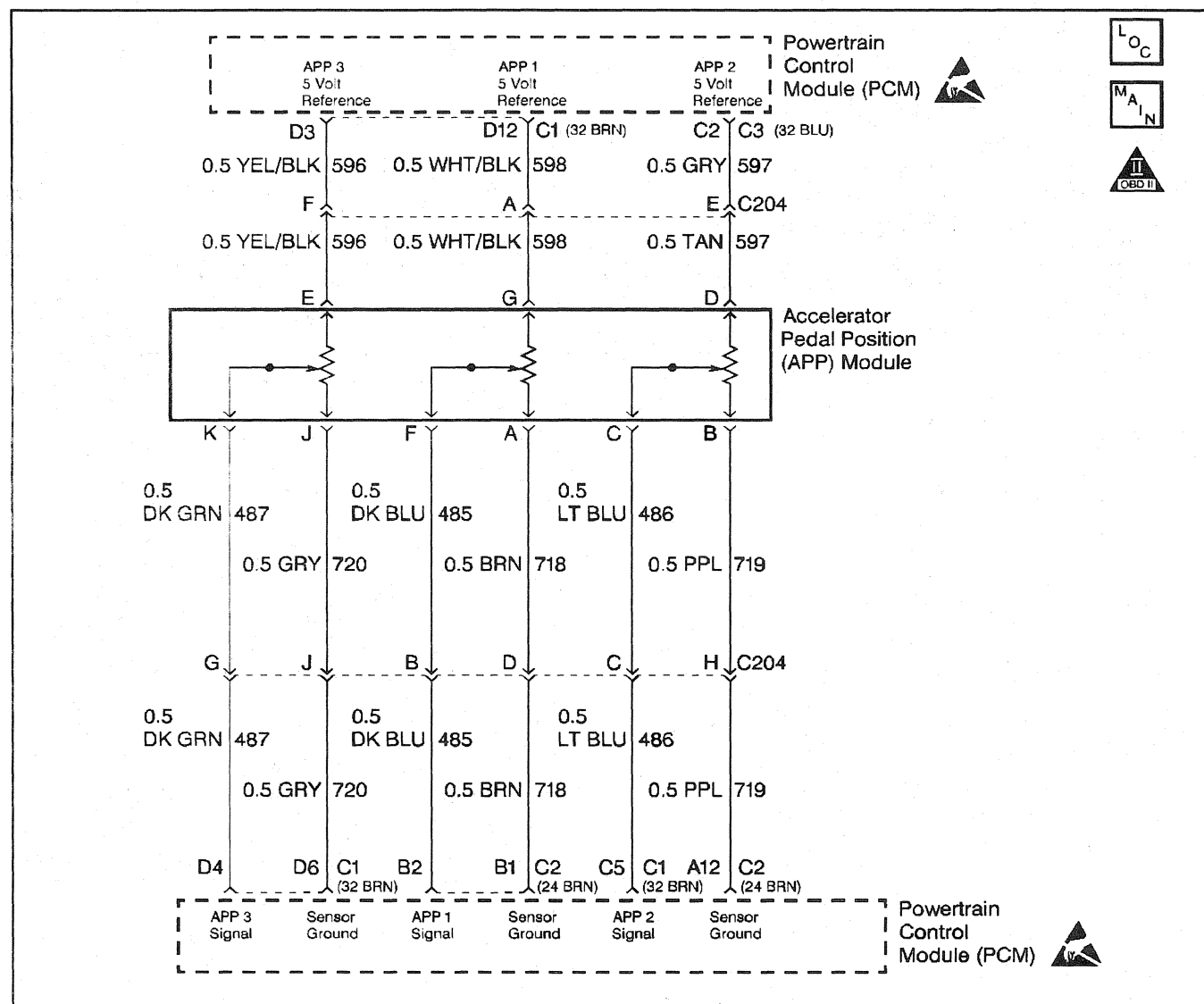
DTC P0118 ECT Sensor Circuit High Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTC(s) use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan tool connected. 2. Start the engine. 3. Monitor the ECT display on scan tool. Is the ECT display less than or equal to the specified value?	-40 °C (-40 °F)	Go to Step 3	Go to Step 5
3	1. Turn the engine OFF. 2. Turn the ignition ON. 3. Disconnect the ECT sensor connector. 4. Jumper the ECT harness terminals together. Does the scan tool display ECT greater than or equal to the specified value?	151 °C (304 °F)	Go to Step 6	Go to Step 4
4	Jumper the ECT sensor signal circuit to a known good ground. Does the scan tool display a ECT greater than the specified value?	151 °C (304 °F)	Go to Step 7	Go to Step 8
5	DTC is intermittent. If no other DTC(s) are stored, refer to Diagnostic Aids. Are there any other DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
6	Inspect the sensor connector and PCM connector for a proper connection. Was a problem found?	—	Go to Step 9	Go to Step 10
7	Check the ECT sensor ground circuit for an open between the ECT sensor and the PCM. Was a problem found?	—	Go to Step 9	Go to Step 11
8	Check the ECT sensor signal circuit for an open between the ECT sensor and the PCM. Was a problem found?	—	Go to Step 9	Go to Step 11
9	Repair the circuit as necessary. Is the action complete?	—	Go to Step 12	—
10	Replace the faulty ECT sensor. Refer to <i>ECT Sensor</i> Is the action complete?	—	Go to Step 12	—
11	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> Is the action complete?	—	Go to Step 12	—

DTC P0118 ECT Sensor Circuit High Voltage (cont'd)

Step	Action	Value(s)	Yes	No
12	<ol style="list-style-type: none">1. Using the Scan Tool, select DTC, Clear Info.2. Start engine and idle at normal operating temperature.3. Select DTC, Specific, then enter the DTC number which was set.4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 13	—
13	Using the Scan Tool, select Capture Info, Review Info. Are any DTC[prime]s displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0121 APP Sensor1 Circuit Performance



29555

Circuit Description

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently. This is a type D DTC.

Conditions for Setting the DTC

- Ignition voltage greater than 6.4 volts.
- Engine speed greater than 300 RPM.
- The difference between APP 1 and APP 2 is greater than .23 volts (PCM compares pre-scaled voltage (internal to PCM)).
- The difference between APP 1 and APP 3 is greater than .50 volts (PCM compares pre-scaled voltage (internal to PCM)).

- No in range faults for APP 2 or APP 3 (PCM checks for high and low voltage faults).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

- The input from APP 1 sensor is ignored.
- A current and history DTC will set but it will not turn on the Service Throttle Soon lamp.
- Throttle will operate normally as long as there is only one malfunction present. If there are two APP malfunctions present, the PCM will turn ON the Service Throttle Soon lamp and limit power. If a third APP malfunction is present, the Service Throttle Soon lamp will be ON and only allow the engine to operate at idle.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

A scan tool reads APP 1 position in volts. It should read about .45 to .95 volt with throttle closed and ignition ON or at idle. Voltage should increase at a steady rate as throttle is moved toward Wide Open Throttle (WOT). Also, 90% pedal travel is acceptable for correct APP operation. Scan APP 1 sensor while depressing accelerator pedal with engine stopped

and ignition ON. Display should vary from about .74 volt when throttle was closed to over about 3.7 volts when throttle is held at Wide Open Throttle (WOT) position. The following chart will check voltages on all APP circuits to see if they fall in normal ranges. The PCM compares pre-scaled voltages (these are voltages that the scan tool can[prime]t read). The scan tool reads only output voltages.

Test Description

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

4. This Step determines if there is a good 5 volt reference.
5. This Step will check for an open in the ground circuit.

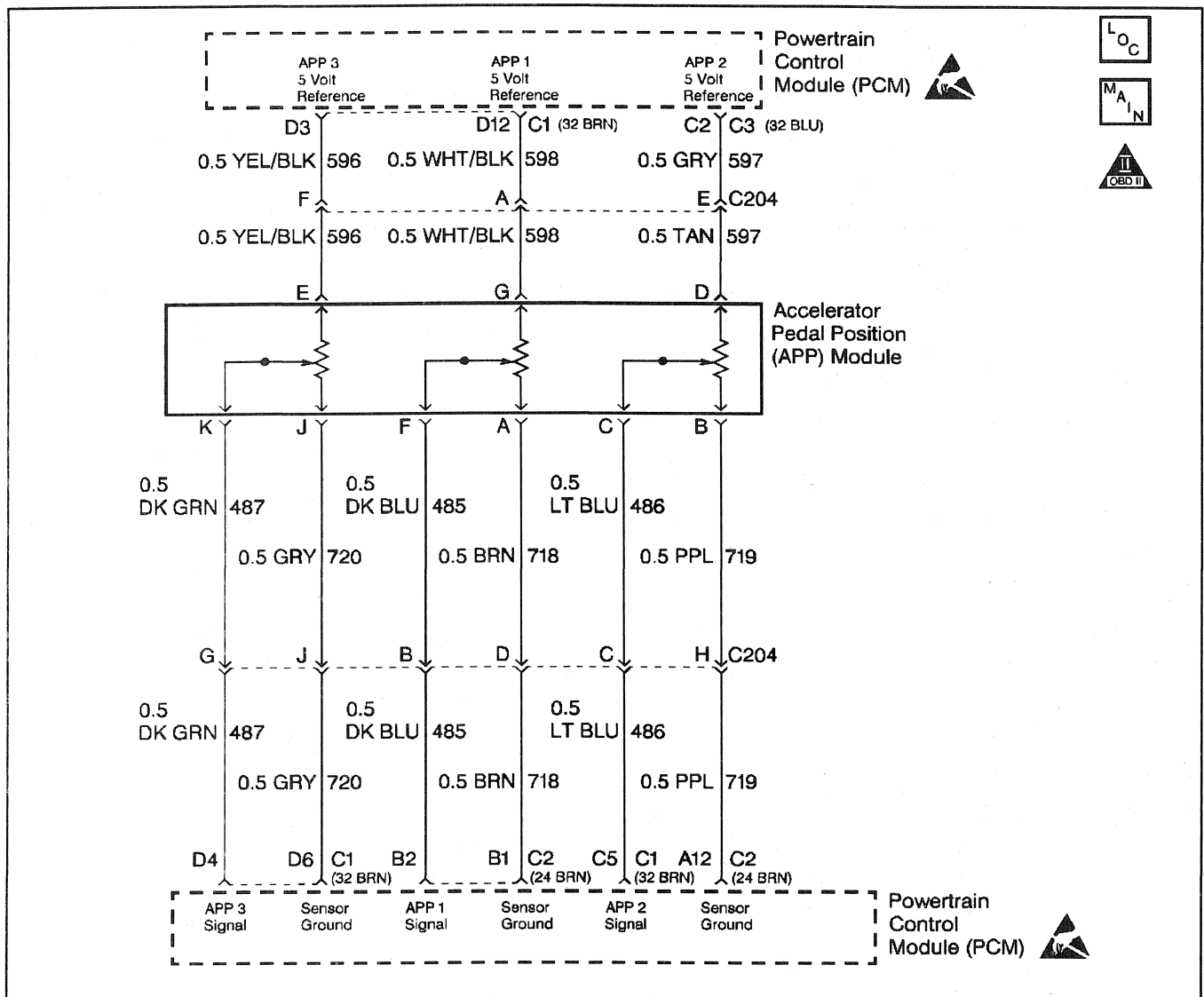
DTC P0121 APP Sensor1 Circuit Performance

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Ignition ON, engine OFF. 2. With the throttle closed, observe APP voltages on the scan tool. Are APP voltages at specified values?	.45-.95 V 4.0-4.5 V 3.6-4.0 V	Go to Step 3	Go to Step 4
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	1. Disconnect the APP sensor electrical connector. 2. Ignition ON, engine OFF. 3. With J 39200 connected to ground, probe APP sensor 5 volt reference circuits at APP harness terminals G, D, and E. Is voltage at the specified value on all circuits?	4.75 V	Go to Step 5	Go to Step 6
5	1. Ignition ON, engine OFF. 2. With a test light connected to B+, probe APP sensor ground circuits at the APP sensor harness terminals A, B, and J. Is Test light ON (all circuits)?	—	Go to Step 9	Go to Step 8
6	1. Ignition OFF. 2. Disconnect the PCM and check the 5 volt reference circuit for an open or short to ground. 3. If the 5 volt reference circuit is open or shorted to ground, repair it as necessary. Was the 5 volt reference circuit open or shorted to ground?	—	Go to Step 11	Go to Step 7
7	Check the 5 volt reference circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 11	Go to Step 10

DTC P0121 APP Sensor1 Circuit Performance (cont'd)

Step	Action	Value(s)	Yes	No
8	1. Ignition OFF. 2. Disconnect the PCM and check for an open sensor ground circuit to the PCM. 3. If problem is found, repair as necessary. Was APP sensor ground circuit open?	—	Go to Step 11	Go to Step 10.
9	Replace the APP module. Refer to <i>APP Module</i> Is the action complete?	—	Go to Step 11	—
10	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> Is the action complete?	—	Go to Step 11	—
11	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 12	Go to Step 2
12	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0122 APP Sensor1 Circuit Low Voltage



29555

Circuit Description

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently. This is a type D DTC.

Conditions for Setting the DTC

- Voltage is less than .25 volts on APP 1.
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

- The input from APP 1 sensor is ignored.
- A current and history DTC will set but it will not turn on the Service Throttle Soon lamp.

- Throttle will operate normally as long as there is only one malfunction present. If there are two APP malfunctions present, the PCM will turn ON the Service Throttle Soon lamp and limit power. If a third APP malfunction is present, the Service Throttle Soon lamp will be ON and only allow the engine to operate at idle.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

A scan tool reads APP 1 position in volts. Should read about .45 to .95 volt with throttle closed and ignition ON or at idle. Voltage should increase at a steady rate as throttle is moved toward Wide Open Throttle (WOT). Also, 90% pedal travel is acceptable for correct APP operation. Scan APP sensor while depressing accelerator pedal with engine stopped and ignition ON. Display should vary from about .74 volt when throttle is closed to about 3.7 volts when throttle is held at Wide Open Throttle (WOT) position. A DTC P0122 will result if the signal or reference circuit are open.

Test Description

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

2. This Step determines if P0122 is the result of a hard failure or an intermittent condition.
4. This Step checks the PCM and wiring.

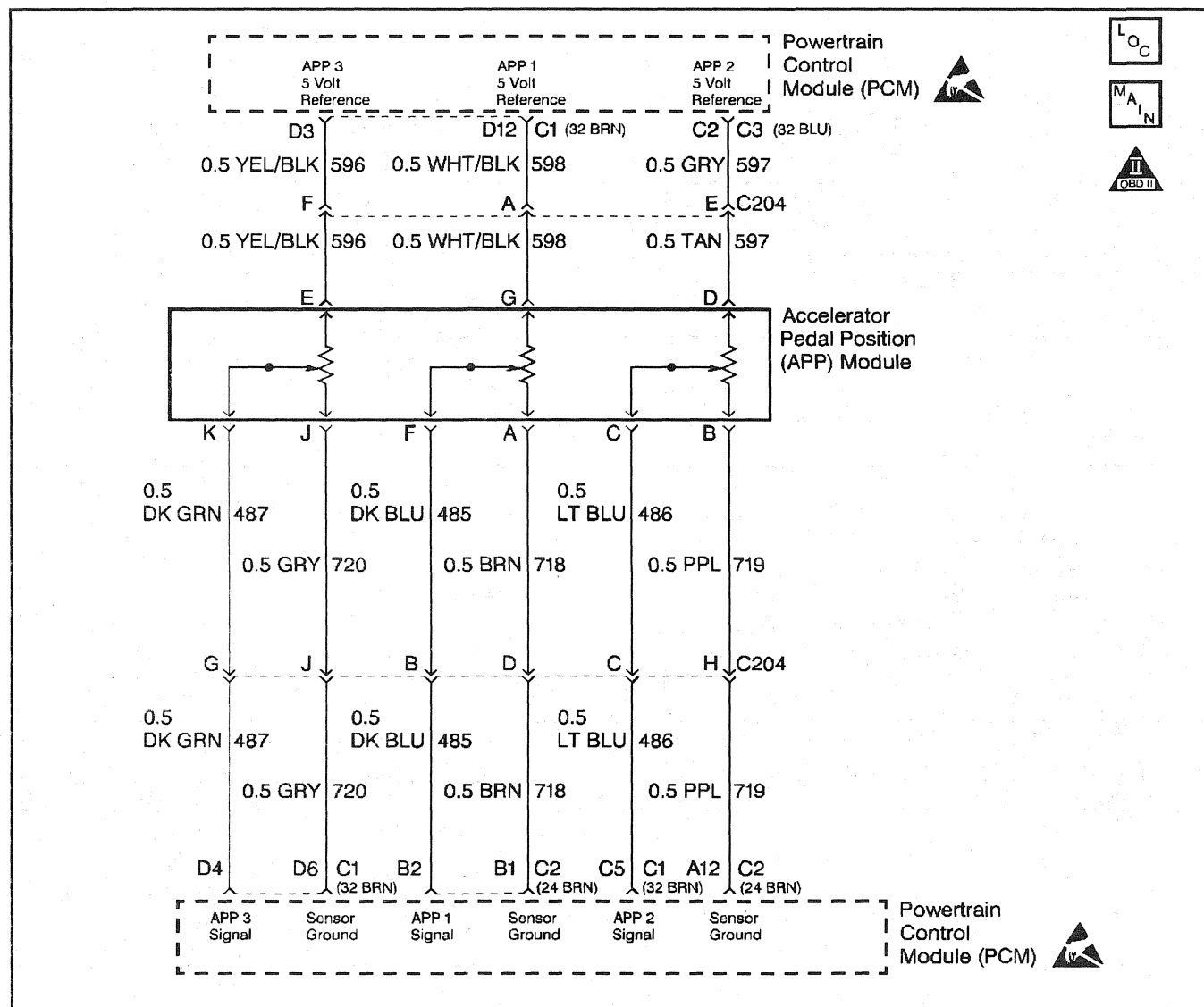
DTC P0122 APP Sensor1 Circuit Low Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTC(s) use the Scan Tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	<i>Go to Step 2</i>	<i>Go to Powertrain OBD System Check</i>
2	1. Ignition ON, engine OFF. 2. With the throttle closed, observe the APP 1 voltage on the Scan Tool. Is APP 1 voltage less than or equal to the specified value?	.25 V	<i>Go to Step 3</i>	<i>Go to Step 4</i>
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to those tables(s) first. Are additional DTCs stored?	—	<i>Go to the Applicable DTC Table</i>	<i>Go to Diagnostic Aids</i>
4	1. Disconnect the APP sensor electrical connector. 2. Jumper APP 1 5 volt reference circuit and the APP 1 signal together at the APP sensor harness connector. 3. Observe the APP 1 voltage on the Scan Tool. Is APP 1 voltage greater than the specified value?	4.75 V	<i>Go to Step 10</i>	<i>Go to Step 5</i>
5	1. Connect a test light between B+ and the APP 1 sensor signal circuit at the APP sensor harness connector. 2. Observe the APP 1 voltage on the Scan Tool. Is APP 1 voltage greater than the specified value?	4.75 V	<i>Go to Step 6</i>	<i>Go to Step 8</i>
6	1. Ignition OFF. 2. Disconnect the PCM and check the 5 volt reference circuit for an open or short to ground. 3. If the 5 volt reference circuit is open or shorted to ground, repair it as necessary. Was the 5 volt reference circuit open or shorted to ground?	—	<i>Go to Step 12</i>	<i>Go to Step 7</i>
7	Check the 5 volt reference circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	<i>Go to Step 12</i>	<i>Go to Step 11</i>

DTC P0122 APP Sensor1 Circuit Low Voltage (cont'd)

Step	Action	Value(s)	Yes	No
8	1. Ignition OFF. 2. Disconnect the PCM, and check the APP 1 signal circuit for an open, short to ground. 3. If the APP 1 sensor signal circuit is open or shorted to ground, repair it as necessary. Was the APP 1 signal circuit open or shorted to ground?	—	Go to Step 12	Go to Step 9
9	Check the APP 1 sensor signal circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 12	Go to Step 11
10	Replace the APP module. Refer to <i>APP Module</i> Is the action complete?	—	Go to Step 12	—
11	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> Is the action complete?	—	Go to Step 12	—
12	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 13	Go to Step 2
13	Using the Scan Tool, select Capture Info, Review Info. Are there any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0123 App Sensor1 Circuit High Voltage



29555

Circuit Description

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently. This is a type D DTC.

Conditions for Setting the DTC

- Voltage is greater than 4.75 volts on APP 1 sensor.
- Condition met for 2 seconds.

Action Taken When the DTC Sets

- The input from APP 1 sensor is ignored.
- A current and history DTC will set but it will not turn on the Service Throttle Soon lamp.

- Throttle will operate normally as long as there is only one malfunction present. If there are two APP malfunctions present, the PCM will turn ON the Service Throttle Soon lamp and limit power. If a third APP malfunction is present, the Service Throttle Soon lamp will be ON and only allow the engine to operate at idle.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

A scan tool reads APP 1 position in volts. Should read about .45 to .95 volt with throttle closed and ignition ON or at idle. Voltage should increase at a steady rate as throttle is moved toward Wide Open Throttle (WOT). Also, 90% pedal travel is acceptable for correct 0 APP operation. Scan APP 1 sensor while depressing accelerator pedal with engine stopped and ignition ON. Display should vary from about .74 volt when throttle was closed to about 3.7 volt when throttle is held at Wide Open Throttle (WOT) position. A P0123 will result if the ground circuit is open or the signal circuit is shorted to voltage. Refer to *Intermittents Symptoms*.

Test Description

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

2. This Step determines if DTC P0123 is the result of a hard failure or an intermittent condition.
3. This Step checks the PCM and wiring.

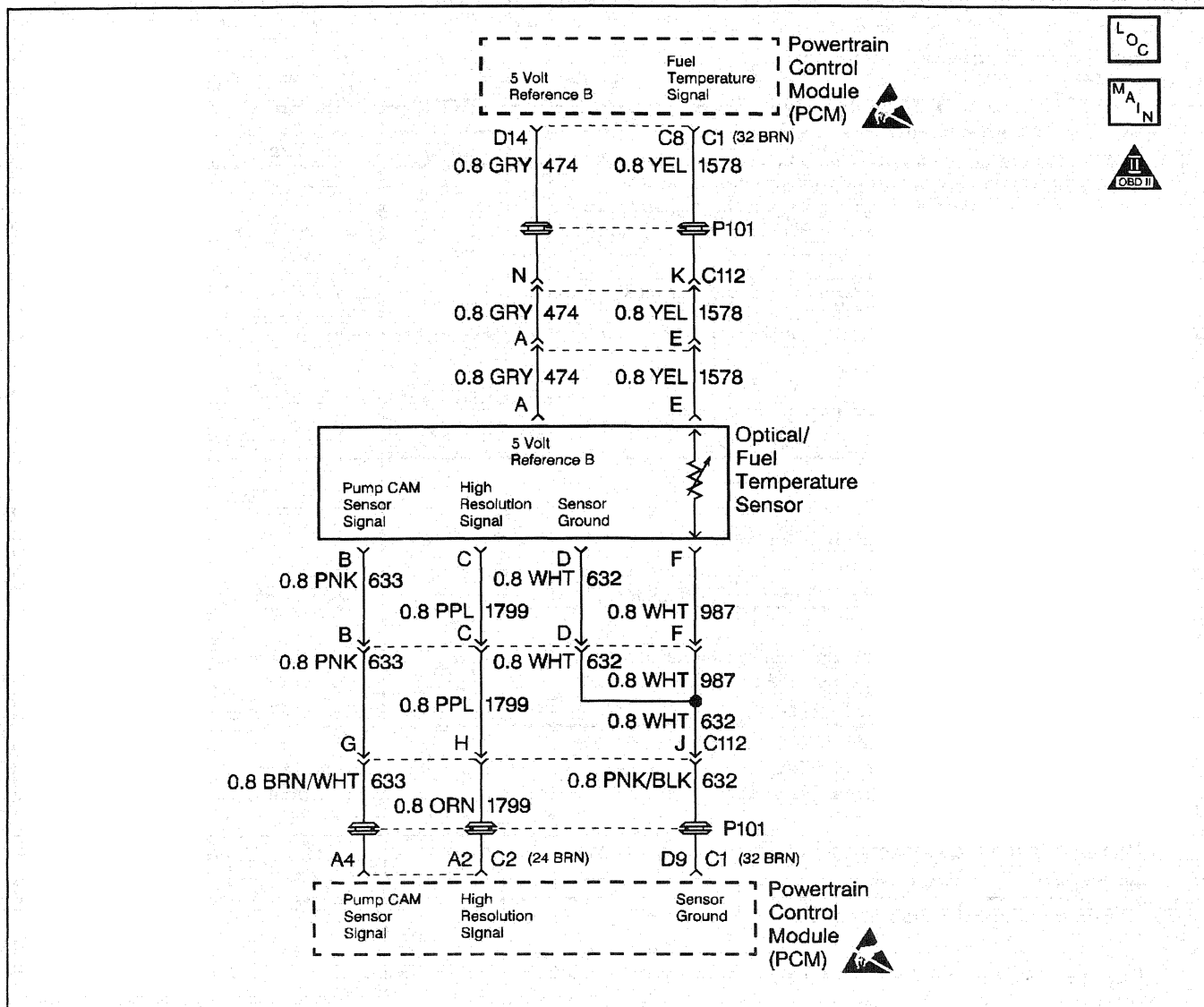
DTC P0123 App Sensor1 Circuit High Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Ignition ON, engine OFF. 2. With the throttle closed, observe the APP 1 display on the scan tool. Is APP 1 above the specified value?	4.75 V	Go to Step 4	Go to Step 3
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	1. Disconnect the APP sensor electrical connector. 2. Observe the APP 1 display on the scan tool. Is APP 1 less than the specified value?	.25 V	Go to Step 5	Go to Step 6
5	Probe APP 1 sensor ground circuit at the APP sensor harness connector with a test light connected to B+. Is the test light ON?	—	Go to Step 7	Go to Step 8
6	1. Check for a short to voltage on the APP 1 sensor signal circuit. 2. If the APP 1 sensor signal circuit is shorted, repair it as necessary. Was the APP 1 sensor signal circuit shorted?	—	Go to Step 11	Go to Step 10
7	Check for poor electrical connections at the APP sensor and replace terminals if necessary. Did any terminals require replacement?	—	Go to Step 11	Go to Step 10.
8	1. Check for an open sensor ground circuit. 2. If a problem is found, repair it as necessary. Was APP 1 sensor ground circuit open?	—	Go to Step 11	Go to Step 10
9	Replace the APP module. Refer to <i>APP Module</i> Is the action complete?	—	Go to Step 11	—
10	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> Is the action complete?	—	Go to Step 10	—

DTC P0123 App Sensor1 Circuit High Voltage (cont'd)

Step	Action	Value(s)	Yes	No
11	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 12	Go to Step 2
12	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0182 Fuel Temperature Sensor CKT Low Voltage



29557

Circuit Description

The fuel temperature sensor is a thermistor that controls signal voltage to the PCM. When the fuel is cold, the sensor resistance is high, therefore the PCM will see high signal voltage. As fuel warms, sensor resistance becomes less and voltage drops. The fuel temperature sensor is integrated with the optical sensor. This is a type B DTC.

Conditions for Setting the DTC

- Fuel temperature greater than 102 °C (215 °F).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

Poor idle quality during hot conditions.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

A scan tool reads fuel temperature in degrees centigrade. After engine is started, the fuel temperature should rise steadily.

Test Description

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

2. This Step determines if DTC P0182 is a hard failure or an intermittent condition.

3. This test will determine if signal circuit is shorted to ground.

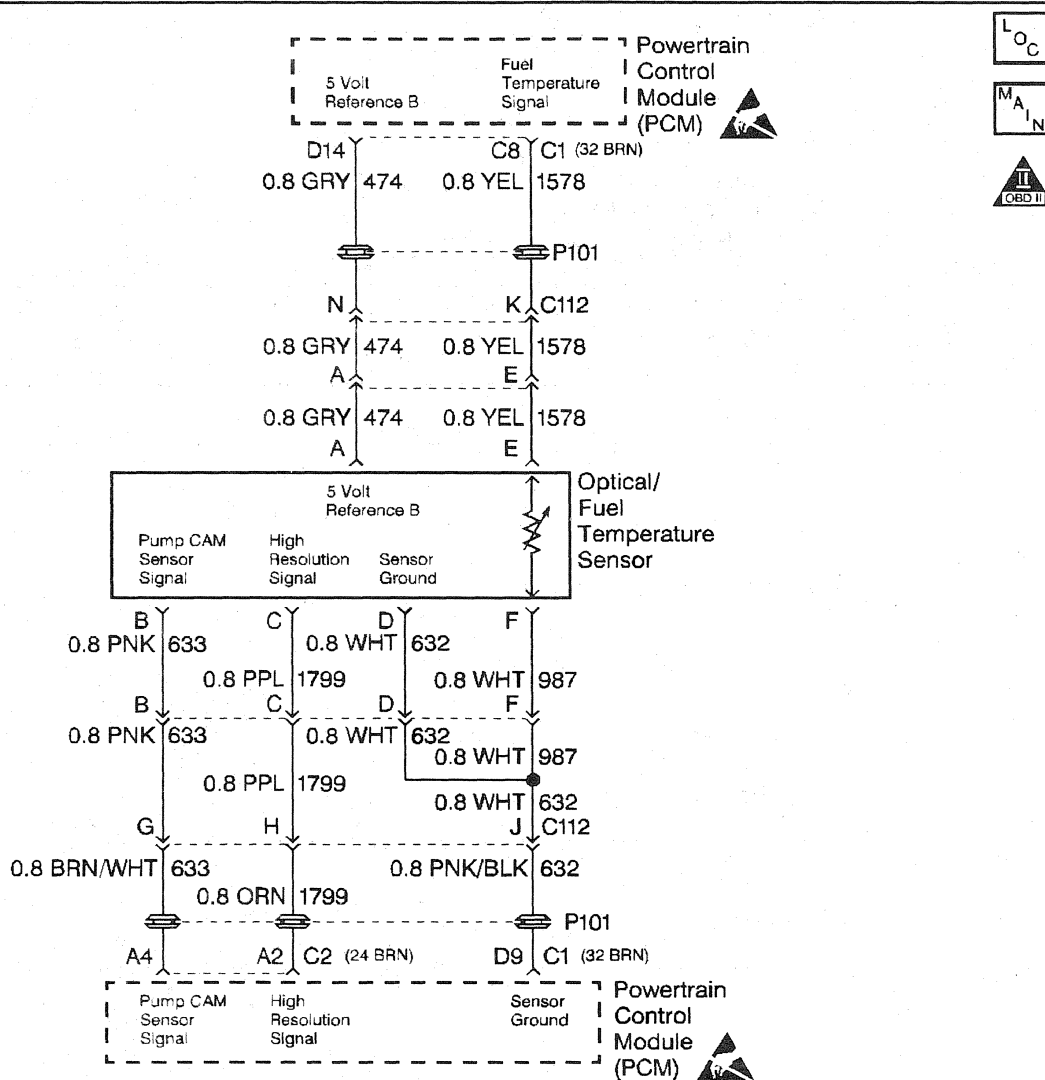
DTC P0182 Fuel Temperature Sensor CKT Low Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTC(s) use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Scan tool connected. 2. Start the engine. 3. Monitor the Fuel Temp display on scan tool. Is Fuel Temp greater than the specified value?	102 °C (215 °F)	Go to Step 3	Go to Step 5
3	1. Engine OFF. 2. Ignition ON. 3. Disconnect the Optical/Fuel Temperature sensor connector. Is Fuel Temp less than or equal to the specified value?	17 °C (63 °F)	Go to Step 7	Go to Step 4
4	1. Ignition OFF. 2. Using the J 39200 measure the resistance across the Fuel Temperature sensor harness connector. Is the resistance at the specified value?	Infinite	Go to Step 8	Go to Step 6
5	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to the applicable DTC table(s) first. Are additional DTC(s) stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
6	Repair the short to ground in the Fuel Temp signal circuit. Is the action complete?	—	Go to Step 9	—
7	Replace the fuel injection pump. Important: If fuel injection pump is faulty, the new injection pump must be timed. Go to Checking or Adjusting injection timing. Is the action complete?	—	Go to Step 9	—
8	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to PCM Replacement/Programming Is the action complete?	—	Go to Step 9	—

DTC P0182 Fuel Temperature Sensor CKT Low Voltage (cont'd)

Step	Action	Value(s)	Yes	No
9	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 10	Go to Step 2
10	Using the Scan Tool, select Capture Info, Review Info. Are any DTC[prime]s displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0183 Fuel Temperature Sensor CKT High Voltage



29557

Circuit Description

The fuel temperature sensor is a thermistor that controls signal voltage to the PCM. When the fuel is cold, the sensor resistance is high, therefore the PCM will see high signal voltage. As fuel warms, sensor resistance becomes less and voltage drops. The fuel temperature sensor is integrated with the optical sensor. This is a type B DTC.

Conditions for Setting the DTC

- Engine operating for 8 minutes.
- Fuel temperature less than or equal to 17 °C (63 °F).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

Poor idle quality during hot conditions.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

A scan tool reads fuel temperature in degrees centigrade. After engine is started, the temperature should rise steadily. A faulty connection, or an open in the signal circuit.

Test Description

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

2. This Step determines if DTC P0183 is a hard failure or an intermittent condition.

3. This test simulates a DTC P0182. If the PCM recognizes the low signal voltage (high temp) the PCM and wiring are OK.
4. This test will determine if signal circuit is open. There should be 5 volts at sensor connector if measured with J 39200-DVM. This will determine if there is a wiring problem or a faulty PCM.

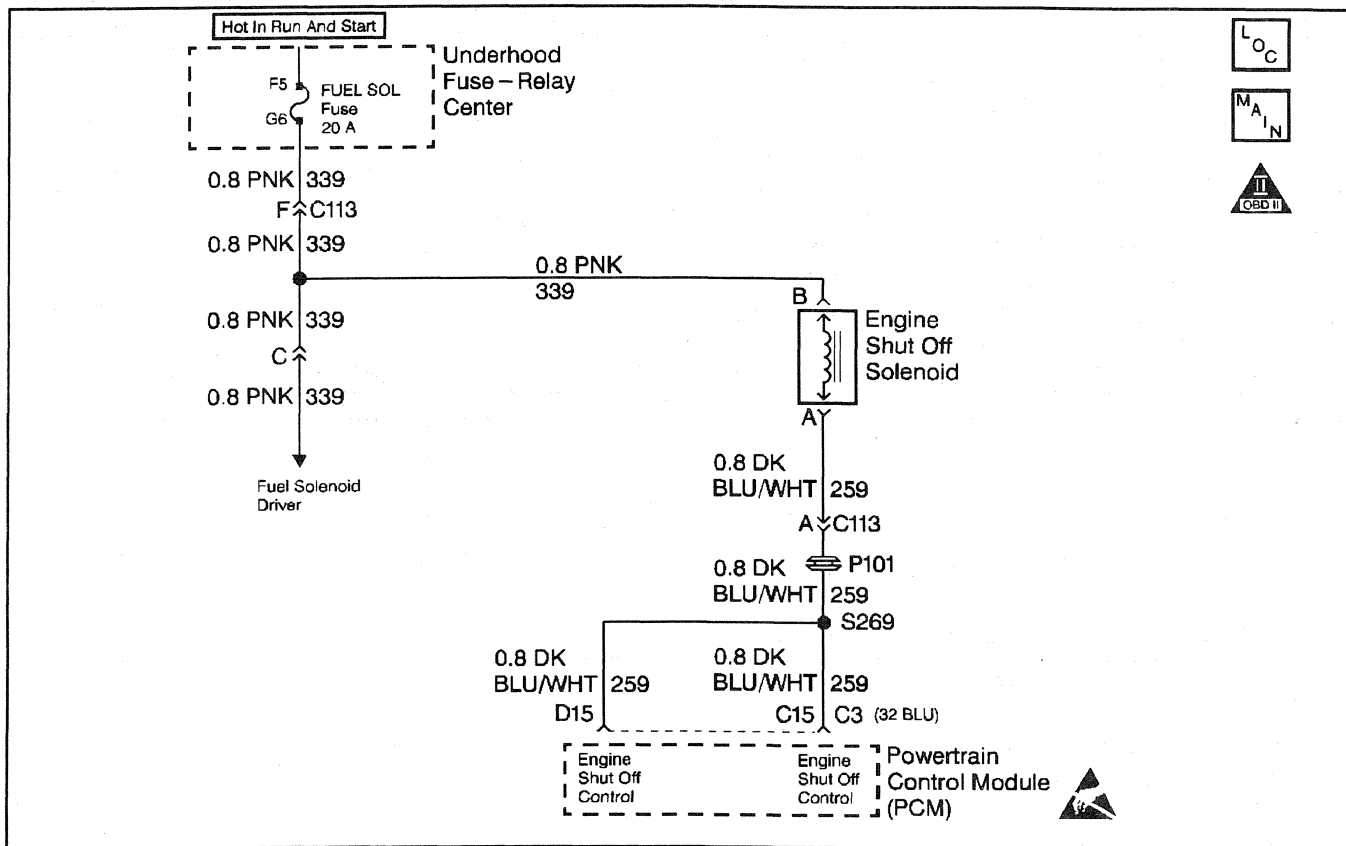
DTC P0183 Fuel Temperature Sensor CKT High Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTC(s) use the Scan Tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the Powertrain On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan Tool connected. 2. Start and idle engine. 3. Monitor the Fuel Temp display on Scan Tool. Is Fuel Temp less than or equal to the specified value?	17°C (63°F)	Go to Step 3	Go to Step 5
3	1. Engine OFF. 2. Ignition ON. 3. Disconnect the Optical/Fuel Temperature sensor connector. 4. Jumper the Fuel Temperature harness terminals together. Does the Scan Tool display fuel temperature greater than the specified value?	105°C (221°F)	Go to Step 6	Go to Step 4
4	Jumper the Fuel Temperature sensor signal circuit to a known good ground. Does the Scan Tool display a Fuel Temp greater than the specified value?	105°C (221°F)	Go to Step 7	Go to Step 8
5	DTC is intermittent. If no other DTC(s) are stored, refer to Diagnostic Aids. If additional DTCs are stored, refer to those table(s) first. Are any other DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
6	Inspect the sensor connector and PCM connector for proper connection. Was a problem found?	—	Go to Step 9	Go to Step 10
7	Check the Fuel Temperature sensor ground circuit for an open between the Fuel Temp sensor and the PCM. Was a problem found?	—	Go to Step 9	Go to Step 11
8	Check the Fuel Sensor signal circuit for an open between the Fuel Temp sensor and the PCM. Was a problem found?	—	Go to Step 9	Go to Step 11
9	Repair the circuit as necessary. Is the action complete?	—	Go to Step 12	—
10	Replace the injection pump. Refer to <i>Fuel Injection Pump</i> Is the action complete?	—	Go to Step 12	—
11	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> Is the action complete?	—	Go to Step 12	—

DTC P0183 Fuel Temperature Sensor CKT High Voltage (cont'd)

Step	Action	Value(s)	Yes	No
12	1. Using the Scan Tool select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific then enter the DTC number which was set. 4. Operate vehicle within the conditions for this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 13	Go to Step 2
13	Using the Scan Tool, select Capture Info, Review Info. Are there any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0215 Engine Shutoff Control Circuit



29575

Circuit Description

The injection pump fuel supply line has a solenoid controlled shutoff located in the injection pump. When the solenoid is energized (key in the run position), the valve is open and fuel is supplied to the injection pump. By providing a ground path, the PCM energizes the solenoid. This is a type D DTC.

Conditions for Setting the DTC

- PCM requested ESO ON.
 - Control circuit voltage at the PCM is greater than 8 volts.
 - Conditions met for 2 seconds.
- or
- PCM requested ESO OFF.
 - Control circuit voltage at the PCM is less than 8 volts.
 - Conditions met for 2 seconds.

Action Taken When the DTC Sets

P0215 will not turn ON the MIL.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

An open in the control circuit or the ignition feed circuit will cause a P0215. Also a no start condition will exist. The Scan Tool has the ability to turn the engine shutoff solenoid ON and OFF. This can be used as a quick operational check.

Test Description

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

3. This Step will check the control circuit for an open.

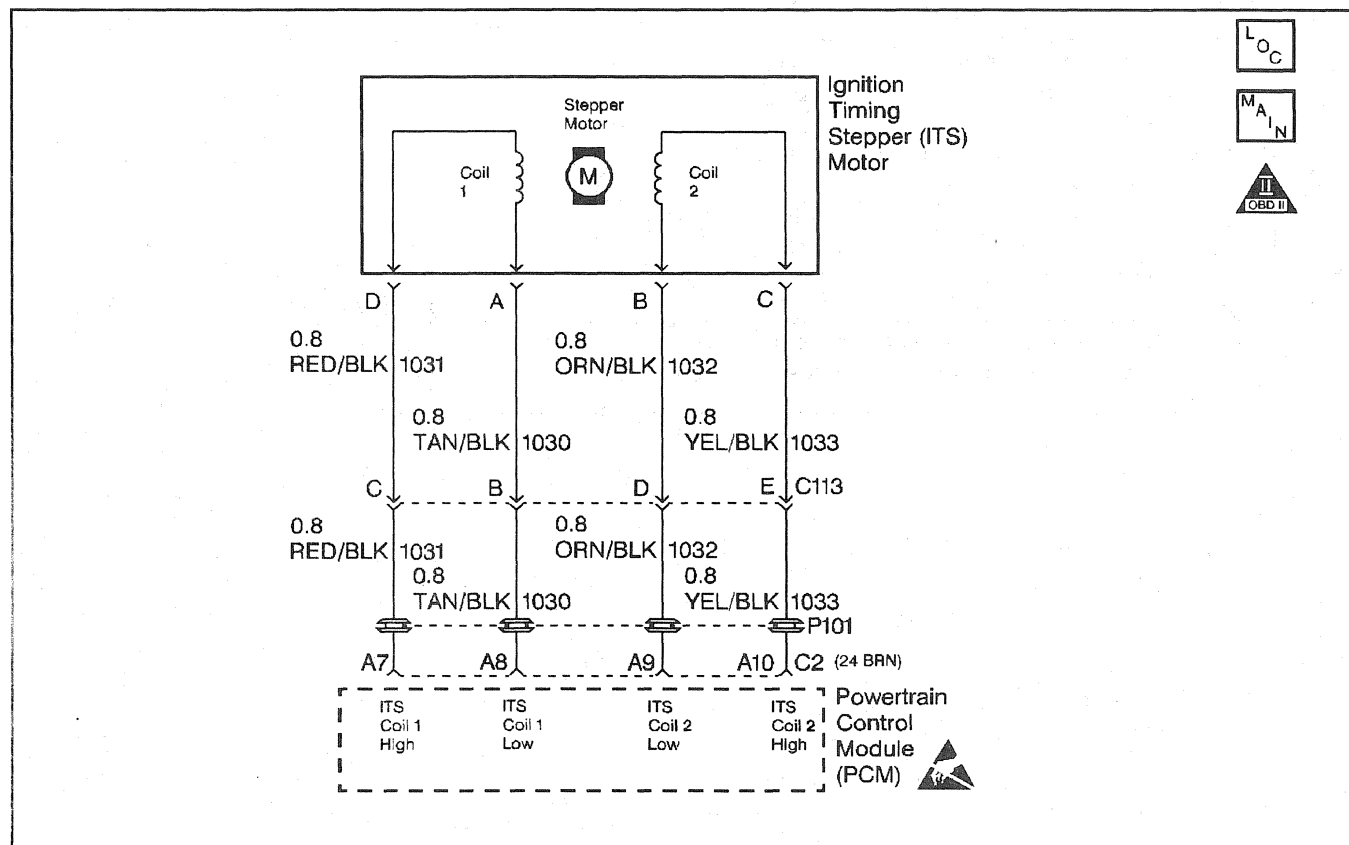
DTC P0215 Engine Shutoff Control Circuit

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTC(s) use the scan tool to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the Powertrain On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Ignition OFF. 2. Disconnect the ESO harness electrical connector. 3. Ignition ON, engine OFF. 4. With a test light connected to chassis ground, probe the ESO ignition feed circuit at harness connector. Is test light ON?	—	Go to Step 3	Go to Step 5
3	1. Ignition OFF 2. With a test light, jumper the ESO harness terminals together. 3. Ignition ON, engine OFF. Is test light ON?	—	Go to Step 4	Go to Step 6
4	Check the ESO harness for a poor connection and replace terminals if necessary. Did the terminal require replacement?	—	Go to Step 9	Go to Step 7
5	1. Check the ESO ignition feed circuit for: <ul style="list-style-type: none"> • an open • faulty fuse. 2. If the ESO ignition feed circuit was faulty, repair it as necessary. Was a repair performed?	—	Go to Step 9	—
6	1. Check the ESO control circuit for the following conditions: <ul style="list-style-type: none"> • an open. • poor connection at PCM. • circuit shorted to ground. 2. If the ESO control circuit was faulty, repair it as necessary. Was a repair performed?	—	Go to Step 09	Go to Step 8
7	Replace the injection pump. Refer to <i>Fuel Injection Pump</i> Important: If the injection pump is faulty, the new injection pump must be timed. Refer to <i>Checking/Adjust Injection Timing</i> Is the action complete?	—	Go to Step 9	—
8	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> Is the action complete?	—	Go to Step 9	—

DTC P0215 Engine Shutoff Control Circuit (cont'd)

Step	Action	Value(s)	Yes	No
9	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	<i>Go to Step 10</i>	<i>Go to Step 2</i>
10	Using the Scan Tool, select Capture Info, Review Info. Are any DT'Cs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0216 Injection Timing Control Circuit



29541

Circuit Description

Timing of the combustion event is accomplished by delivering a pulse of fuel into the combustion chamber at a desired degree of cylinder travel. This desired degree (desired timing), defines the current position of the cylinder in relationship of Top Dead Center. This test compares desired timing to measured timing when certain conditions have been met. To retard injection timing the PCM extends the Stepper motor. To advance injection timing the PCM retracts the Stepper motor. This is a type B DTC.

Conditions for Setting the DTC

- Engine speed has not changed more than 56 rpm for 20.8 seconds.
- A 5 degree difference between Act. Inj. Time and Des. Inj. Time

Action Taken When the DTC Sets

Possible combustion noise.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

A hard start and possible poor performance condition might exist. Act. Inj. Time will freeze at the point of the fault. Its possible DTC P0216 will set if injection timing is not set correctly. Refer to Checking and Adjusting Injection Timing for correct procedure.

Test Description

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

2. This Step determines if DTC P0216 is a hard failure or an intermittent.
4. This Step checks for an open or short in the injection timing coil circuit 1.
5. This Step checks for an open or short in the injection timing coil circuit 2.

6. The important thing in this Step is that the PCM is sending a varying voltage (voltage may vary between 1 and 12 (usually you will see voltage vary between 5 and 6 when engine is idling)), this will indicate that the PCM is OK and that there is a problem with the injection timing Stepper motor. If there is a steady voltage present on any circuit, this will indicate a problem with the PCM or a circuit shorted to voltage.

DTC P0216 Injection Timing Control Circuit

Step	Action	Value(s)	Yes	No
1	Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info' function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to OBD System Check
2	1. Engine at operating temperature. 2. Scan injection timing at idle and at 1500 rpm. Does scan tool display a the difference of the specified value between Actual Inj Time and Desired Inj Time at idle or at 1500 RPMs?	5°	Go to Step 3	Go to Step 4
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to those table(s) first. Are additional DTCs stored?	—	Go to the applicable DTC Table	Go to Diagnostic Aids
4	1. Ignition OFF. 2. Disconnect PCM. 3. Measure resistance between coil 1 low and coil 1 high at PCM harness. Is resistance between specified value?	10 – 60 Ohms	Go to Step 5	Go to Step 9
5	Measure resistance between coil 2 low and coil 2 high at PCM harness. Is resistance between specified value?	10 – 60 Ohms	Go to Step 6	Go to Step 10
6	1. Reconnect PCM. 2. Disconnect Injection Timing Stepper motor. 3. Start and idle engine. 4. Using scan tool, command Time Set ON. 5. With J 39200 connected to ground, check for a varying voltage on all terminals at injection timing Stepper motor electrical harness. Does voltage vary?	—	Go to Step 7	Go to Step 12
7	1. Disconnect crankshaft position sensor. 2. Measure resistance between crankshaft position sensor signal and 5 volt reference circuit at sensor pigtail. Is resistance between specified value?	950 – 1050 Ohms	Go to Step 8	Go to Step 15
8	Check for one of the following: • Injection timing set correctly • Sheared camshaft driven key Was a repair performed?	—	Go to Step 18	Go to Step 16

DTC P0216 Injection Timing Control Circuit (cont'd)

Step	Action	Value(s)	Yes	No
9	1. Ignition OFF. 2. Disconnect PCM and check for an open in one of the following: <ul style="list-style-type: none"> • Coil 1 low circuit. • Coil 1 high circuit. • If a problem is found, repair it as necessary. Was a repair performed?	—	Go to Step 18	Go to Step 16
10	1. Ignition OFF. 2. Disconnect PCM and check for an open in one of the following: <ul style="list-style-type: none"> • Coil 2 low circuit. • Coil 2 high circuit. • If a problem is found, repair it as necessary. Was a repair performed?	—	Go to Step 18	Go to Step 16
11	Check for poor electrical connection at the injection timing Stepper motor. Did any terminals require replacement?	—	Go to Step 12	Go to Step 17
12	Check the circuit for a short to ground or a poor connection at the PCM. Was a repair performed?	—	Go to Step 18	Go to Step 17
13	1. Check crankshaft sensor pigtail for a short to ground. 2. If the circuit is shorted to ground, repair it as necessary. Was the circuit shorted to ground?	—	Go to Step 18	Go to Step 14
14	Check the circuit for a poor connection and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 18	Go to Step 17
15	Replace crankshaft position sensor. Refer to <i>Crankshaft Position Sensor</i> Is the action complete?	—	Go to Step 18	—
16	Replace Injection pump. Refer to <i>Fuel Injection Pump</i> Important: If injection pump is faulty, the new injection pump must be timed. Refer to <i>Checking/Adjust Injection Timing</i> Is the action complete?	—	Go to Step 18	—
17	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> Is the action complete?	—	Go to Step 18	—
18	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 19	Go to Step 2
19	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

[illegible]

2. The injection pump is being replaced in this Step.

DTC P0219 Engine Overspeed Condition

Step	Action	Value(s)	Yes	No
1	Before clearing DTC(s) use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to OBD System Check
2	Replace Injection pump. If injection pump is faulty, the new injection pump must be timed. Refer to Checking and Adjusting Injection Timing. Is the action complete?	—	Go to Step 3	—
3	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 4	Go to Step 2
4	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

Powertrain Control Module (PCM)

APP 3 5 Volt Reference (D3)
 APP 1 5 Volt Reference (D12)
 APP 2 5 Volt Reference (C2)

0.5 YEL/BLK 596 (F)
 0.5 WHT/BLK 598 (A)
 0.5 GRY 597 (E)

0.5 YEL/BLK 596 (F)
 0.5 WHT/BLK 598 (A)
 0.5 TAN 597 (E)

Accelerator Pedal Position (APP) Module

0.5 DK GRN 487 (K)
 0.5 DK BLU 485 (F)
 0.5 LT BLU 486 (C)
 0.5 GRY 720 (J)
 0.5 BRN 718 (A)
 0.5 PPL 719 (B)

0.5 DK GRN 487 (G)
 0.5 DK BLU 485 (J)
 0.5 LT BLU 486 (C)
 0.5 GRY 720 (J)
 0.5 BRN 718 (A)
 0.5 PPL 719 (B)

Powertrain Control Module (PCM)

APP 3 Signal (D4)
 Sensor Ground (D6)
 APP 1 Signal (B2)
 Sensor Ground (B1)
 APP 2 Signal (C5)
 Sensor Ground (C2)

29555

2. This Step will determine if there is a good voltage reference.

DTC P0220 APP Sensor2 Circuit

Step	Action	Value(s)	Yes	No
1	<p>Important: Before clearing DTC(s) use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used.</p> <p>Was the On-Board Diagnostic (OBD) System Check performed?</p>	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	<p>1. Disconnect the APP sensor electrical connector. 2. Ignition ON, engine OFF. 3. With <i>J 39200</i> connected to ground, check all APP 5 volt reference circuits at APP harness.</p> <p>Is voltage less than specified value?</p>	4.8 V	Go to Step 4	Go to Step 3
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to those table(s) first. Are additional DTC(s) stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	<p>1. Ignition OFF. 2. Disconnect the PCM and check the 5 volt reference circuit for a short to ground. 3. If the 5 volt reference circuit is shorted to ground, repair it as necessary.</p> <p>Was the 5 volt reference circuit shorted to ground?</p>	—	Go to Step 6	Go to Step 5
5	<p>Replace the faulty PCM.</p> <p>Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i></p> <p>Is the action complete?</p>	—	Go to Step 6	—
6	<p>1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text.</p> <p>Does the Scan Tool indicate that this diagnostic Ran and Passed?</p>	—	Go to Step 7	Go to Step 2
7	<p>Using the Scan Tool, select Capture Info, Review Info.</p> <p>Are any DTC[prime]s displayed that have not been diagnosed?</p>	—	Go to the Applicable DTC Table	System OK

29555

- The input from APP 2 sensor is ignored.
- A current and history DTC will set but it will not turn on the Service Throttle Soon lamp.
- Throttle will operate normally as long as there is only one malfunction present. If there are two APP malfunctions present, the PCM will then turn ON the Service Throttle Soon lamp and limit power. If a third APP malfunction is present, the Service Throttle Soon lamp will be ON and will only allow the engine to operate at idle.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

A scan tool reads APP 2 position in volts and should read about 4.5 volts with throttle closed and ignition ON or at idle. Voltage should decrease at a steady rate as throttle is moved toward WOT. Also, 90%

pedal travel is acceptable for correct APP operation. Scan APP 2 sensor while depressing accelerator pedal with engine stopped and ignition ON. Display should vary from about 4.5 volts when throttle was closed to about 1.5 volts when throttle is held at Wide Open Throttle (WOT) position.

Test Description

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

4. This Step determines if there is a good 5 volt reference.
5. This Step will check for an open in the ground circuit.

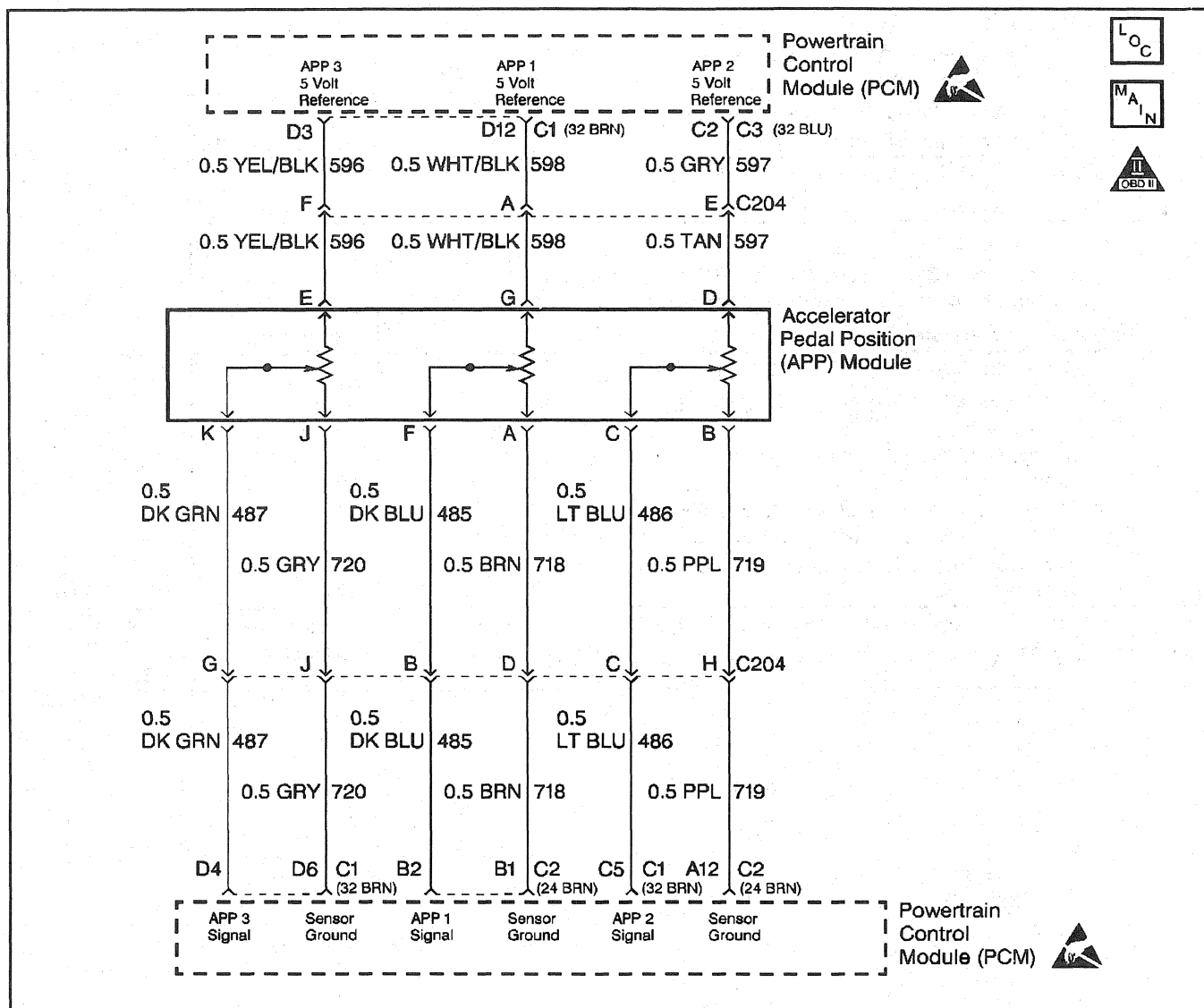
DTC P0221 APP Sensor2 Circuit Performance

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool. Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Ignition ON, engine OFF. 2. With the throttle closed, observe APP voltages on the scan tool. Are APP voltages at specified values?	0.45–0.95 V 4.0–4.5 V 3.6–4.0 V	Go to Step 3	Go to Step 4
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	1. Disconnect the APP sensor electrical connector. 2. Ignition ON, engine OFF. 3. With J 39200 connected to ground, probe APP sensor 5 volt reference circuits at APP harness terminals G, D, and E. Is voltage at the specified value on all circuits?	4.75 V	Go to Step 5	Go to Step 6
5	1. Ignition ON, engine OFF. 2. With a test light connected to B+, probe APP sensor ground circuits at the APP sensor harness terminals A, B, and J. Is Test light ON (all circuits)?	—	Go to Step 9	Go to Step 8
6	1. Ignition OFF. 2. Disconnect the PCM and check the 5 volt reference circuit for an open or short to ground. 3. If the 5 volt reference circuit is open or shorted to ground, repair it as necessary. Was the 5 volt reference circuit open or shorted to ground?	—	Go to Step 11	Go to Step 7
7	Check the 5 volt reference circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 11	Go to Step 10

DTC P0221 APP Sensor2 Circuit Performance (cont'd)

Step	Action	Value(s)	Yes	No
8	1. Ignition OFF. 2. Disconnect the PCM and check for an open sensor ground circuit to the PCM. 3. If problem is found, repair as necessary. Was APP sensor ground circuit open?	—	Go to Step 11	Go to Step 10
9	Replace the APP module. Refer to <i>APP Module</i> . Is the action complete?	—	Go to Step 11	—
10	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 11	—
11	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 12	Go to Step 2
12	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0222 APP Sensor2 Circuit Low Voltage



29555

Circuit Description

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently. This is a type D DTC.

Conditions for Setting the DTC

- Voltage is less than .25 volt on APP 2 sensor.
- Condition met for 2 seconds

Action Taken When the DTC Sets

- The input from APP 2 sensor is ignored.
- A current and history DTC will set but it will not turn on the Service Throttle Soon lamp.

- The throttle will operate normally as long as there is only one sensor malfunction present. If two different APP sensors have a malfunction, the Service Throttle Soon lamp will light and the PCM will limit power. If three APP sensors have a malfunction present, the Service Throttle Soon lamp will light and the PCM will only allow the engine to operate at idle.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

A scan tool reads APP 2 position in volts and should read about 4.5 volts with throttle closed and ignition ON or at idle. Voltage should decrease at a steady rate as throttle is moved toward WOT. Also, 90% pedal travel is acceptable for correct APP operation. Scan APP 2 sensor while depressing accelerator pedal with engine stopped and ignition ON. Display should vary from about 4.5 volts when throttle was closed to about 1.5 volts when throttle is held at Wide Open Throttle (WOT) position.

Test Description

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

2. This Step determines if P0222 is the result of a hard failure or an intermittent condition.
3. This Step checks the PCM and wiring.

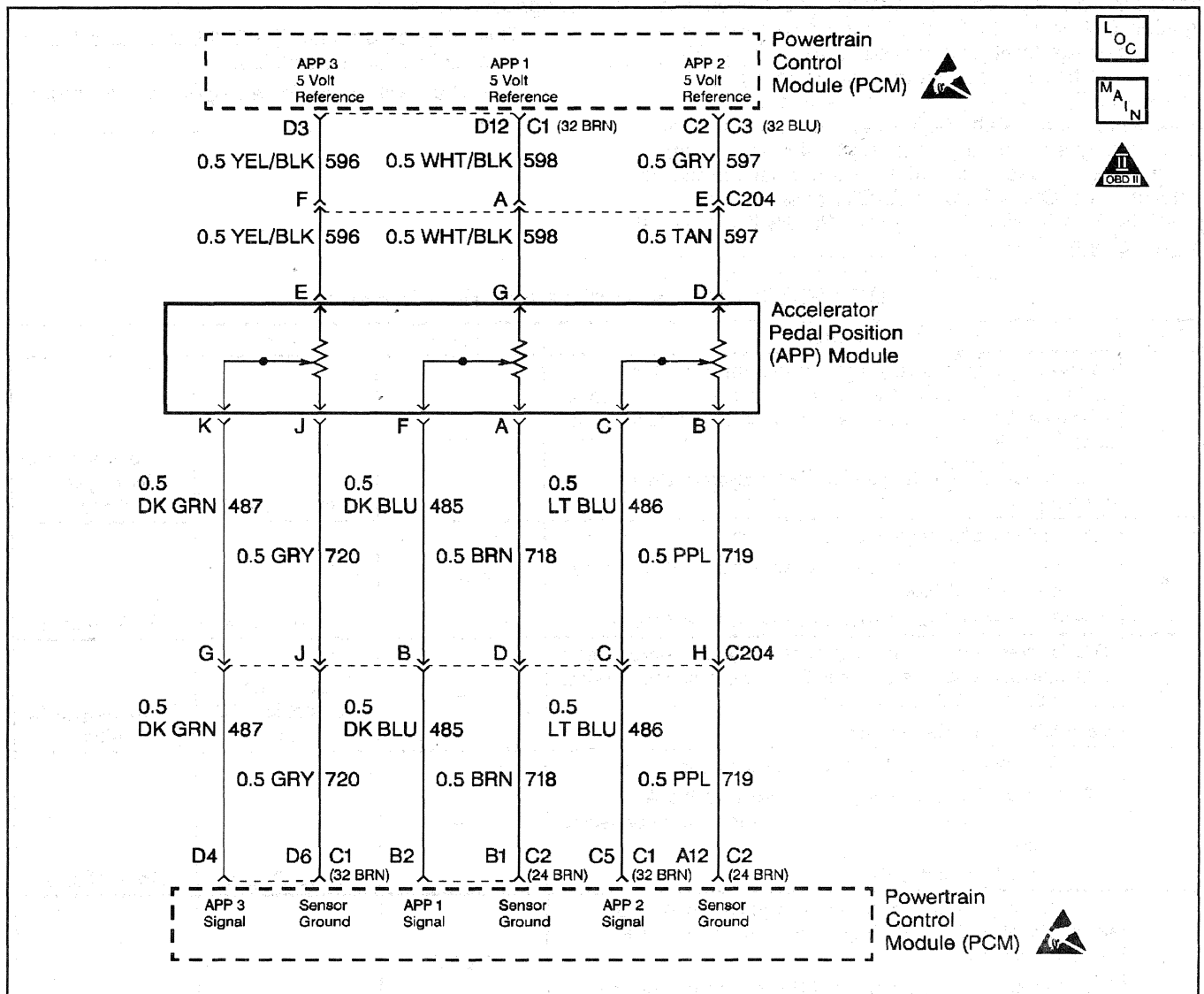
DTC P0222 APP Sensor2 Circuit Low Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the Scan Tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	<i>Go to Step 2</i>	<i>Go to Powertrain OBD System Check</i>
2	1. Ignition ON, engine OFF. 2. With the throttle closed, observe the APP 2 voltage on the Scan Tool. Is APP 2 voltage less than or equal to the specified value?	0.25 V	<i>Go to Step 4</i>	<i>Go to Step 3</i>
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to those tables(s) first. Are additional DTCs stored?	—	<i>Go to the Applicable DTC Table</i>	<i>Go to Diagnostic Aids</i>
4	1. Disconnect the APP sensor electrical connector. 2. Use the J 39200 in order to probe the APP 2, 5 volt reference circuit at APP harness. Is APP 2 voltage greater than the specified value?	5 V	<i>Go to Step 5</i>	<i>Go to Step 6</i>
5	Use the J 39200 in order to probe APP 2 sensor signal circuit at the APP sensor harness. Is APP 2 voltage greater than the specified value?	5 V	<i>Go to Step 10</i>	<i>Go to Step 8</i>
6	1. Ignition OFF. 2. Disconnect the PCM and check the 5 volt reference circuit for an open or short to ground. 3. If the 5 volt reference circuit is open or shorted to ground, repair it as necessary. Was the 5 volt reference circuit open or shorted to ground?	—	<i>Go to Step 13</i>	<i>Go to Step 7</i>
7	Check the 5 volt reference circuit for a poor connection at the PCM and replace the terminal if necessary. Did the terminal require replacement?	—	<i>Go to Step 13</i>	<i>Go to Step 12</i>
8	1. Ignition OFF. 2. Disconnect the PCM, and check the APP 2 signal circuit for an open, or a short to ground. 3. If the APP 2 sensor signal circuit is open or shorted to ground, repair it as necessary. Was the APP 2 signal circuit open or shorted to ground?	—	<i>Go to Step 13</i>	<i>Go to Step 9</i>
9	Check the APP 2 sensor signal circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	<i>Go to Step 13</i>	<i>Go to Step 12</i>

DTC P0222 APP Sensor2 Circuit Low Voltage (cont'd)

Step	Action	Value(s)	Yes	No
10	Check for a poor electrical connection at the APP sensor. Was a repair performed?	—	Go to Step 13	Go to Step 11
11	Replace the APP module. Refer to <i>APP Module</i> . Is the action complete?	—	Go to Step 13	—
12	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 13	—
13	1. Use the Scan Tool in order to select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 14	Go to Step 2
14	Using the Scan Tool, select Capture Info, Review Info. Are there any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0223 APP Sensor2 Circuit High Voltage



29555

Circuit Description

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently. This is a type D DTC.

Conditions for Setting the DTC

- Voltage is greater than 4.75 volts on APP 2.
- Condition met for 2 seconds.

Action Taken When the DTC Sets

- The input from APP 2 sensor is ignored.
- A current and history DTC will set but it will not turn on the Service Throttle Soon lamp.

- The throttle will operate normally as long as there is only one sensor malfunction present. If two different APP sensors have a malfunction, the Service Throttle Soon lamp will light and the PCM will limit power. If three APP sensors have a malfunction present, the Service Throttle Soon lamp will light and the PCM will only allow the engine to operate at idle.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

A Scan tool reads APP 2 position in volts and should read about 4.5 volts with throttle closed and ignition ON or at idle. Voltage should decrease at a steady rate as throttle is moved toward WOT. Also, 90% pedal travel is acceptable for correct APP operation. Scan APP 2 signal while depressing accelerator pedal with engine stopped and ignition ON. Display should vary from about 4.5 volts when throttle was closed to about 1.5 volts when throttle is held at Wide Open Throttle (WOT) position. Its possible P1125 will set along with P0223 if the signal circuit is open.

Test Description

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

2. This Step determines if P0223 is a hard failure or an intermittent condition.
5. This Step will check for an open in the ground circuit.

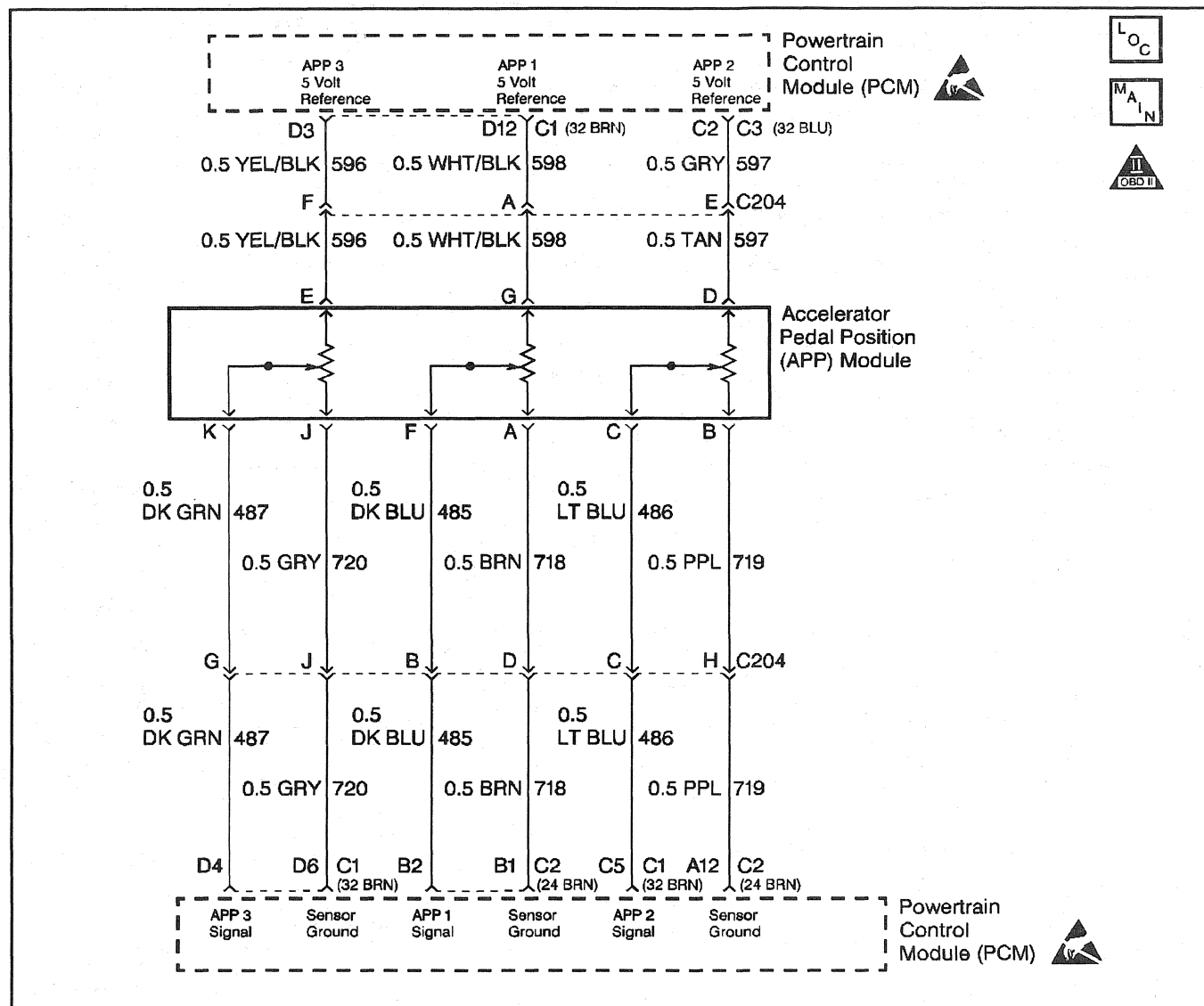
DTC P0223 APP Sensor2 Circuit High Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Ignition ON, engine OFF. 2. With the throttle closed, observe the APP 2 display on the scan tool. Is APP 2 greater than or equal to the specified value?	4.75 V	Go to Step 4	Go to Step 3
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	1. Disconnect the APP sensor harness connector. 2. Probe APP 2 sensor ground circuit at the APP sensor harness connector with a test light connected to B+. Is the test light ON?	—	Go to Step 5	Go to Step 7
5	Use a fused jumper wire in order to jump the APP 2 signal circuit to the APP 2 ground circuit at the APP harness connector. Does the scan tool display the APP 2 voltage less than the specified value.	0.25 V	Go to Step 8	Go to Step 6
6	1. Check for an open on the APP 2 sensor signal circuit. 2. If the APP 2 sensor signal circuit is open, repair it as necessary. Was the APP 2 sensor signal circuit open?	—	Go to Step 11	Go to Step 10
7	1. Check for an open sensor ground circuit. 2. If a problem is found, repair it as necessary. Was the APP 2 sensor ground circuit open?	—	Go to Step 11	Go to Step 10
8	Check for a poor electrical connection at the APP sensor. Was the repair performed?	—	Go to Step 11	Go to Step 9
9	Replace the APP module. Refer to APP Module. Is the action complete?	—	Go to Step 11	—

DTC P0223 APP Sensor2 Circuit High Voltage (cont'd)

Step	Action	Value(s)	Yes	No
10	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 11	—
11	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 12	Go to Step 2
12	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0225 APP Sensor3 Circuit



29555

Circuit Description

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently. This is a type D DTC.

Conditions for Setting the DTC

- Reference voltage on APP 3 below 4.8 volts.
- Condition met for 2 seconds.

Action Taken When the DTC Sets

If DTC P0225 is present, the PCM will turn ON the Service Throttle Soon lamp and limit power.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

All 5 volt reference circuits must be checked for proper reference voltage. Voltmeter accuracy is important.

Test Description

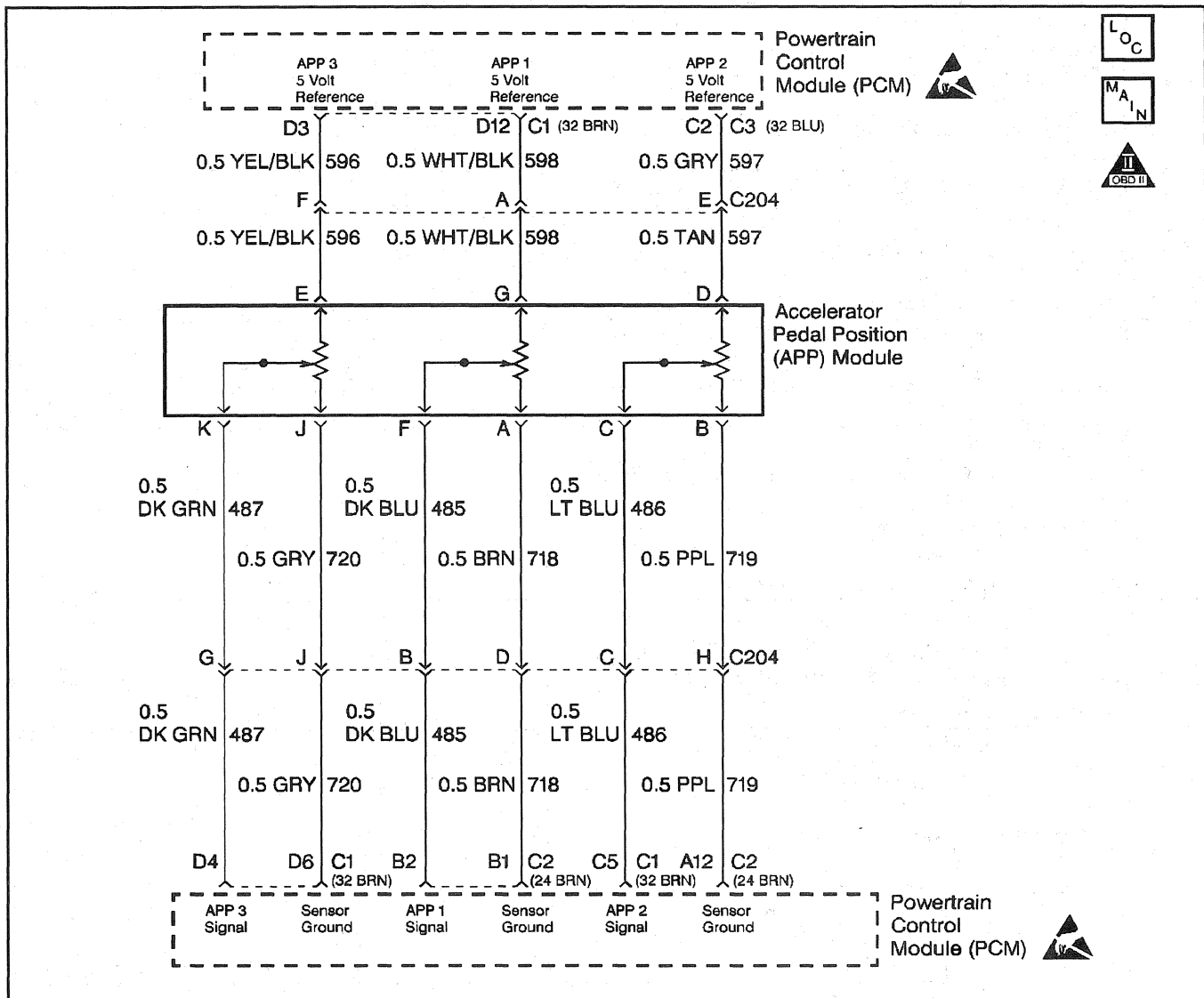
Number(s) below refer to the Step number(s) on the Diagnostic Table.

2. This Step will check all 5 volt reference circuits.

DTC P0225 APP Sensor3 Circuit

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when 'Clear Info' function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Disconnect the APP sensor electrical connector. 2. Ignition ON, engine OFF. 3. With J 39200 connected to ground, check all APP 5 volt reference circuits at APP harness. Is voltage less than specified value?	4.8 V	Go to Step 4	Go to Step 3
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	1. Ignition OFF. 2. Disconnect the PCM and check the 5 volt reference circuit for a short to ground. 3. If the 5 volt reference circuit is shorted to ground, repair it as necessary. Was the 5 volt reference circuit shorted to ground?	—	Go to Step 6	Go to Step 5
5	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 6	—
6	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 7	Go to Step 2
7	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0226 APP Sensor3 Circuit Performance



29555

Circuit Description

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently. This is a type D DTC.

Conditions for Setting the DTC

- Ignition voltage greater than 6.4 volts.
- Engine speed greater than 300 RPM.
- The difference between APP 3 and APP 1 is greater than .23 volts (PCM compares pre-scaled voltage (internal to PCM)).
- The difference between APP 3 and APP 2 is greater than .50 volts (PCM compares pre-scaled voltage (internal to PCM)).

- No in range faults for APP 1 or APP 2 (PCM checks for high and low voltage faults).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

- The input from APP 2 sensor is ignored.
- A current and history DTC will set but it will not turn on the Service Throttle Soon lamp.
- Throttle will operate normally as long as there is only one malfunction present. If there are two APP malfunctions present, the PCM will then turn ON the Service Throttle Soon lamp and limit power. If a third APP malfunction is present, the Service Throttle Soon lamp will be ON and will only allow the engine to operate at idle.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

A scan tool reads APP 3 position in volts. Should read about 4.0 volts with throttle closed and ignition ON or at idle. Voltage should decrease at a steady rate as throttle is moved toward Wide Open Throttle

(WOT). Also, 90% pedal travel is acceptable for correct APP operation. Scan APP 3 sensor while depressing accelerator pedal with engine stopped and ignition ON. Display should vary from about 4.0 volts when throttle was closed to about 2.0 volts when throttle is held at Wide Open Throttle (WOT) position.

Test Description

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

2. This Step determines if there is a good reference voltage.

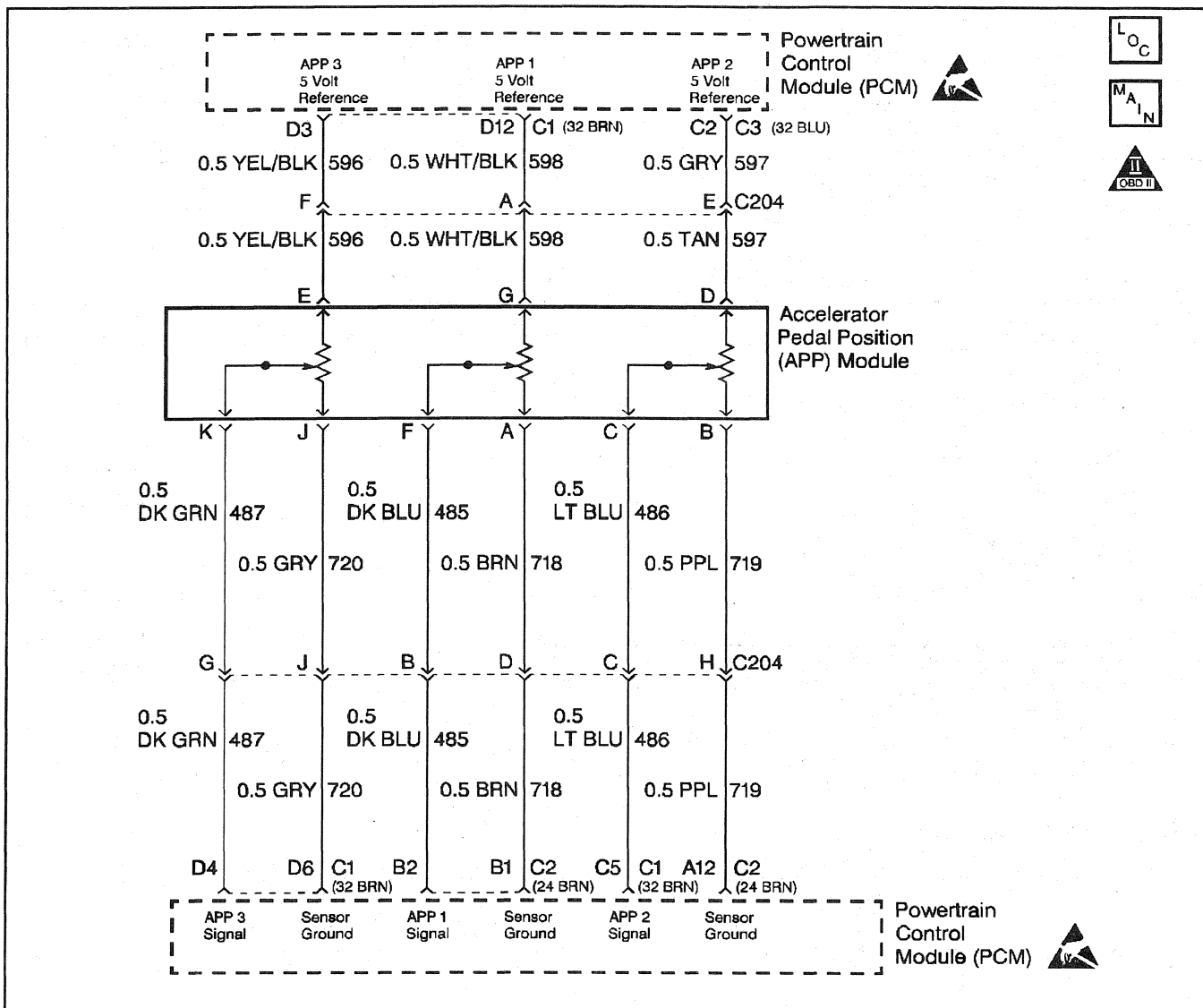
DTC P0226 APP Sensor3 Circuit Performance

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Ignition ON, engine OFF. 2. With the throttle closed, observe APP voltages on the scan tool. Are APP voltages at specified values?	0.45–0.95 V 4.0–4.5 V 3.6–4.0 V	Go to Step 3	Go to Step 4
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	1. Disconnect the APP sensor electrical connector. 2. Ignition ON, engine OFF. 3. With <i>J 39200</i> connected to ground, probe APP sensor 5 volt reference circuits at APP harness terminals G, D, and E. Is voltage at the specified value on all circuits?	4.75 V	Go to Step 5	Go to Step 6
5	1. Ignition ON, engine OFF. 2. With a test light connected to B+, probe APP sensor ground circuits at the APP sensor harness terminals A, B, and J. Is Test light ON (all circuits)?	—	Go to Step 9	Go to Step 8
6	1. Ignition OFF. 2. Disconnect the PCM and check the 5 volt reference circuit for an open or short to ground. 3. If the 5 volt reference circuit is open or shorted to ground, repair it as necessary. Was the 5 volt reference circuit open or shorted to ground?	—	Go to Step 11	Go to Step 7
7	Check the 5 volt reference circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 11	Go to Step 10

DTC P0226 APP Sensor3 Circuit Performance (cont'd)

Step	Action	Value(s)	Yes	No
8	1. Ignition OFF. 2. Disconnect the PCM and check for an open sensor ground circuit to the PCM. 3. If problem is found, repair as necessary. Was APP sensor ground circuit open?	—	Go to Step 11	Go to Step 10
9	Replace the APP module. Refer to <i>APP Module</i> . Is the action complete?	—	Go to Step 11	—
10	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 11	—
11	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 12	Go to Step 2
12	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0227 APP Sensor3 Circuit Low Voltage



29555

Circuit Description

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently. This is a type D DTC.

Conditions for Setting the DTC

- Voltage is less than .25 volts on APP 3 sensor.
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

- The input from APP 3 sensor is ignored.
- A current and history DTC will set but it will not turn ON the Service Throttle Soon lamp.

- The throttle will operate normally as long as there is only one malfunction present. If two different APP sensors have a malfunction, the Service Throttle Soon lamp will light and the PCM will limit power. If three APP sensors have a malfunction present, the Service Throttle Soon lamp will light and the PCM will only allow the engine to operate at idle.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

A scan tool reads APP 3 position in volts. Should read about 4.0 volts with throttle closed and ignition ON or at idle. Voltage should decrease at a steady rate as throttle is moved toward Wide Open Throttle (WOT). Also, 90% pedal travel is acceptable for correct APP operation. Scan APP 3 sensor while depressing accelerator pedal with engine stopped and ignition ON. Display should vary from about 4.0 volts when throttle was closed to about 2.0 volts when throttle is held at Wide Open Throttle (WOT) position.

Test Description

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

2. This Step will determine if DTC P0227 is the result of a hard failure or an intermittent condition.
3. This Step checks the PCM and wiring.

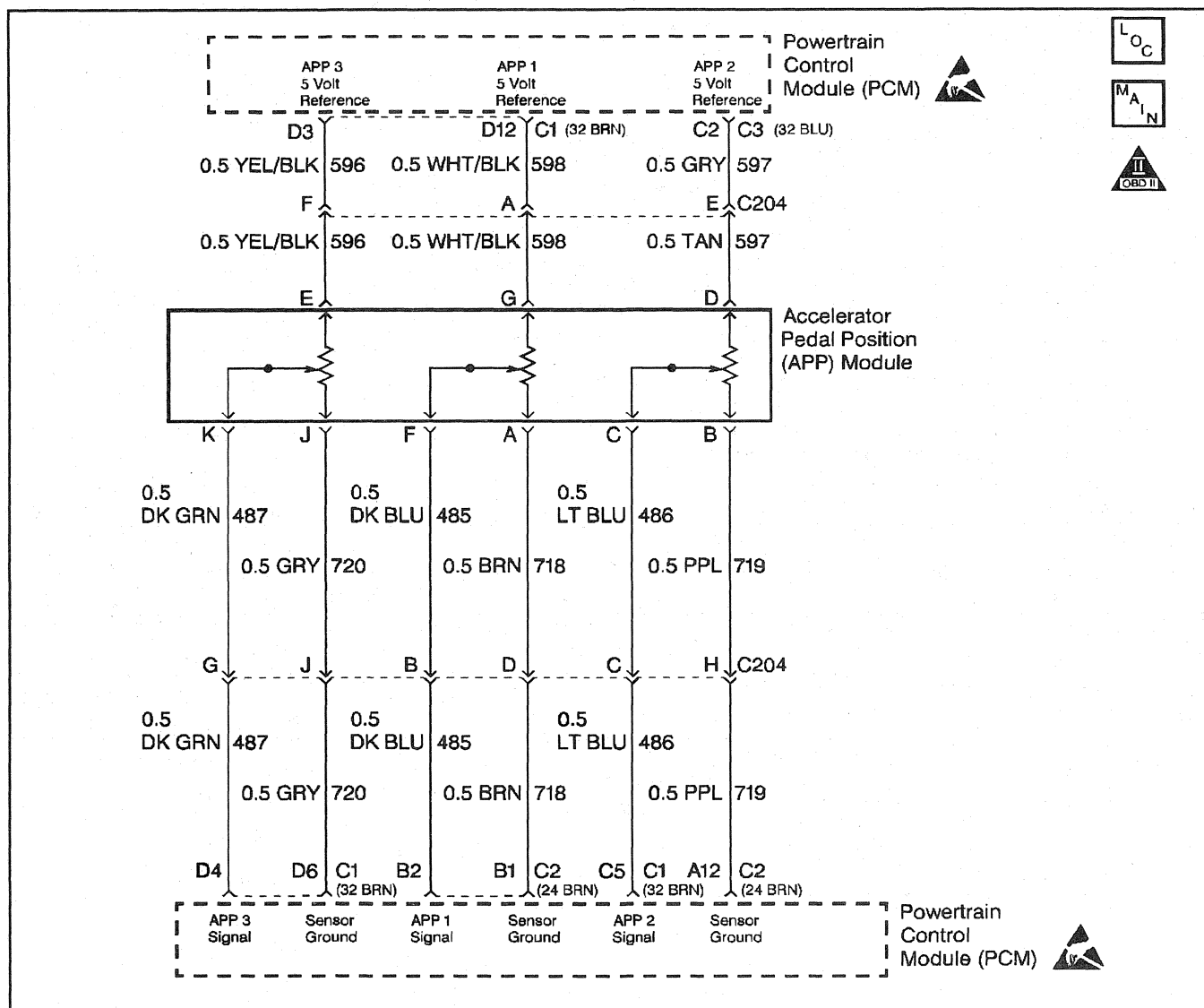
DTC P0227 APP Sensor3 Circuit Low Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the Scan Tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Ignition ON, engine OFF. 2. With the throttle closed, observe the APP 3 voltage on the Scan Tool. Is APP 3 voltage less than or equal to the specified value?	0.25 V	Go to Step 4	Go to Step 3
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to those tables(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	1. Disconnect the APP sensor electrical connector. 2. Use the <i>J 39200</i> in order to probe the APP 3, 5 volt reference circuit at the APP harness. Is the voltage at the specified value?	5 V	Go to Step 5	Go to Step 6
5	Use <i>J 39200</i> in order to probe the APP 3 signal circuit at the APP harness. Is the voltage at the specified value?	5 V	Go to Step 10	Go to Step 8
6	1. Ignition OFF. 2. Disconnect the PCM and check the 5 volt reference circuit for an open or short to ground. 3. If the 5 volt reference circuit is open or shorted to ground, repair it as necessary. Was the 5 volt reference circuit open or shorted to ground?	—	Go to Step 13	Go to Step 7
7	Check the 5 volt reference circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 13	Go to Step 12
8	1. Ignition OFF. 2. Disconnect the PCM, and check the APP 3 signal circuit for an open, short to ground. 3. If the APP 3 sensor signal circuit is open or shorted to ground, repair it as necessary. Was the APP 3 signal circuit open or shorted to ground?	—	Go to Step 13	Go to Step 9
9	Check the APP 3 sensor signal circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 13	Go to Step 12

DTC P0227 APP Sensor3 Circuit Low Voltage (cont'd)

Step	Action	Value(s)	Yes	No
10	Check for a poor electrical connection at the APP sensor. Was a repair performed?	—	Go to Step 13	Go to Step 11
11	Replace the APP module. Refer to <i>APP Module</i> . Is the action complete?	—	Go to Step 13	—
12	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 13	—
13	<ol style="list-style-type: none"> Using the Scan Tool, select DTC, Clear Info. Start engine and idle at normal operating temperature. Select DTC, Specific, then enter the DTC number which was set. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 14	Go to Step 2
14	Using the Scan Tool, select Capture Info, Review Info. Are there any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0228 APP Sensor3 Circuit High Voltage



29555

Circuit Description

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently. This is a type D DTC.

Conditions for Setting the DTC

- Voltage is greater than 4.75 volts for 2 seconds on APP 3 sensor.
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

- The input from APP 3 sensor is ignored.
- A current and history DTC will set but it will not turn ON the Service Throttle Soon lamp.

- The throttle will operate normally as long as there is only one malfunction present. If two different APP sensors have a malfunction, the Service Throttle Soon lamp will light and the PCM will limit power. If three APP sensors have a malfunction present, the Service Throttle Soon lamp will light and the PCM will only allow the engine to operate at idle.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

A scan tool reads APP 3 position in volts. Should read about 4.0 volts with throttle closed and ignition ON or at idle. Voltage should decrease at a steady rate as throttle is moved toward Wide Open Throttle (WOT). Also, 90% pedal travel is acceptable for correct APP operation. Scan APP 3 sensor while depressing accelerator pedal with engine stopped and ignition ON. Display should vary from about 4.0 volts when throttle was closed to about 2.0 volts when throttle is held at Wide Open Throttle (WOT) position.

Test Description

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

2. This Step will determine if DTC P0228 is the result of a hard failure or an intermittent condition.
3. This Step checks the PCM and wiring.

DTC P0228 APP Sensor3 Circuit High Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Ignition ON, engine OFF. 2. With the throttle closed, observe the APP 3 display on the scan tool. Is APP 3 greater than or equal to the specified value?	4.75 V	Go to Step 4	Go to Step 3
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to the applicable DTC table(s) first. Are additional DTCs stored ?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	1. Disconnect the APP sensor harness connector. 2. Probe the APP 3 sensor ground circuit at the APP sensor harness connector with a test light connected to B+. Is the test light ON?	—	Go to Step 5	Go to Step 7
5	Use a fused jumper wire in order to jump the APP 3 signal circuit to the APP 3 ground circuit at the APP harness connector. Does the scan tool display the APP 3 voltage less than the specified value?	0.25 V	Go to Step 8	Go to Step 6
6	1. Check for an open on the APP 3 sensor signal circuit. 2. If the APP 3 sensor signal is open, repair it as necessary. Was the APP 3 sensor signal circuit open?	—	Go to Step 11	Go to Step 10
7	1. Check for an open sensor ground circuit. 2. If a problem is found, repair it as necessary. Was APP 3 sensor ground circuit open?	—	Go to Step 11	Go to Step 10
8	Check for a poor electrical connection at the APP sensor. Was a repair performed?	—	Go to Step 11	Go to Step 9
9	Replace the APP module. Refer to APP Module. Is the action complete?	—	Go to Step 11	—

DTC P0228 APP Sensor3 Circuit High Voltage (cont'd)

Step	Action	Value(s)	Yes	No
10	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 11	—
11	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 12	Go to Step 2
12	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0231 Fuel Pump Feedback Circuit Low Voltage

Refer to *Fuel Pump System*

Circuit Description

The status of the lift pump is monitored by the PCM. This signal is also used to store a DTC if the fuel pump relay is defective or fuel pump voltage is lost while the engine is running. There should be about 12 volts on circuit 120 during glow plug cycle. This is a type B DTC.

Conditions for Setting the DTC

- Fuel lift pump commanded ON.
- Ignition voltage minus 4 volts.
- Fuel lift pump voltage less than ignition voltage value.
- Condition met for 2 seconds.

Action Taken When the DTC Sets

No action taken.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

A DTC P0231 will result in a poor performance problem under heavy loads or grades.

Test Description

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

2. This fuel pump can also be felt for a pulsing, this will also determine if the fuel pump is working.
3. This Step checks the fuel lift pump circuit.
13. This Step checks if the PCM is sending a signal to turn ON the fuel pump. The scan tool display Lift Pump Voltage will tell you if feed back voltage is being sent back to the PCM.

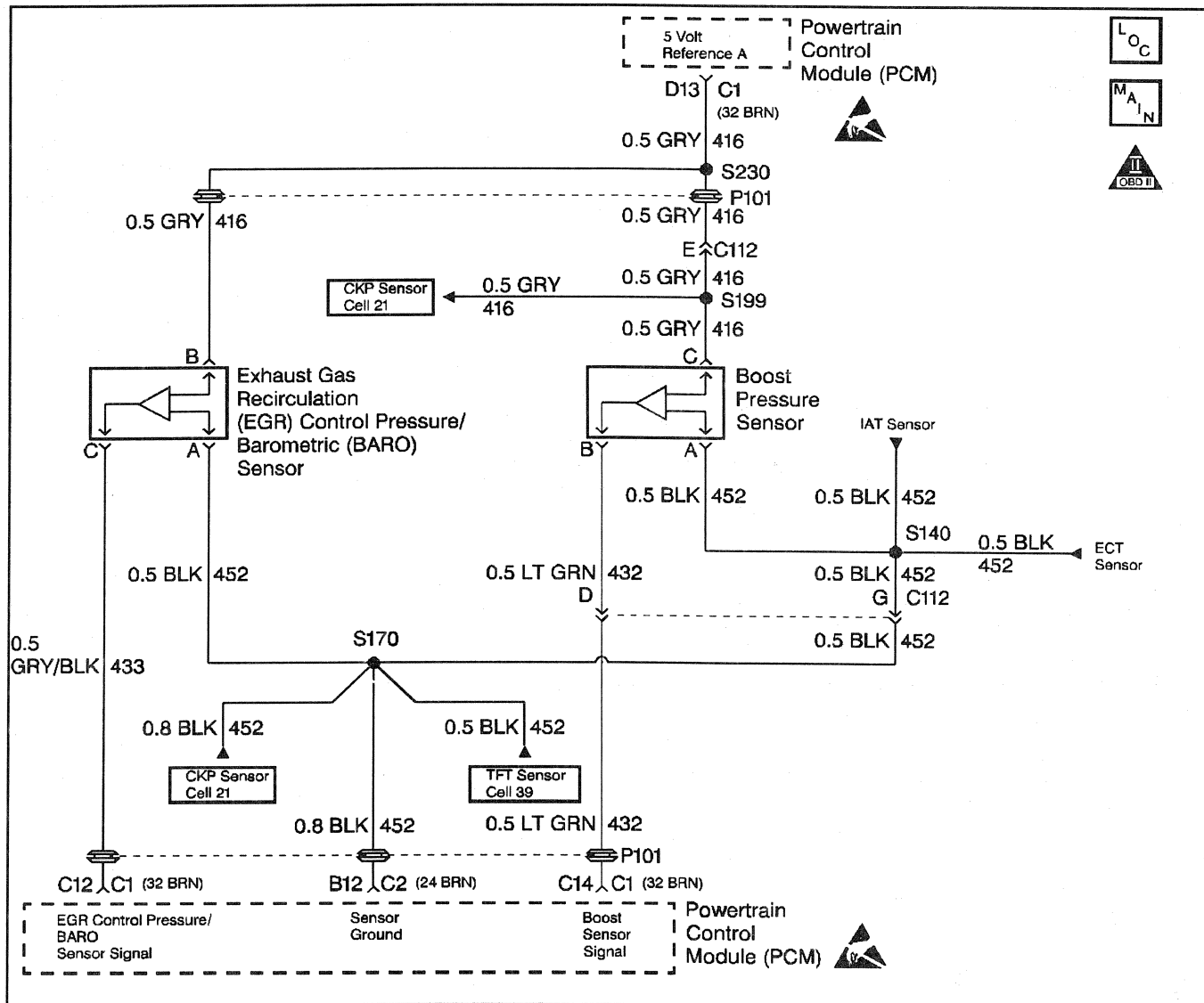
DTC P0231 Fuel Pump Feedback Circuit Low Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool to record Freeze Frame and failure Records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Scan tool installed. 2. With the scan tool command the fuel pump ON. 3. Listen for the fuel pump. Does the fuel pump operate?	—	Go to Diagnostic Aids	Go to Step 3
3	1. Turn the ignition OFF. 2. Probe the fuel pump test terminal with a fused jumper to B+. 3. Listen for the fuel pump. Does the fuel pump operate?	—	Go to Step 9	Go to Step 4
4	1. Remove the fuel pump relay. 2. From underneath the U/H relay center, probe the A3 terminal with a fused jumper to B+. 3. Listen for the fuel pump. Does the fuel pump operate?	—	Go to Step 5	Go to Step 6
5	Replace the faulty fuel pump relay. Refer to <i>Fuel Pump Relay</i> . Is the action complete?	—	Go to Step 20	—
6	Check for an open fuel pump signal circuit. Was a problem found?	—	Go to Step 7	Go to Step 8
7	Check for a ground on the fuel pump signal circuit. Is the action complete?	—	Go to Step 20	Go to Step 16
8	Replace the faulty fuel pump. Refer to <i>Fuel Lift Pump</i> . Is the action complete?	—	Go to Step 20	—

DTC P0231 Fuel Pump Feedback Circuit Low Voltage (cont'd)

Step	Action	Value(s)	Yes	No
9	1. Turn the ignition OFF. 2. Remove the fuel pump relay. 3. Connect a test light to ground. 4. Probe the fuel pump relay harness connector terminal number B1. Is the test light ON?	—	Go to Step 11	Go to Step 10
10	Repair the open in the battery feed circuit to the fuel pump relay. Is the action complete?	—	Go to Step 20	—
11	Connect a test light between terminal number B1 and terminal number A1 of the fuel pump relay harness connector. Is the test light ON?	—	Go to Step 13	Go to Step 12
12	Repair the open fuel pump relay ground circuit. Is the action complete?	—	Go to Step 20	—
13	1. Turn the ignition OFF. 2. Connect a test light between terminal number B3 of the fuel pump relay harness connector and ground. 3. Monitor the test light. 4. Turn the ignition ON. Does the test light come ON during the glow plug cycle and then go OFF after the glow plug cycle is complete?	—	Go to Step 17	Go to Step 14
14	Check for an open in circuit from fuel pump relay harness connector terminal number B3 and PCM. Was a problem found?	—	Go to Step 15	Go to Step 16
15	Repair the open in the fuel pump relay control circuit. Is the action complete?	—	Go to Step 20	—
16	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 20	—
17	Check for a faulty connection at fuel pump relay connector terminal number B3. Was a problem found?	—	Go to Step 18	Go to Step 19
18	Repair the faulty connection at the fuel pump relay connector terminal number B3. Is the action complete?	—	Go to Step 20	—
19	Replace the faulty fuel pump relay. Refer to <i>Fuel Pump Relay</i> . Is the action complete?	—	Go to Step 20	—
20	After Repair, use the scan tool Clear Info function and road test vehicle. check for DTCs, Current or history. Review test status information. If status is test(s) Failed or DTCs are present begin diagnosis again, on that DTCs. If last test Failed is not present and no DTCs are present repair is complete. Are the repairs complete?	—	Go to Step 21	—
21	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0236 TC Boost System



29574

Circuit Description

The PCM operates a solenoid to control boost. This solenoid is normally open. By providing a ground path the PCM energizes the solenoid which then allows vacuum to pass to the wastegate valve. During normal operation, the PCM compares its wastegate duty cycle signal with the boost signal and makes corrections in the duty cycle accordingly. This is a type B DTC.

Conditions for Setting the DTC

- Engine speed greater than 2400 RPM.
- Fuel rate greater than 20 mm.
- Boost pressure less than or equal to 20 kPa from desired (internal to PCM).

- Conditions met for 10 seconds.
- or
- Engine speed greater than 1800 but less than 2400 RPM.
- Fuel rate greater than 20 mm.
- Boost pressure less than or equal to (110 kPa) - ((100 kPa - BARO)/2) (internal to PCM).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

- Poor performance
- Reduce maximum fuel.
- No TCC

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

A vacuum leak or a pinched vacuum line may cause a DTC P0236. Check all vacuum lines and components connected to the hoses for leaks or sharp bends. Check vacuum source. A possible EGR DTC will store if there is a problem with the vacuum source. Also check for proper vacuum line routing. This diagnostic checks for a skewed sensor.

Test Description

Number(s) below the Step number(s) on the Diagnostic Table.

3. This will check the Boost sensor scaling. One Step will check the scaling with vacuum applied and one without.

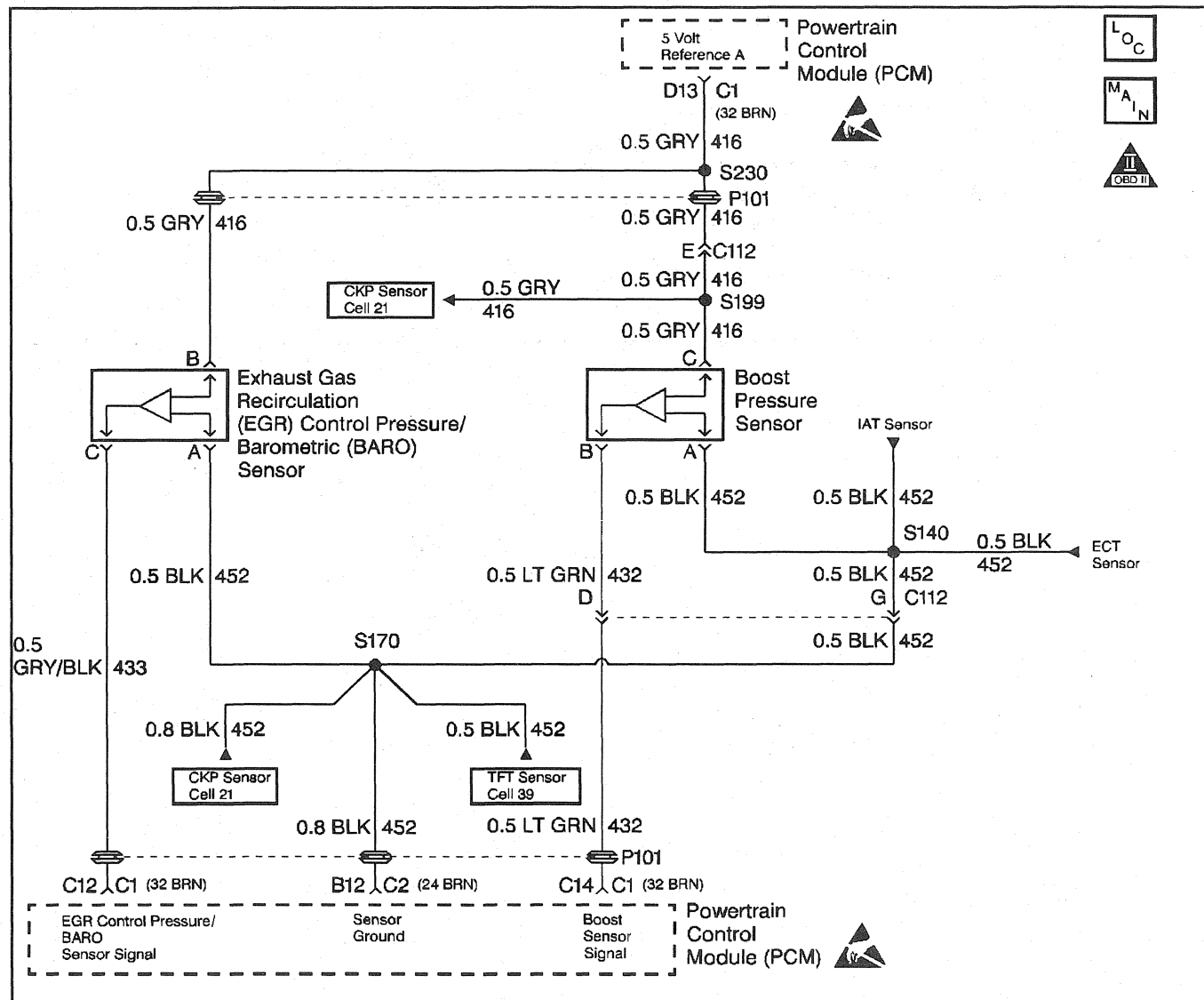
DTC P0236 TC Boost System

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Install the scan tool. 2. Turn the ignition ON, engine OFF. 3. Observe scan tool displays for Boost Pressure and BARO. Is the Boost Pressure and BARO within the specified value of each other?	5 kPa	Go to Step 3	Go to Step 7
3	1. Disconnect and plug the Boost sensor source. 2. Connect a vacuum pump to the Boost sensor. 3. Start the engine. 4. With <i>J 39200</i> connected to ground, probe PCM harness connector Boost signal circuit. 5. Note the Boost Pressure voltage. 6. Apply 34 kPa (10" Hg) of vacuum and note the Boost sensor voltage. Subtract the second reading from the first, is the difference greater than the specified value?	1.5 V	Go to Step 4	Go to Step 5
4	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to those table(s). Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
5	Check the Boost sensor connection(s). Was a problem found?	—	Go to Step 6	Go to Step 7
6	Repair the connection(s) as necessary. Is the action complete?	—	Go to Step 8	—
7	Replace the faulty Boost sensor. Refer to <i>Boost Sensor (Diesel)</i> . Is the action complete?	—	Go to Step 8	—

DTC P0236 TC Boost System (cont'd)

Step	Action	Value(s)	Yes	No
8	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 9	Go to Step 2
9	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0237 TC Boost Sensor Circuit Low Voltage



29574

Circuit Description

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently. This is a type D DTC.

Conditions for Setting the DTC

- Boost Pressure less than 40 kPa.
- Condition met for 2 seconds.

Action Taken When the DTC Sets

No turbo boost.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

With the ignition ON and the engine stopped, boost pressure is equal to atmospheric pressure. Comparison of this reading with a known good vehicle using the same sensor is a good way to check accuracy of a suspect sensor. Readings should be the same + .4 volt. Very little boost can be attained by revving the engine in neutral. If the Boost sensor signal circuit is open or shorted to ground, Boost solenoid will show a zero duty cycle. A J 39200 can be used to measure (actual) signal voltage at the PCM harness connector.

Test Description

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

2. This Step will determine if DTC P0237 is the result of a hard failure or an intermittent condition.
3. This Step simulates conditions for a DTC P0237. If the PCM recognizes the change, the PCM and signal circuit are OK.

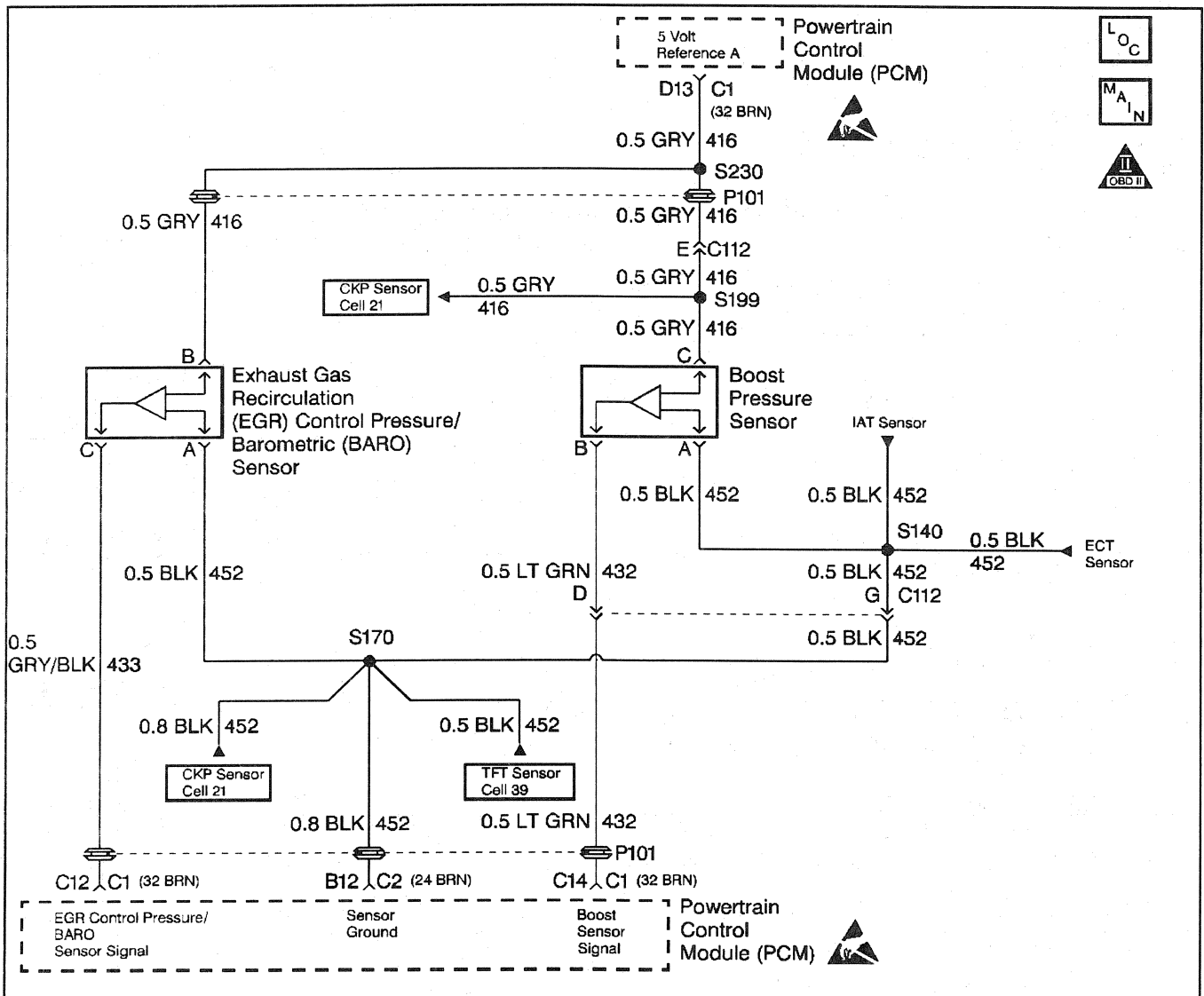
DTC P0237 TC Boost Sensor Circuit Low Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) system check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan tool connected. 2. Engine idling. 3. With J 39200 connected to ground, probe PCM harness connector Boost signal circuit. Does the J 39200 display a voltage less than the specified value?	1 V (40 kPa)	Go to Step 3	Go to Step 5
3	1. Turn the ignition OFF. 2. Disconnect the Boost sensor electrical connector. 3. Jumper the Boost sensor 5 volt reference to the Boost sensor signal circuit at the harness. 4. Turn the ignition ON. Does the scan tool display a Boost Pressure greater than the specified value?	202 kPa	Go to Step 6	Go to Step 4
4	1. Turn the ignition OFF. 2. Boost sensor still disconnected. 3. Remove the jumper wire. 4. Jumper the Boost sensor signal circuit at the harness with a test light connected to B+. 5. Turn the ignition ON. Does the scan tool display a Boost Pressure greater than the specified value?	202 kPa (4.0 V)	Go to Step 8	Go to Step 7
5	The DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs are stored, refer to those chart(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
6	Check for a faulty connection at the Boost sensor. Was a problem found?	—	Go to Step 11	Go to Step 10
7	Check for an open or a short to ground in Boost sensor signal circuit. Was a problem found?	—	Go to Step 11	Go to Step 12
8	Check for an open in the Boost sensor 5 volt reference circuit. Was a problem found?	—	Go to Step 11	Go to Step 9

DTC P0237 TC Boost Sensor Circuit Low Voltage (cont'd)

Step	Action	Value(s)	Yes	No
9	Check for a short to ground in the Boost sensor 5 volt reference circuit. Was a problem found?	—	Go to Step 11	Go to Step 12
10	Replace the faulty Boost sensor. Refer to <i>Boost Sensor (Diesel)</i> . Is the action complete?	—	Go to Step 13	—
11	Repair the circuit as necessary. Is the action complete?	—	Go to Step 13	—
12	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 13	—
13	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 14	Go to Step 2
14	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0238 TC Boost Sensor Circuit High Voltage



29574

Circuit Description

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently. This is a type D DTC.

Conditions for Setting the DTC

- Boost Pressure greater than or equal 4.8 volts (202 kPa).
- Engine Speed less than 3506 RPM.

Action Taken When the DTC Sets

No turbo boost.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

With the ignition ON and the engine stopped, boost pressure is approximately equal to Baro. Comparison of this reading with a known good vehicle using the same sensor is a good way to check accuracy of a suspect sensor. Readings should be the same + .4 volt. Very little boost can be attained by revving the engine in neutral. A J 39200 can be used to measure (actual) signal voltage at the PCM harness connector.

Test Description

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

2. This Step simulates conditions for a DTC P0237. If the PCM recognizes the change, the PCM and the signal circuit are OK.
3. This Step will make sure the PCM is responding to a low signal voltage. This will indicate that the PCM is OK.

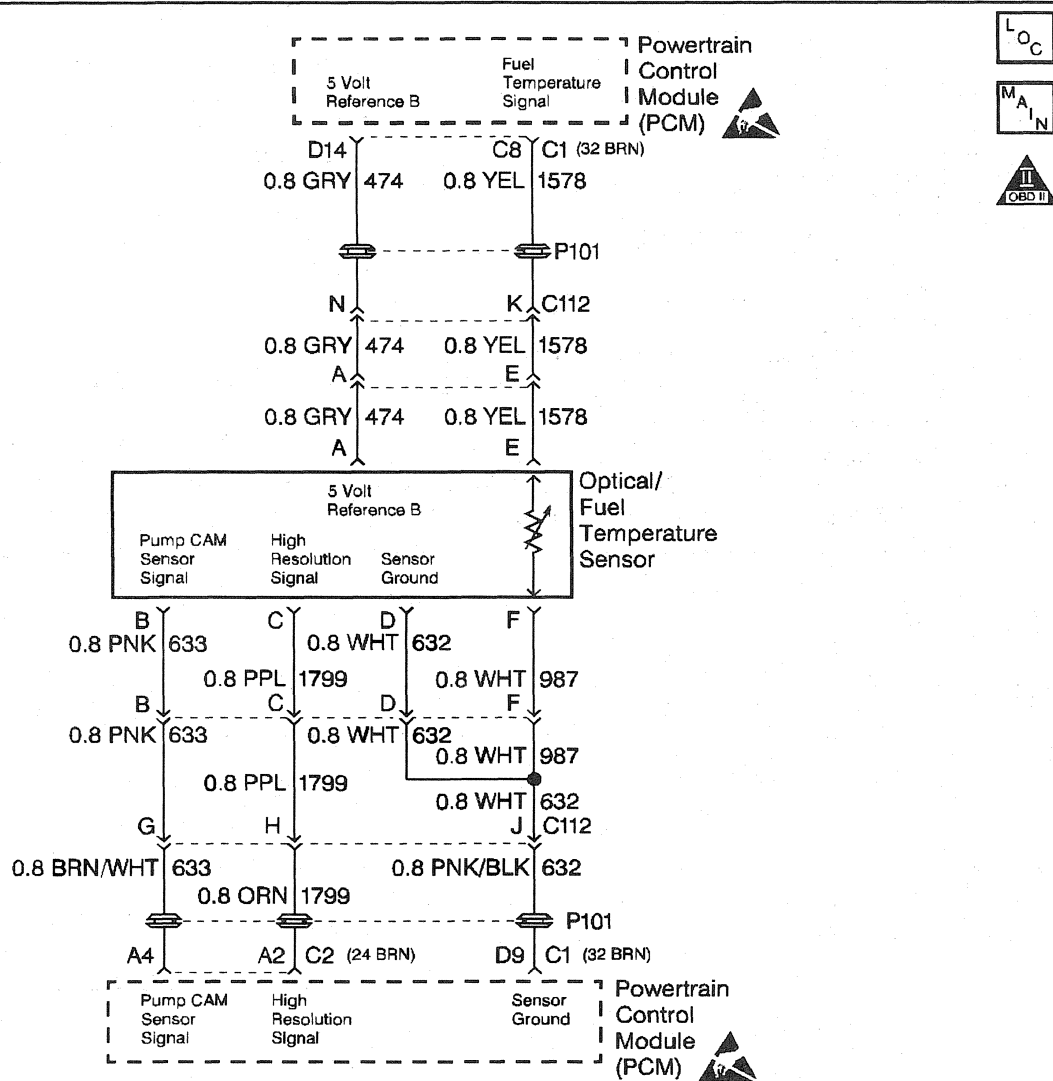
DTC P0238 TC Boost Sensor Circuit High Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan tool connected. 2. Engine idling. Does the scan tool display a Boost Pressure greater than or equal to the specified value?	202 kPa (4.8 V)	Go to Step 3	Go to Step 4
3	1. Turn the ignition OFF. 2. Disconnect the Boost sensor electrical connector. 3. Turn the ignition ON. Does the scan tool display a Boost Pressure less than or equal to the specified value?	9 kPa	Go to Step 5	Go to Step 9
4	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs are stored, refer to those chart(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
5	1. Ignition ON, engine OFF 2. With a J 39200 connected to ground, probe the 5 volt reference circuit at the boost sensor harness. Is voltage greater than the specified value?	5.2V	Go to Step 10	Go to Step 6
6	1. Boost sensor disconnected. 2. Jumper the Boost sensor ground circuit at the harness with a test light connected to B+. Is the test light ON?	—	Go to Step 7	Go to Step 11
7	Check the Boost sensor for a restriction. Was a problem found?	—	Go to Step 12	Go to Step 8
8	Replace the faulty Boost sensor. Refer to <i>Boost Sensor (Diesel)</i> . Is the action complete?	—	Go to Step 14	—
9	Check for a short to voltage in the Boost sensor signal circuit. Was a problem found?	—	Go to Step 12	Go to Step 13
10	Check for a short to voltage in the Boost sensor 5 volt reference circuit. Was a problem found?	—	Go to Step 12	Go to Step 13
11	Repair the Boost sensor ground circuit. Is the action complete?	—	Go to Step 14	—
12	Repair as necessary. Is the action complete?	—	Go to Step 14	—

DTC P0238 TC Boost Sensor Circuit High Voltage (cont'd)

Step	Action	Value(s)	Yes	No
13	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 14	—
14	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 15	Go to Step 2
15	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0251 Injection Pump Cam System



29557

Circuit Description

The optical sensor provides a pump cam signal to the PCM by counting pulses on the sensor disk located in the injection pump. The pump cam is one of the most important inputs by the PCM for fuel control and timing. This test monitors the number of crankshaft position pulses that have occurred since the last cam pulse. The physical one to one correspondence between the pump cam and the crankshaft implies if more crank pulses are detected than cam pulses, cam pulses have been missed. This is a type A DTC.

Conditions for Setting the DTC

- RPM less than 300.
 - 8 consecutive cam pulses missing for 8 #1 cylinder events.
- or
- RPM greater than or equal to 300.
 - 8 consecutive cam pulses missing for 32 #1 cylinder events.

Action Taken When the DTC Sets

Backup fuel.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan Tool

Test Description

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

2. This Step will determine if this is a hard or intermittent DTC.
4. This Step will determine if there is a 5 volt reference.
6. This Step will check to see if the sensor is sending a signal back to the PCM.

Diagnostic Aids

When PCM is in backup fuel, fast idle and poor performance problems will exist. If P0251 is also stored, there is a possible problem with signal circuit. P0251 and P0370 will set if vehicle has run out of fuel.

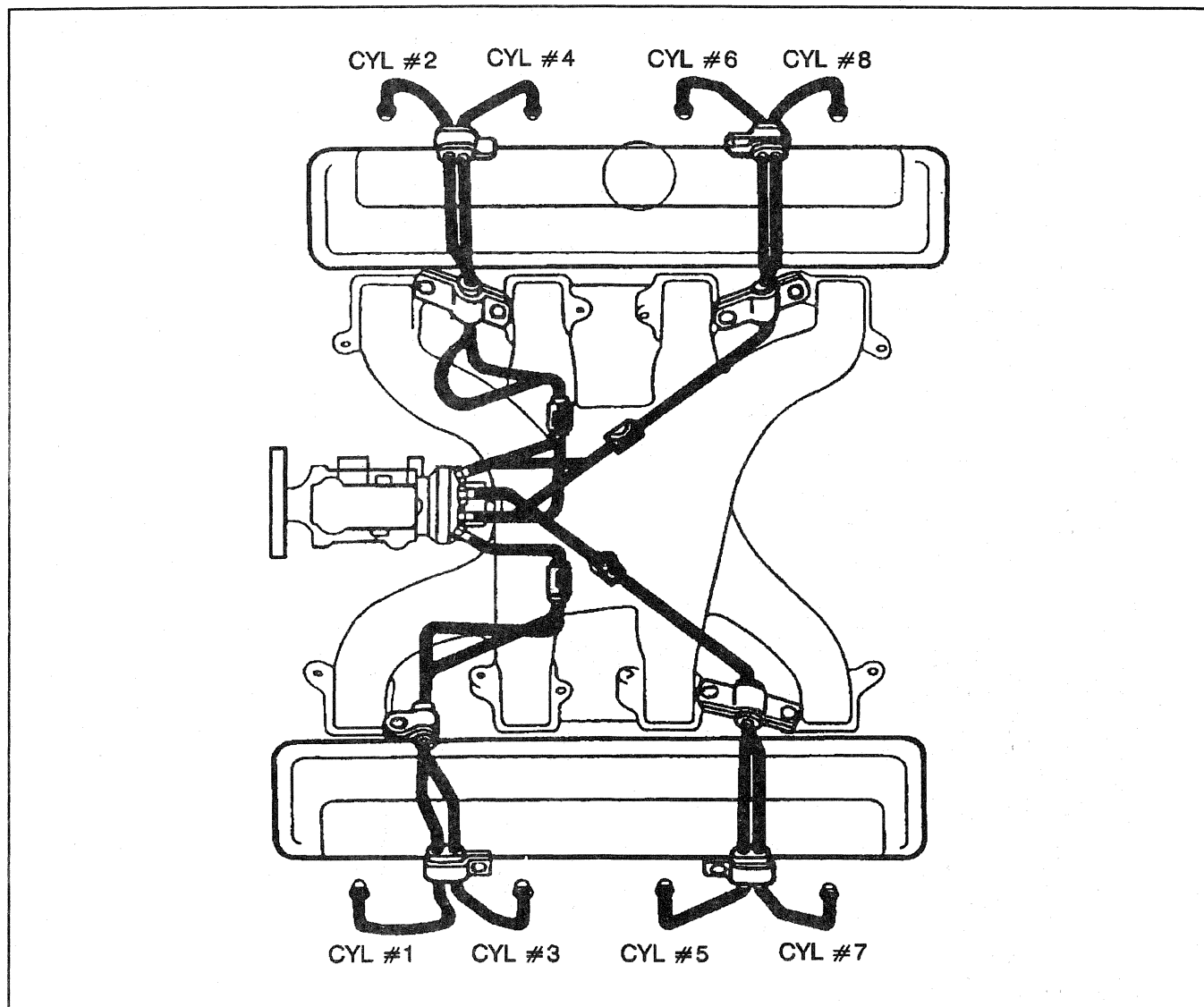
DTC P0251 Injection Pump Cam System

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Start and idle engine. 2. With the throttle closed, observe the Cam Ref Missed display on scan tool. Does scan tool display specified value?	8	Go to Step 4	Go to Step 3
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	1. Ignition OFF. 2. Disconnect the Optical/Fuel temperature sensor electrical connector. 3. Ignition ON engine OFF. 4. Using a J 39200, measure voltage between the Optical/Fuel Temperature 5 volt reference circuit and chassis ground at harness connector. Is voltage at specified value?	5 V	Go to Step 5	Go to Step 7
5	Probe the sensor ground circuit with a test light connected to B+ at the harness connector. Is test light ON?	—	Go to Step 6	Go to Step 8
6	1. Reconnect Optical/Fuel temperature sensor. 2. Start and idle engine. 3. With scan tool, command 900 rpm. 4. With J 39200 on Hertz (Hz) scale, back probe Cam signal circuit at PCM. Is Hertz reading at specified value?	60 Hz (± 3 Hz)	Go to Step 12	Go to Step 11
7	1. Removed electrical harness filter from vehicle. 2. Check resistance on the electrical harness filter 5 volt reference circuit (terminal A). Is resistance greater than specified value?	2.0 Ohms	Go to Step 15	Go to Step 8

DTC P0251 Injection Pump Cam System (cont'd)

Step	Action	Value(s)	Yes	No
8	1. Ignition OFF. 2. Electrical harness filter removed from vehicle. 3. Disconnect the PCM, and check the Optical/Fuel temperature 5 volts reference circuit for an open, short to ground, or short to the sensor ground circuit. 4. If the Optical/Fuel temperature 5 volt reference circuit is open or shorted to ground, repair it as necessary. Was the Optical/Fuel temperature 5 volt reference circuit open or shorted to ground?	—	Go to Step 16	Go to Step 10
9	1. Check for an open or a poor sensor ground terminal connection at the PCM. 2. If a problem is found, repair as necessary. Was a repair performed?	—	Go to Step 16	Go to Step 14
10	Check the Optical/Fuel temperature 5 volt reference circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 16	Go to Step 14
11	1. Ignition OFF. 2. Check the Cam signal circuit for an open or short to ground. 3. If the Cam signal circuit is open or shorted to ground, repair it as necessary. Was the Cam signal circuit open or shorted to ground?	—	Go to Step 16	Go to Step 13
12	Check for a poor connection at the PCM harness terminal and replace if necessary. Did the terminal require replacement?	—	Go to Step 16	Go to Step 14
13	Replace injection pump. Refer to <i>Fuel Injection Pump</i> . Is the action complete?	—	Go to Step 16	—
14	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 16	—
15	Replace electrical harness filter. Is the action complete?	—	Go to Step 16	—
16	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 10	Go to Step 2
17	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0263 Cylinder 8 Balance System



29653

Circuit Description

The PCM has the ability to increase and decrease the amount of fuel to each cylinder to provide smooth idle operation. If the fuel correction amount exceeds define limits, DTC P0263 will set. This is a type D DTC.

Conditions for Setting the DTC

- Engine at idle.
- Engine coolant at normal temperatures.
- Cylinder fault must be constant.
- Fuel correction amount exceeds limits (internal to PCM).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

Possible rough idle

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

Injector balance test on scan tool should be used to confirm faulty cylinder. Scan tool will cutout specific cylinder requested. If original complaint was multiple cylinder balance DTCs and vehicle has a manual transmission, dual mass flywheel could be at fault. Its possible that if a cylinder balance fault has been detected and engine has been running for a long time, the PCM will try to increase or decrease fuel in other cylinders to compensate for a rough idle which will cause multiple cylinder balance DTCs to set. The

scan tool snap shot mode can be used to properly identify the suspected cylinder. The most likely cause of cylinder balance DTCs are faulty nozzles or engine mechanical (low compression) problems.

Test Description

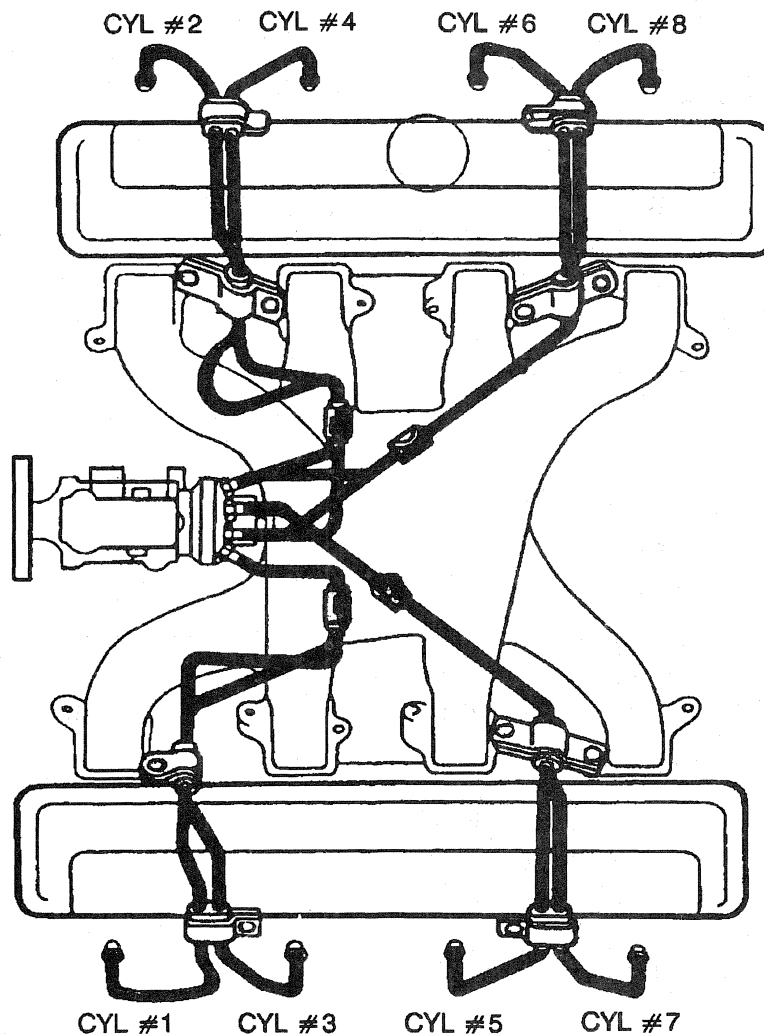
Number(s) below refer to the Step number(s) on the Diagnostic Table.

2. This Step will properly identify a suspected cylinder by looking for a RPM drop (if RPM drops, cylinder is contributing, if not cylinder is not contributing).

DTC P0263 Cylinder 8 Balance System

Step	Action	Value(s)	Yes	No
1	<p>Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used.</p> <p>Was the On-Board Diagnostic (OBD) System Check performed?</p>	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	<ol style="list-style-type: none"> 1. Scan tool connected. 2. Start and idle engine. 3. Engine at operating temperature. 4. Make sure all DTCs are cleared. 5. Using the scan tool, cutout (Inj. Balance) the suspected cylinder. <p>Is there an RPM drop in the suspected cylinder?</p>	—	Go to Step 3	Go to Step 4
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	<p>Check for the following basic engine mechanical or fuel delivery problems in that cylinder.</p> <ul style="list-style-type: none"> • Low compression (refer to Engine Mechanical) • Faulty injection nozzle (refer to Fuel Systems) <p>Was a repair performed?</p>	—	Go to Step 5	—
5	<ol style="list-style-type: none"> 1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. <p>Does the Scan Tool indicate that this diagnostic Ran and Passed?</p>	—	Go to Step 6	Go to Step 2
6	<p>Using the Scan Tool, select Capture Info, Review Info.</p> <p>Are any DTCs displayed that have not been diagnosed?</p>	—	Go to the Applicable DTC Table	System OK

DTC P0266 Cylinder 7 Balance System



29653

Circuit Description

The PCM has the ability to increase and decrease the amount of fuel to each cylinder to provide smooth idle operation. If the fuel correction amount exceeds define limits, DTC P0266 will set. This is a type D DTC.

Conditions for Setting the DTC

- Engine at idle.
- Engine coolant at normal temperatures.
- Cylinder fault must be constant.
- Fuel correction amount exceeds limits (internal to PCM).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

Possible rough idle

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

Injector balance test on scan tool should be used to confirm faulty cylinder. Scan tool will cutout specific cylinder requested. If original complaint was multiple cylinder balance DTCs and vehicle has a manual transmission, dual mass flywheel could be at fault. Its possible that if a cylinder balance fault has been detected and engine has been running for a long

time, the PCM will try to increase or decrease fuel in other cylinders to compensate for a rough idle which will cause multiple cylinder balance DTCs to set. The scan tool snap shot mode can be used to properly identify the suspected cylinder. The most likely cause of cylinder balance DTCs are faulty nozzles or engine mechanical (low compression) problems.

Test Description

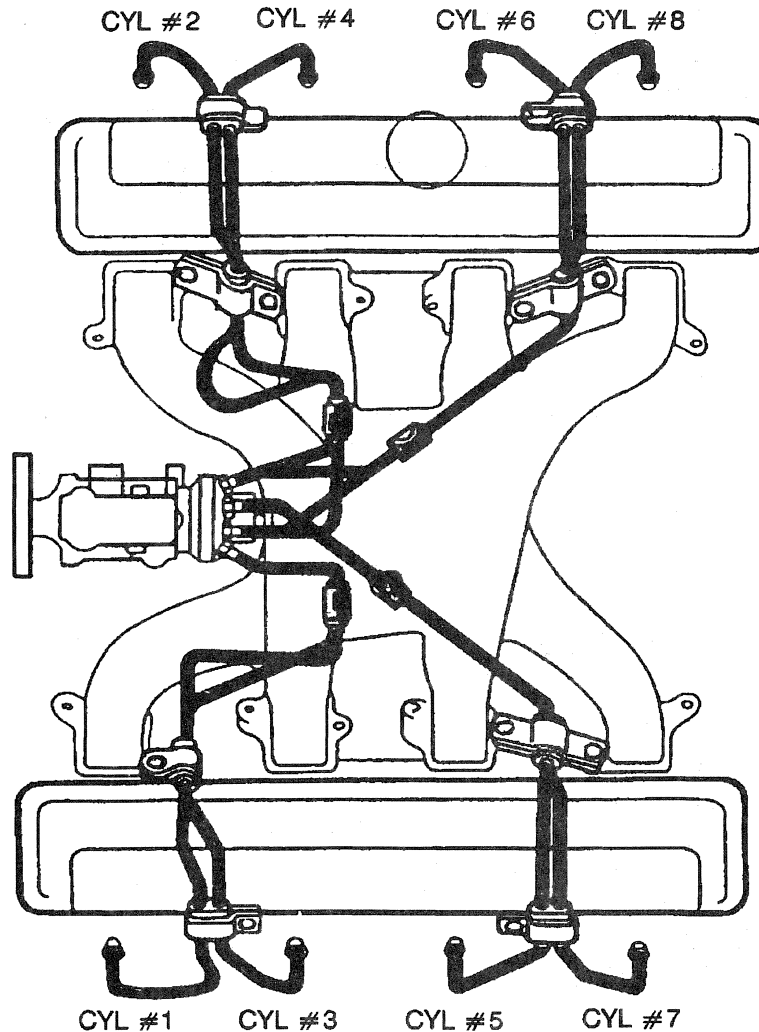
Number(s) below refer to the Step number(s) on the Diagnostic Table.

2. This Step will properly identify a suspected cylinder by looking for a RPM drop (if RPM drops, cylinder is contributing, if not cylinder is not contributing).

DTC P0266 Cylinder 7 Balance System

Step	Action	Value(s)	Yes	No
1	<p>Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used.</p> <p>Was the On-Board Diagnostic (OBD) System Check performed?</p>	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	<ol style="list-style-type: none"> 1. Scan tool connected. 2. Start and idle engine. 3. Engine at operating temperature. 4. Make sure all DTCs are cleared. 5. Using the scan tool, cutout (Inj. Balance) the suspected cylinder. <p>Is there an RPM drop in the suspected cylinder?</p>	—	Go to Step 3	Go to Step 4
3	<p>DTC is intermittent. If no additional DTCs are stored refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first.</p> <p>Are additional DTCs stored?</p>	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	<p>Check for the following basic engine mechanical or fuel delivery problems in that cylinder.</p> <ul style="list-style-type: none"> • Low compression (refer to Engine Mechanical) • Faulty injection nozzle (refer to Fuel Systems) <p>Was a repair performed?</p>	—	Go to Step 5	—
5	<ol style="list-style-type: none"> 1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. <p>Does the Scan Tool indicate that this diagnostic Ran and Passed?</p>	—	Go to Step 6	Go to Step 2
6	<p>Using the Scan Tool, select Capture Info, Review Info.</p> <p>Are any DTCs displayed that have not been diagnosed?</p>	—	Go to the Applicable DTC Table	System OK

DTC P0269 Cylinder 2 Balance System



29653

Circuit Description

The PCM has the ability to increase and decrease the amount of fuel to each cylinder to provide smooth idle operation. If the fuel correction amount exceeds define limits, DTC P0269 will set. This is a type D DTC.

Conditions for Setting the DTC

- Engine at idle.
- Engine coolant at normal temperatures.
- Cylinder fault must be constant.
- Fuel correction amount exceeds limits (internal to PCM).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

Possible rough idle

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

Injector balance test on scan tool should be used to confirm faulty cylinder. Scan tool will cutout specific cylinder requested. If original complaint was multiple cylinder balance DTCs and vehicle has a manual transmission, dual mass flywheel could be at fault. Its possible that if a cylinder balance fault has been detected and engine has been running for a long

time, the PCM will try to increase or decrease fuel in other cylinders to compensate for a rough idle which will cause multiple cylinder balance DTCs to set. The scan tool snap shot mode can be used to properly identify the suspected cylinder. The most likely cause of cylinder balance DTCs are faulty nozzles or engine mechanical (low compression) problems.

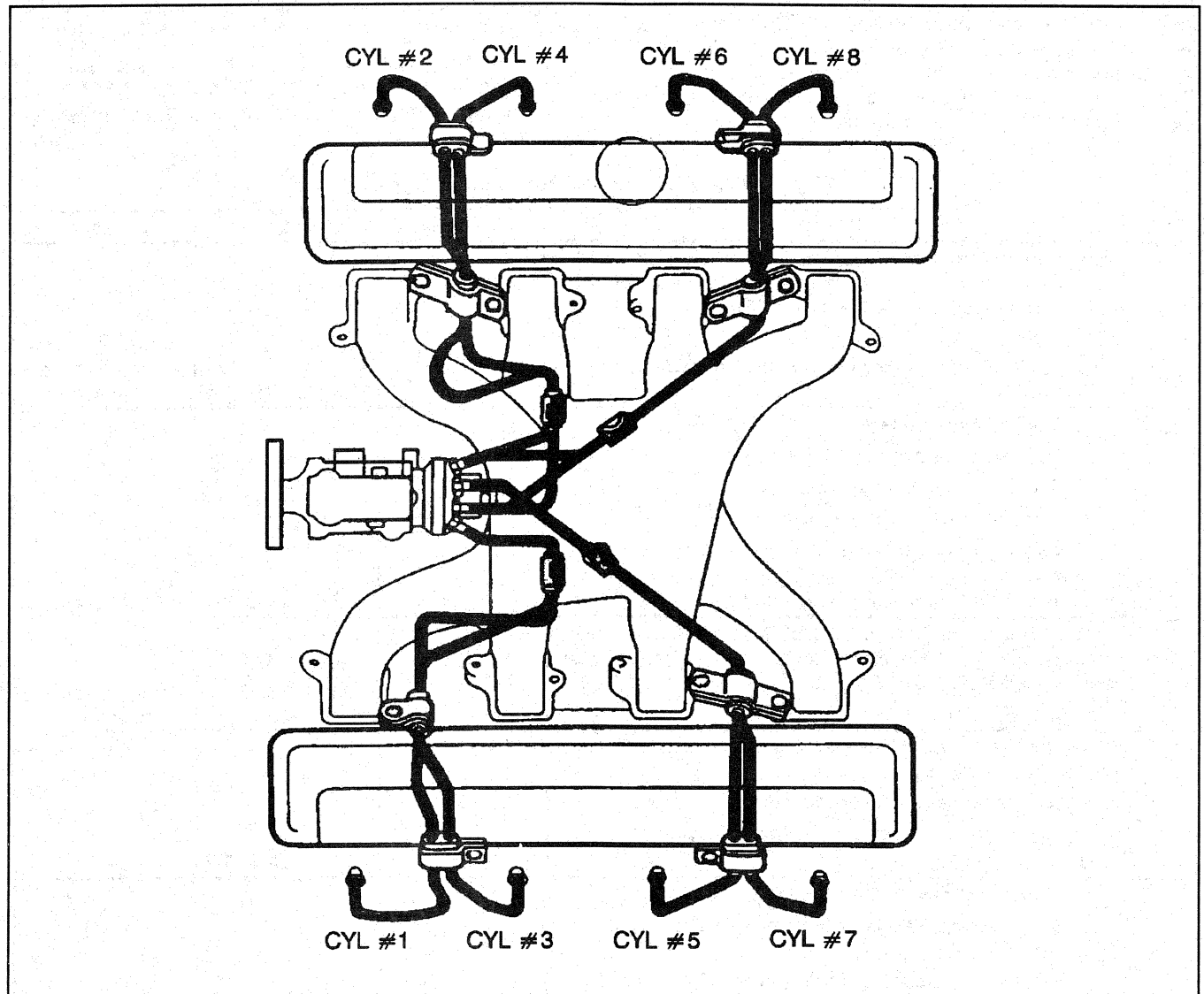
Test Description

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

2. This Step will properly identify a suspected cylinder by looking for a RPM drop (if RPM drops, cylinder is contributing, if not cylinder is not contributing).

DTC P0269 Cylinder 2 Balance System

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	<i>Go to Step 2</i>	<i>Go to Powertrain OBD System Check</i>
2	1. Scan tool connected. 2. Start and idle engine. 3. Engine at operating temperature. 4. Make sure all DTCs are cleared. 5. Using the scan tool, cutout (Inj. Balance) the suspected cylinder. Is there an RPM drop in the suspected cylinder?	—	<i>Go to Step 3</i>	<i>Go to Step 4</i>
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	<i>Go to the Applicable DTC Table</i>	<i>Go to Diagnostic Aids</i>
4	Check for the following basic engine mechanical or fuel delivery problems in that cylinder. <ul style="list-style-type: none"> • Low compression (refer to Engine Mechanical) • Faulty injection nozzle (refer to Fuel Systems) Was a repair performed?	—	<i>Go to Step 5</i>	—
5	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	<i>Go to Step 6</i>	<i>Go to Step 2</i>
6	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	<i>Go to the Applicable DTC Table</i>	<i>System OK</i>

DTC P0272 Cylinder 6 Balance System

29653

Circuit Description

The PCM has the ability to increase and decrease the amount of fuel to each cylinder to provide smooth idle operation. If the fuel correction amount exceeds define limits, DTC P0272 will set. This is a type D DTC.

Conditions for Setting the DTC

- Engine at idle.
- Engine coolant at normal temperatures.
- Cylinder fault must be constant.
- Fuel correction amount exceeds limits (internal to PCM).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

Possible rough idle

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

Injector balance test on scan tool should be used to confirm faulty cylinder. Scan tool will cutout specific cylinder requested. If original complaint was multiple cylinder balance DTCs and vehicle has a manual transmission, dual mass flywheel could be at fault. Its possible that if a cylinder balance fault has been detected and engine has been running for a long

time, the PCM will try to increase or decrease fuel in other cylinders to compensate for a rough idle which will cause multiple cylinder balance DTCs to set. The scan tool snap shot mode can be used to properly identify the suspected cylinder. The most likely cause of cylinder balance DTCs are faulty nozzles or engine mechanical (low compression) problems.

Test Description

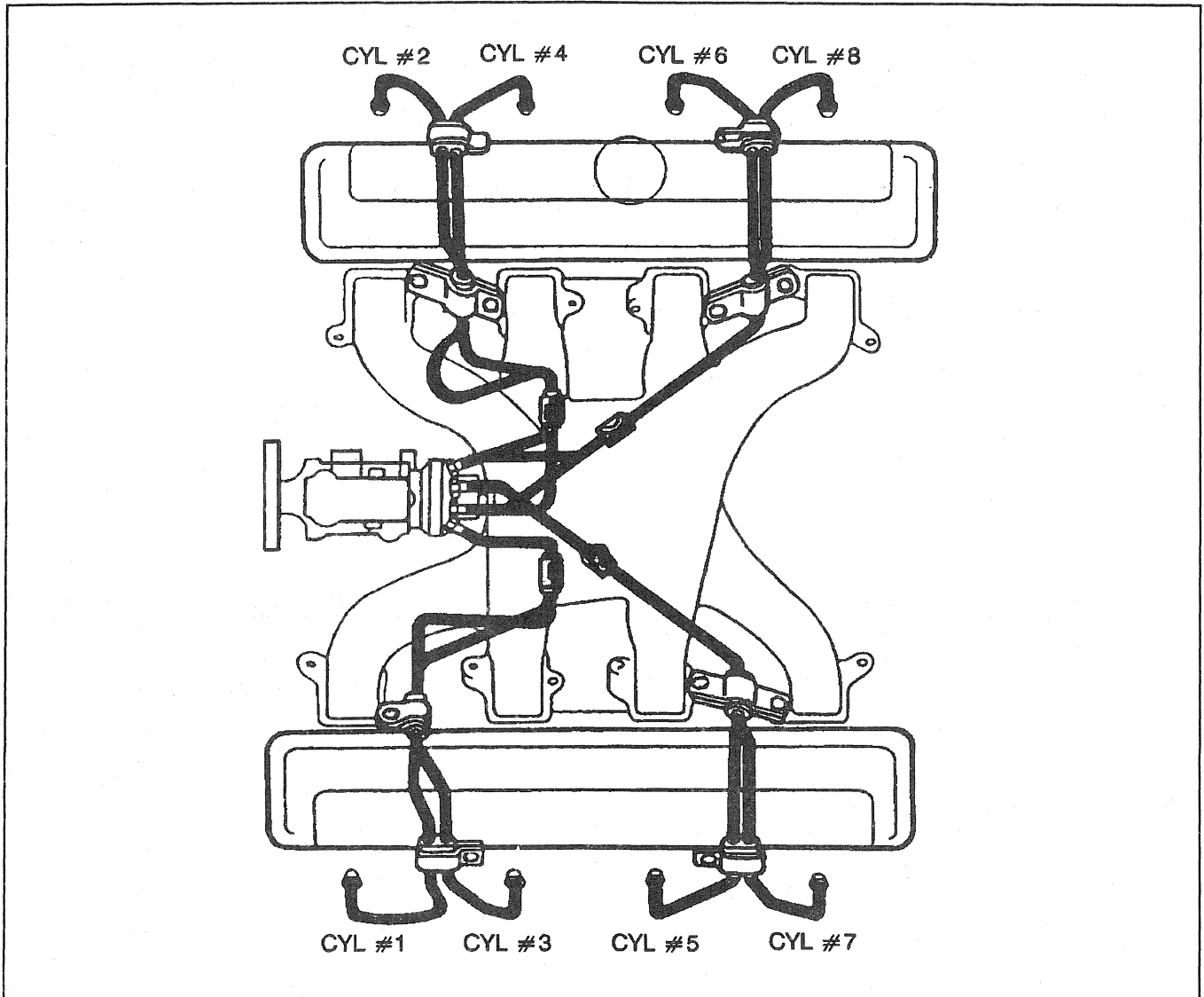
Number(s) below refer to the Step number(s) on the Diagnostic Table.

- This Step will properly identify a suspected cylinder by looking for a RPM drop (if RPM drops, cylinder is contributing, if not cylinder is not contributing).

DTC P0272 Cylinder 6 Balance System

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Scan tool connected. 2. Start and idle engine. 3. Engine at operating temperature. 4. Make sure all DTCs are cleared. 5. Using the scan tool, cutout (Inj. Balance) the suspected cylinder. Is there an RPM drop in the suspected cylinder?	—	Go to Step 3	Go to Step 4
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	Check for the following basic engine mechanical or fuel delivery problems in that cylinder. <ul style="list-style-type: none"> Low compression (refer to Engine Mechanical) Faulty injection nozzle (refer to Fuel Systems) Was a repair performed?	—	Go to Step 5	—
5	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 6	Go to Step 2
6	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0275 Cylinder 5 Balance System



29653

Circuit Description

The PCM has the ability to increase and decrease the amount of fuel to each cylinder to provide smooth idle operation. If the fuel correction amount exceeds define limits, DTC P0275 will set. This is a type D DTC.

Conditions for Setting the DTC

- Engine at idle.
- Engine coolant at normal temperatures.
- Cylinder fault must be constant.
- Fuel correction amount exceeds limits (internal to PCM).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

Possible rough idle

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

Injector balance test on scan tool should be used to confirm faulty cylinder. Scan tool will cutout specific cylinder requested. If original complaint was multiple cylinder balance DTCs and vehicle has a manual transmission, dual mass flywheel could be at fault. Its possible that if a cylinder balance fault has been detected and engine has been running for a long

time, the PCM will try to increase or decrease fuel in other cylinders to compensate for a rough idle which will cause multiple cylinder balance DTCs to set. The scan tool snap shot mode can be used to properly identify the suspected cylinder. The most likely cause of cylinder balance DTCs are faulty nozzles or engine mechanical (low compression) problems.

Test Description

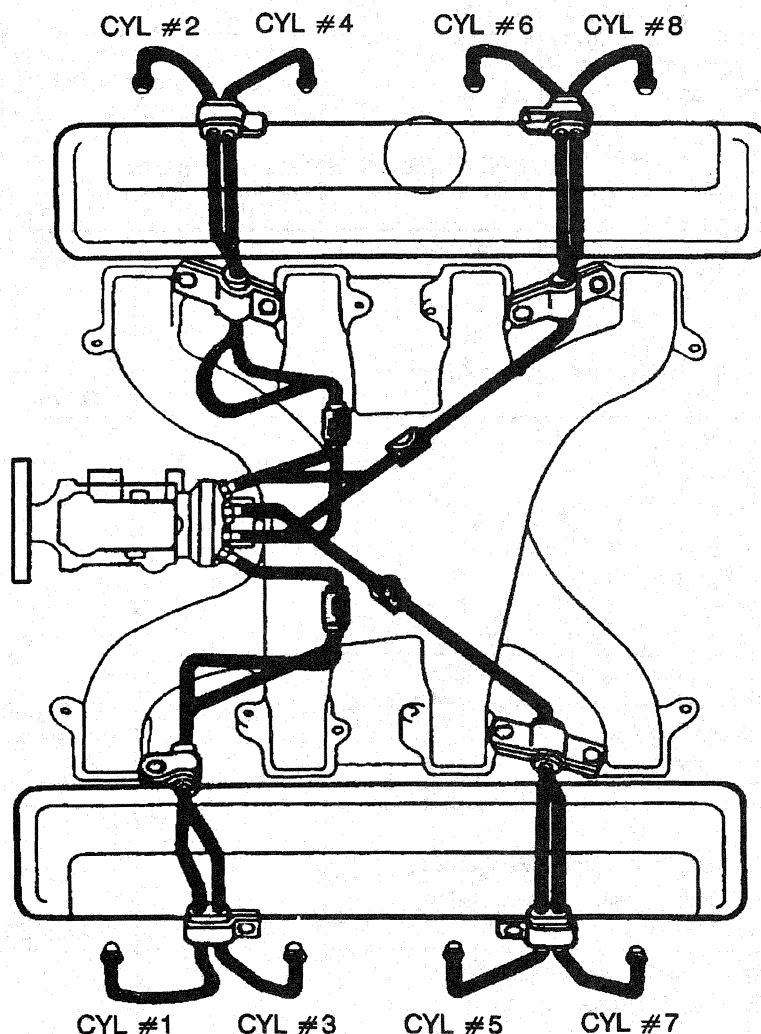
Number(s) below refer to the Step number(s) on the Diagnostic Table.

2. This Step will properly identify a suspected cylinder by looking for a RPM drop (if RPM drops, cylinder is contributing, if not cylinder is not contributing).

DTC P0275 Cylinder 5 Balance System

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan tool connected. 2. Start and idle engine. 3. Engine at operating temperature. 4. Make sure all DTCs are cleared. 5. Using the scan tool, cutout (Inj. Balance) the suspected cylinder. Is there an RPM drop in the suspected cylinder?	—	Go to Step 3	Go to Step 4
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	Check for the following basic engine mechanical or fuel delivery problems in that cylinder. <ul style="list-style-type: none"> • Low compression (refer to Engine Mechanical) • Faulty injection nozzle (refer to Fuel Systems) Was a repair performed?	—	Go to Step 5	—
5	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 6	Go to Step 2
6	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0278 Cylinder 4 Balance System



29653

Circuit Description

The PCM has the ability to increase and decrease the amount of fuel to each cylinder to provide smooth idle operation. If the fuel correction amount exceeds define limits, DTC P0278 will set. This is a type D DTC.

Conditions for Setting the DTC

- Engine at idle.
- Engine coolant at normal temperatures.
- Cylinder fault must be constant.
- Fuel correction amount exceeds limits (internal to PCM).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

Possible rough idle

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

Injector balance test on scan tool should be used to confirm faulty cylinder. Scan tool will cutout specific cylinder requested. If original complaint was multiple cylinder balance DTCs and vehicle has a manual transmission, dual mass flywheel could be at fault. Its possible that if a cylinder balance fault has been detected and engine has been running for a long

time, the PCM will try to increase or decrease fuel in other cylinders to compensate for a rough idle which will cause multiple cylinder balance DTCs to set. The scan tool snap shot mode can be used to properly identify the suspected cylinder. The most likely cause of cylinder balance DTCs are faulty nozzles or engine mechanical (low compression) problems.

Test Description

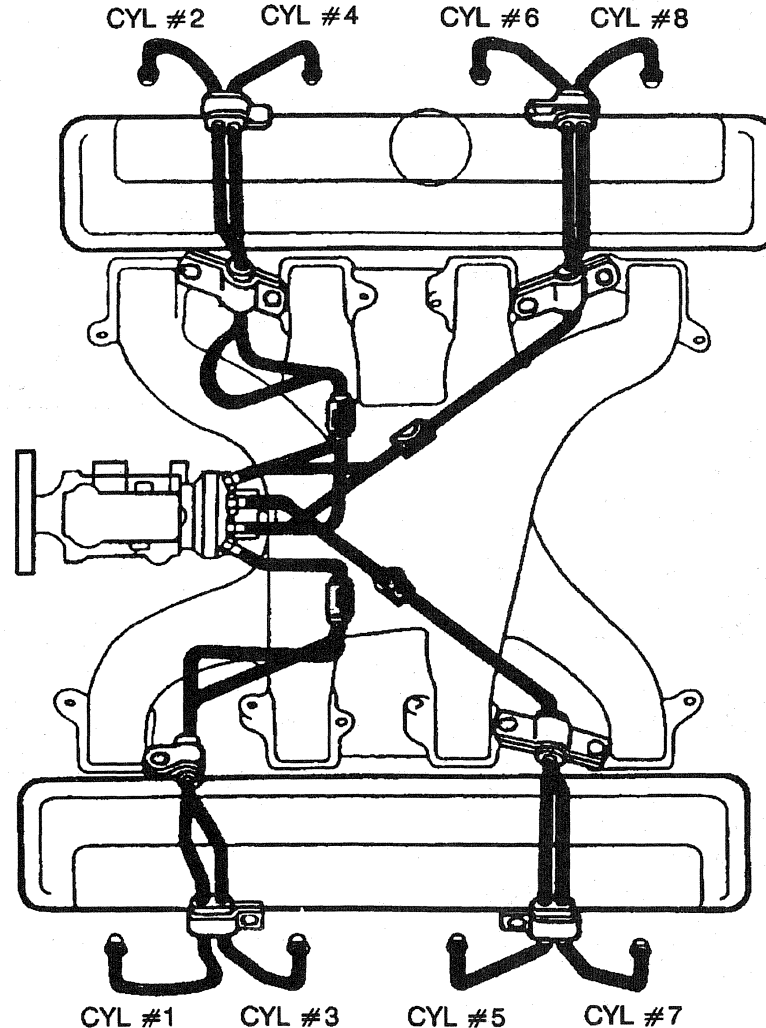
Number(s) below refer to the Step number(s) on the Diagnostic Table.

2. This Step will properly identify a suspected cylinder by looking for a RPM drop (if RPM drops, cylinder is contributing, if not cylinder is not contributing).

DTC P0278 Cylinder 4 Balance System

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan tool connected. 2. Start and idle engine. 3. Engine at operating temperature. 4. Make sure all DTCs are cleared. 5. Using the scan tool, cutout (Inj. Balance) the suspected cylinder. Is there an RPM drop in the suspected cylinder?	—	Go to Step 3	Go to Step 4
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	Check for the following basic engine mechanical or fuel delivery problems in that cylinder. <ul style="list-style-type: none"> • Low compression (refer to Engine Mechanical) • Faulty injection nozzle (refer to Fuel Systems) Was a repair performed?	—	Go to Step 5	—
5	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 6	Go to Step 2
6	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0281 Cylinder 3 Balance System



29653

Circuit Description

The PCM has the ability to increase and decrease the amount of fuel to each cylinder to provide smooth idle operation. If the fuel correction amount exceeds define limits, DTC P0281 will set. This is a type D DTC.

Conditions for Setting the DTC

- Engine at idle.
- Engine coolant at normal temperatures.
- Cylinder fault must be constant.
- Fuel correction amount exceeds limits (internal to PCM).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

Possible rough idle

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

Injector balance test on scan tool should be used to confirm faulty cylinder. Scan tool will cutout specific cylinder requested. If original complaint was multiple cylinder balance DTCs and vehicle has a manual transmission, dual mass flywheel could be at fault. Its possible that if a cylinder balance fault has been detected and engine has been running for a long

time, the PCM will try to increase or decrease fuel in other cylinders to compensate for a rough idle which will cause multiple cylinder balance DTCs to set. The scan tool snap shot mode can be used to properly identify the suspected cylinder. The most likely cause of cylinder balance DTCs are faulty nozzles or engine mechanical (low compression) problems.

Test Description

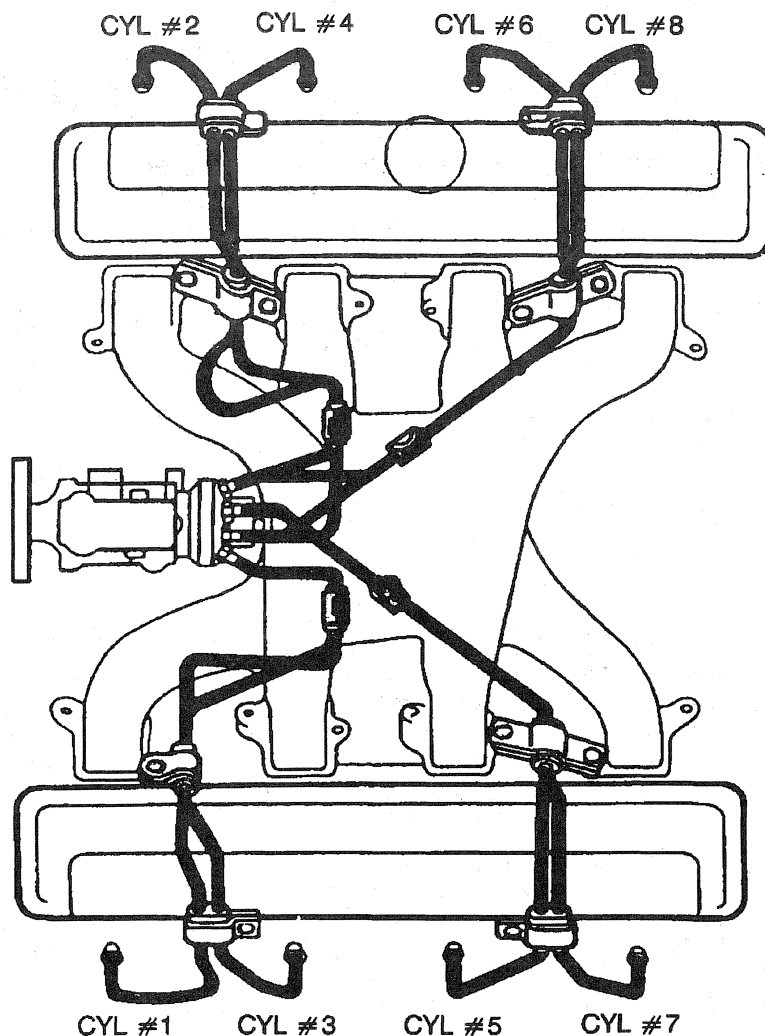
Number(s) below refer to the Step number(s) on the Diagnostic Table.

2. This Step will properly identify a suspected cylinder by looking for a RPM drop (if RPM drops, cylinder is contributing, if not cylinder is not contributing).

DTC P0281 Cylinder 3 Balance System

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan tool connected. 2. Start and idle engine. 3. Engine at operating temperature. 4. Make sure all DTCs are cleared. 5. Using the scan tool, cutout (Inj. Balance) the suspected cylinder. Is there an RPM drop in the suspected cylinder?	—	Go to Step 3	Go to Step 4
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	Check for the following basic engine mechanical or fuel delivery problems in that cylinder. <ul style="list-style-type: none"> • Low compression (refer to Engine Mechanical) • Faulty injection nozzle (refer to Fuel Systems) Was a repair performed?	—	Go to Step 5	—
5	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 6	Go to Step 2
6	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0284 Cylinder 1 Balance System



29653

Circuit Description

The PCM has the ability to increase and decrease the amount of fuel to each cylinder to provide smooth idle operation. If the fuel correction amount exceeds define limits, DTC P0284 will set. This is a type D DTC.

Conditions for Setting the DTC

- Engine at idle.
- Engine coolant at normal temperatures.
- Cylinder fault must be constant.
- Fuel correction amount exceeds limits (internal to PCM).
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

Possible rough idle

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

Injector balance test on scan tool should be used to confirm faulty cylinder. Scan tool will cutout specific cylinder requested. If original complaint was multiple cylinder balance DTCs and vehicle has a manual transmission, dual mass flywheel could be at fault. Its possible that if a cylinder balance fault has been detected and engine has been running for a long

time, the PCM will try to increase or decrease fuel in other cylinders to compensate for a rough idle which will cause multiple cylinder balance DTCs to set. The scan tool snap shot mode can be used to properly identify the suspected cylinder. The most likely cause of cylinder balance DTCs are faulty nozzles or engine mechanical (low compression) problems.

Test Description

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

2. This Step will properly identify a suspected cylinder by looking for a RPM drop (if RPM drops, cylinder is contributing, if not cylinder is not contributing).

DTC P0284 Cylinder 1 Balance System

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan tool connected. 2. Start and idle engine. 3. Engine at operating temperature. 4. Make sure all DTCs are cleared. 5. Using the scan tool, cutout (Inj. Balance) the suspected cylinder. Is there an RPM drop in the suspected cylinder?	—	Go to Step 3	Go to Step 4
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored, refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	Check for the following basic engine mechanical or fuel delivery problems in that cylinder. <ul style="list-style-type: none"> • Low compression (refer to Engine Mechanical) • Faulty injection nozzle (refer to Fuel Systems) Was a repair performed?	—	Go to Step 5	—
5	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 6	Go to Step 2
6	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

Diagnostic Aids

When PCM is in backup fuel, long crank times, fast idle and poor performance conditions will exist. Check for good connection at crankshaft position sensor and at PCM. Many intermittent problems are caused by faulty electrical connections or wiring. When attempting to diagnose an intermittent problem, always begin by trying to reproduce the conditions under which the failure occurs. This usually involves raising the engine to a higher temperature or operating it near rpm that the problem occurs. Since heat and vibration are often the cause of intermittent, this may bring out the failure.

Test Description

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

2. This Step will determine if DTC P0335 is the result of a hard failure or an intermittent condition.
4. This Step checks the 5 volt reference circuit (the 5 volt reference may vary slightly).
5. This Step checks the ground circuit.

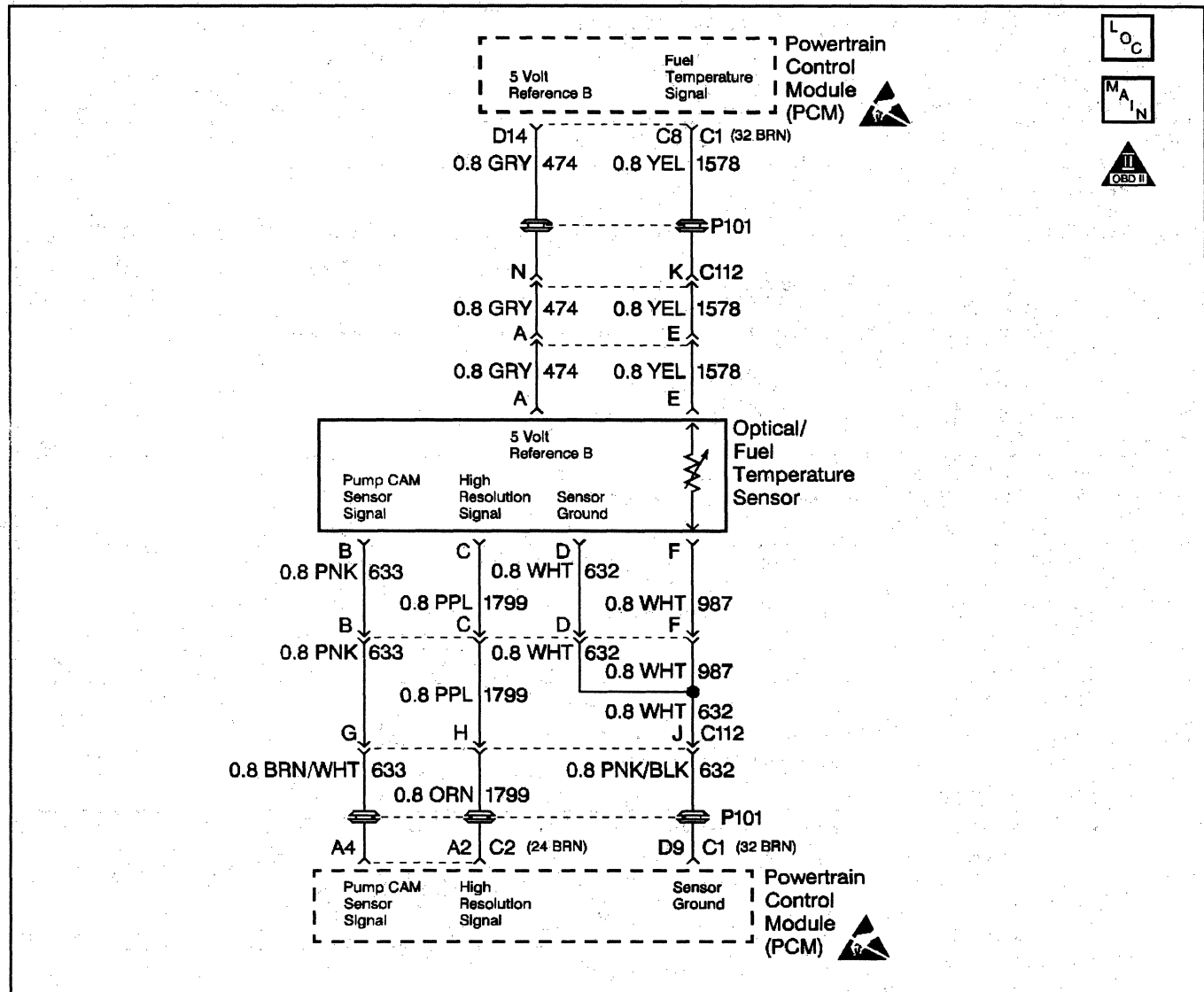
DTC P0335 Crankshaft Position (CKP) Sensor CKT

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Start and idle engine. 2. With the throttle closed, observe the 'Crank Ref. Missed' display on scan tool. Does scan tool display specified value?	8	Go to Step 4	Go to Step 3
3	DTC is intermittent. If no additional DTCs are stored, refer to the Applicable DTC Table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	1. Ignition OFF. 2. Disconnect the Optical/Fuel temperature sensor electrical connector. 3. Ignition ON engine OFF. 4. With a DVM J 39200, measure voltage between the Optical/Fuel Temperature 5 volt reference circuit and chassis ground. Is voltage at specified value?	5 V	Go to Step 5	Go to Step 7
5	Probe the sensor ground circuit with a test light connected to B+. Is test light ON?	—	Go to Step 6	Go to Step 8
6	1. Reconnect Optical/Fuel temperature sensor. 2. Back probe Optical/Fuel temperature signal circuit at the PCM with a DVM J 39200 connected to ground. 3. Crank engine. Is voltage at the specified value?	4 V	Go to Step 11	Go to Step 10
7	1. Ignition OFF. 2. Disconnect the PCM, and check the Optical/Fuel temperature 5 volts reference circuit for an open, short to ground, or short to the sensor ground circuit. 3. If the Optical/Fuel temperature 5 volt reference circuit is open or shorted to ground, repair it as necessary. Was the Optical/Fuel temperature 5 volt reference circuit open or shorted to ground?	—	Go to Step 14	Go to Step 9

DTC P0335 Crankshaft Position (CKP) Sensor CKT (cont'd)

Step	Action	Value(s)	Yes	No
8	1. Check for an open or a poor sensor ground terminal connection at the PCM. 2. If a problem is found, repair as necessary. Was a repair performed?	—	Go to Step 14	Go to Step 13
9	Check the Optical/Fuel temperature 5 volt reference circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 14	Go to Step 13.
10	1. Ignition OFF. 2. Disconnect the PCM, and check the Optical/Fuel temperature signal circuit for an open, short to ground, or short to the sensor ground circuit. 3. If the Optical/Fuel temperature signal circuit is open or shorted to ground, repair it as necessary. Was the Optical/Fuel temperature signal circuit open or shorted to ground?	—	Go to Step 14	Go to Step 11
11	Check the Optical/Fuel temperature signal circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 14	Go to Step 12
12	Replace the Crankshaft position sensor. Refer to <i>Crankshaft Position Sensor</i> . If the Crankshaft Position Sensor is faulty, the PCM must be programmed with a new TDC Offset. Refer to <i>TDC Offset</i> . Is the action complete?	—	Go to Step 14	—
13	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 14	—
14	1. Using the scan tool, select DTC, Clear Info. 2. Start the engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic Ran and Passed?	—	Go to Step 15	Go to Step 2
15	Using the scan tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0370 Timing Reference High Resolution



29557

Circuit Description

The optical sensor provides a high resolution signal to the PCM by counting pulses on the sensor disk located in the injection pump. The high resolution is one of the most important inputs by the PCM for fuel control and timing. This test monitors the number of high resolution pulses which have been missed (not detected). It's based on a comparison between the number of pulses that were detected since the last pump cam pulse and the number of the pulses that should have occurred. This is a type A DTC.

Conditions for Setting the DTC

A number of High Resolution pulses (internal to PCM) per every 8 cam reference pulses.

Action Taken When the DTC Sets

Backup fuel.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

When PCM is in backup fuel, fast idle and poor performance problems will exist. If P0251 is also stored, the snap shot mode on the scan tool should be used to properly identify fault. It is possible P0370 may set if the vehicle runs out of fuel.

Test Description

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

2. This Step will determine if there is a 5 volt reference.

3. This Step checks the ground circuit.

4. This Step will check to see if the sensor is sending a signal back to the PCM.

DTC P0370 Timing Reference High Resolution

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Ignition OFF. 2. Disconnect the Optical/Fuel temperature sensor electrical connector. 3. Ignition ON engine OFF. 4. Using a J 39200, measure voltage between the Optical/Fuel Temperature 5 volt reference circuit and chassis ground at harness connector. Is voltage at specified value?	5 V	Go to Step 3	Go to Step 5
3	Probe the sensor ground circuit with a test light connected to B+ at the harness connector. Is test light ON?	—	Go to Step 4	Go to Step 7
4	1. Reconnect Optical/Fuel temperature sensor. 2. Start and idle engine. 3. With scan tool, command 900 rpm. 4. With J 39200 on Hertz (Hz) scale, back probe high resolution signal circuit at PCM. Is Hertz reading at specified value?	3840 Hz (± 100)	Go to Step 10	Go to Step 9
5	1. Removed electrical harness filter from vehicle. 2. Check resistance on the electrical harness filter 5 volt reference circuit (terminal A). Is resistance greater than specified value?	2.0 Ohms	Go to Step 13	Go to Step 6
6	1. Ignition OFF. 2. Electrical harness filter removed from vehicle. 3. Disconnect the PCM, and check the Optical/Fuel temperature 5 volts reference circuit for an open, short to ground, or short to the sensor ground circuit. 4. If the Optical/Fuel temperature 5 volt reference circuit is open or shorted to ground, repair it as necessary. Was the Optical/Fuel temperature 5 volt reference circuit open or shorted to ground?	—	Go to Step 14	Go to Step 8
7	1. Check for an open or a poor sensor ground terminal connection at the PCM. 2. If a problem is found, repair as necessary. Was a repair performed?	—	Go to Step 14	Go to Step 12
8	Check the Optical/Fuel temperature 5 volt reference circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 14	Go to Step 14

DTC P0370 Timing Reference High Resolution (cont'd)

Step	Action	Value(s)	Yes	No
9	1. Ignition OFF. 2. Disconnect the PCM, and check the high resolution signal circuit for an open, short to ground, or short to the sensor ground circuit. 3. If the high resolution signal circuit is open or shorted to ground, repair it as necessary. Was the high resolution signal circuit open or shorted to ground?	—	Go to Step 14	Go to Step 11
10	Check the high resolution signal circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 14	Go to Step 12
11	Replace Injection pump. If injection pump is faulty, the new injection pump must be timed. Refer to <i>Checking and Adjusting Injection Timing</i> in Section 4. Is the action complete?	—	Go to Step 14	—
12	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 14	—
13	Replace electrical harness filter. Is the action complete?	—	Go to Step 14	—
14	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 10	Go to Step 2
15	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0380 Glow Plug Circuit PerformanceRefer to *Glow Plug System***Circuit Description**

The glow plug system is used to assist in providing the heat required to begin combustion during engine starting at cold ambient temperatures. The glow plugs are heated before and during cranking, as well as initial engine operation. The PCM controls the glow plug ON times by monitoring coolant temperatures and glow plug voltage. This is a type B code.

Conditions for Setting the DTC

- PCM has commanded glow plugs ON and voltage at the glow plugs is less than .8 volts.
- or
- PCM has commanded glow plugs OFF and voltage at the glow plugs is greater than .8 volts.
- or
- PCM has commanded glow plugs ON and there is more than a 2 volt difference between glow plug voltage and ignition voltage.

Action Taken When the DTC Sets

Hard start or no start and possible white smoke.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

If glow plug relay is stuck in the ON position, check for proper operation of glow plugs, refer to *Section 7*. When glow plugs are commanded ON by the Scan tool, an internal PCM timer protects the glow plugs from damage by cycling them ON for 3 seconds and the OFF for 12 seconds.

Test Description

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

2. This Step will determine if P0380 is a hard failure.
3. This Step will determine if PCM is requesting the glow plug system ON.
7. This Step will determine if the glow plug relay has been activated, and out put voltage has been seen by the PCM.

DTC P0380 Glow Plug Circuit Performance

Step	Action	Value(s)	Yes	No
1	Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan tool installed 2. Ignition ON, engine OFF. 3. With scan tool command glow plugs ON. 4. Observe Glow Plug System on scan tool display. Does scan tool display Glow Plug System enabled?	—	Go to Step 3	Go to Step 7
3	1. Ignition ON, engine OFF. 2. With scan tool command glow plugs ON. 3. Observe Glow Plugs display on scan tool. Does scan tool display Glow Plugs at specified value?	B+	Go to Step 4	Go to Step 5
4	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids If additional DTCs were stored refer to those table(s). Were additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
5	1. Disconnect glow plug relay connector. 2. Ignition ON, engine OFF. 3. With test light connected to ground, probe glow plug relay harness ignition feed circuit. Is test light ON?	—	Go to Step 6	Go to Step 10

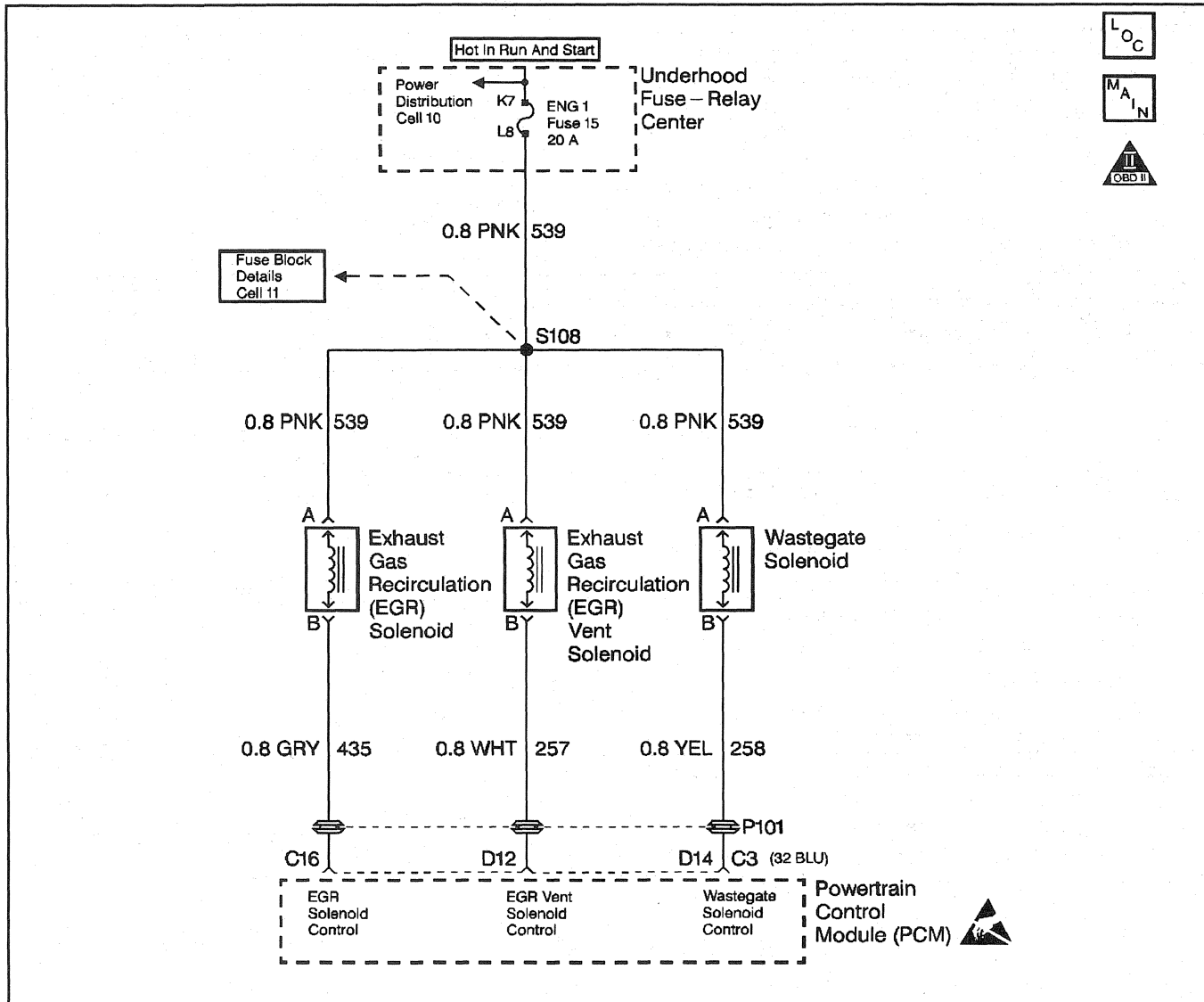
DTC P0380 Glow Plug Circuit Performance (cont'd)

Step	Action	Value(s)	Yes	No
6	1. Ignition ON, engine OFF. 2. Connect test light between glow plug harness ignition feed circuit and the harness ground circuit. Is test light ON?	—	Go to Step 7	Go to Step 11
7	1. Ignition ON, engine OFF. 2. Glow plug harness still disconnected. 3. With a <i>J 39200</i> connected to ground, probe glow plug relay control circuit at the glow plug harness connector. 4. With scan tool, command glow plugs ON. Is voltage at the specified value?	B+	Go to Step 8	Go to Step 12
8	1. Reconnect glow plug relay. 2. Ignition ON, engine OFF. 3. With test light connected to ground, probe glow plug side of relay. 4. With scan tool, command glow plugs ON. Is test light ON when scan tool commands glow plugs ON?	—	Go to Step 14	Go to Step 16
9	Check glow plug relay control circuit for a poor connection at the PCM and replace terminal if necessary. Did any terminals require replacement?	—	Go to Step 18	Go to Step 17
10	Repair open or short to ground in glow plug relay ignition feed circuit. Is the action complete?	—	Go to Step 18	—
11	Repair open or poor connections in glow plug relay ground circuit. Is the action complete?	—	Go to Step 18	—
12	1. Check glow plug relay control circuit for an open or short to ground. 2. If the glow plug relay control circuit is open or shorted to ground, repair it as necessary. Was a problem found?	—	Go to Step 18	Go to Step 13
13	Check glow plug relay control circuit for a poor connection at the PCM and replace terminal if necessary. Was a problem found?	—	Go to Step 18	Go to Step 17
14	1. Check glow plug relay signal control circuit for an open or short to ground. 2. If the glow plug relay signal circuit is open or shorted to ground, repair it as necessary. Was a problem found?	—	Go to Step 18	Go to Step 15
15	Check glow plug relay signal circuit for a poor connection at the PCM and replace terminal if necessary. Was a problem found?	—	Go to Step 18	Go to Step 17
16	Replace glow plug relay. Refer to <i>Glow Plug Relay</i> . Is the action complete?	—	Go to Step 18	
17	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 18	—

DTC P0380 Glow Plug Circuit Performance (cont'd)

Step	Action	Value(s)	Yes	No
18	<ol style="list-style-type: none">1. Using the scan tool, select DTC, Clear Info.2. Start engine and idle at normal operating temperature.3. Select DTC, Specific, then enter the DTC number which was set.4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic Ran and Passed?	—	Go to Step 19	Go to Step 2
19	Using the scan tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0404 EGR System



29560

Circuit Description

The PCM operates a solenoid to control the EGR valve. This solenoid is normally open. By providing a ground path the PCM energizes the solenoid which then allows vacuum to pass to the EGR. During normal operation, the PCM compares its desired EGR signal with the EGR pressure signal and makes corrections in the duty cycle accordingly. If there is a difference in the PCM command and what is at the EGR valve sensed by the EGR control pressure/BARO sensor, the PCM makes minor adjustments to correct.

Conditions for Setting the DTC

- DTCs P0405 or P0406 are not stored.
- ENGINE SPEED greater than 506 rpm.

- (Desired EGR pressure) – (Measured EGR pressure) > 50 kPa.
- Above conditions persist for at least 25.5 seconds.

Action Taken When the DTC Sets

The PCM will shut down the EGR.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

A vacuum leak or a pinched vacuum will cause a DTC P0404. Check all vacuum lines and components connected to the hoses for leaks or sharp bends or deformities. Check vacuum source to EGR solenoid assembly. Also check for small leak in EGR valve, and proper vacuum line routing.

Test Description

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

3. This step checks vacuum to the EGR valve.
4. This step checks for a faulty EGR vent solenoid.
5. This step checks for a good vacuum source. The vacuum gauge will fluctuate at the approximate specified value.

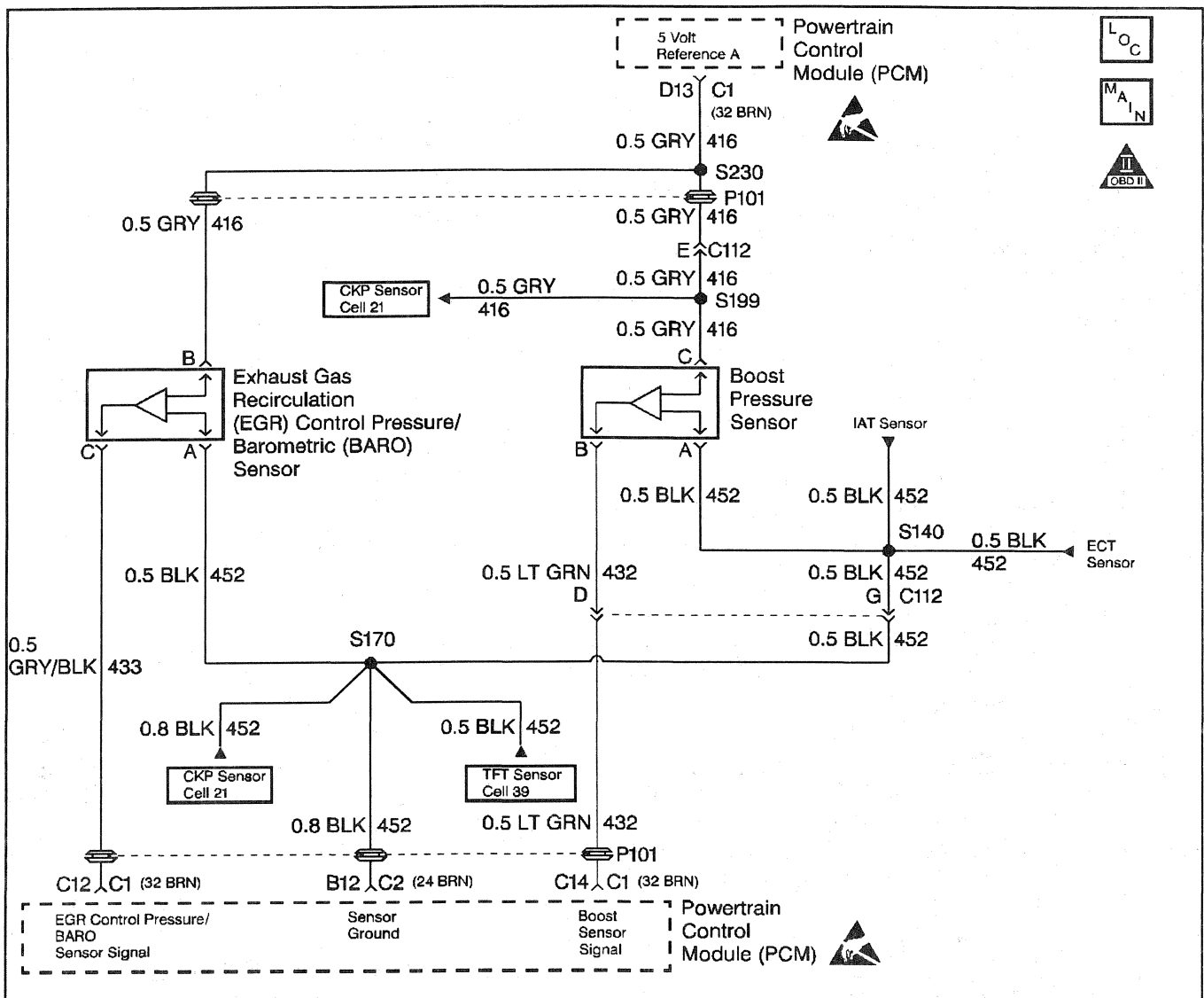
DTC P0404 EGR System

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Install vacuum gage in place of EGR valve. 2. Start engine. 3. At idle observe vacuum. Is vacuum at the specified value?	5 -7 Hg	Go to Step 3	Go to Step 5
3	1. Disconnect EGR vent solenoid electrical connector. 2. Vacuum gage still in place. 3. Start engine. 4. Observe vacuum gage at idle. Is there any vacuum present?	—	Go to Step 10	Go to Step 6
4	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to those table(s). Were additional DTCs stored? Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
5	Check vacuum source at solenoid assembly. Is vacuum greater than the specified value?	15 Hg	Go to Step 7	Go to Step 8
6	1. Ignition OFF. 2. Install vacuum pump on EGR valve. 3. Pump up to 15 Hg of vacuum. 4. Observe EGR valve for movement. Does EGR valve move?	—	Go to Step 7	Go to Step 11
7	Check for plugged or leaking vacuum hoses. Is the action complete?	—	Go to Step 12	—
8	Check for plugged or leaking vacuum hose to the vacuum pump. Is the action complete?	—	Go to Step 12	Go to Step 9
9	Check for a faulty vacuum pump. Is the action complete?	—	Go to Step 12	—
10	Replace EGR vent solenoid. Refer to <i>EGR Vent Solenoid</i> . Is the action complete?	—	Go to Step 12	—
11	Replace EGR valve. Refer to <i>EGR Valve</i> . Is the action complete?	—	Go to Step 12	—

DTC P0404 EGR System (cont'd)

Step	Action	Value(s)	Yes	No
12	After Repairs use the scan tool Clear Info function and road test vehicle. Check for DTCs Current or History. Review test status information. If status is test Failed or DTCs are present begin diagnosis again on that DTCs. If last test Failed is not present and no DTCs are present repair is complete. Are the repairs complete?	—	Go to <i>Powertrain OBD System Check</i>	—
13	Using the scan tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0405 EGR Sensor Circuit Low Voltage



29574

Circuit Description

A EGR Control Pressure/Baro sensor is used to monitor the amount of vacuum in the EGR circuit. It senses the actual vacuum in the EGR vacuum line and sends a signal back to the PCM. This signal is used to control EGR duty cycle calculated by the PCM. This is a type B DTC.

Conditions for Setting the DTC

- Actual EGR less than or equal to .24 volts (15 kPa).
- Condition met for 2 seconds.

Action Taken When the DTC Sets

The PCM will shut down the EGR.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

With the ignition ON and the engine stopped, the EGR pressure is equal to atmospheric pressure with the signal voltage being high. The information is used by the PCM as an indication of vehicle altitude. Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a 'suspect' sensor. Readings should be the same + .4 volt. An intermittent open in signal circuit or the 5 volt reference circuit will result in a DTC P0405.

Test Description

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

2. This Step determines if P0405 is a hard failure or an intermittent condition.

3. Jumpering the 5 volt reference circuit to the signal circuit will determine if the sensor is at fault, or if there is a problem with the PCM or wiring.
4. The scan tool may not display 5 volts. The important thing is that the PCM recognized the voltage as more than 4 volts, indicating that the PCM and the signal circuit are OK.

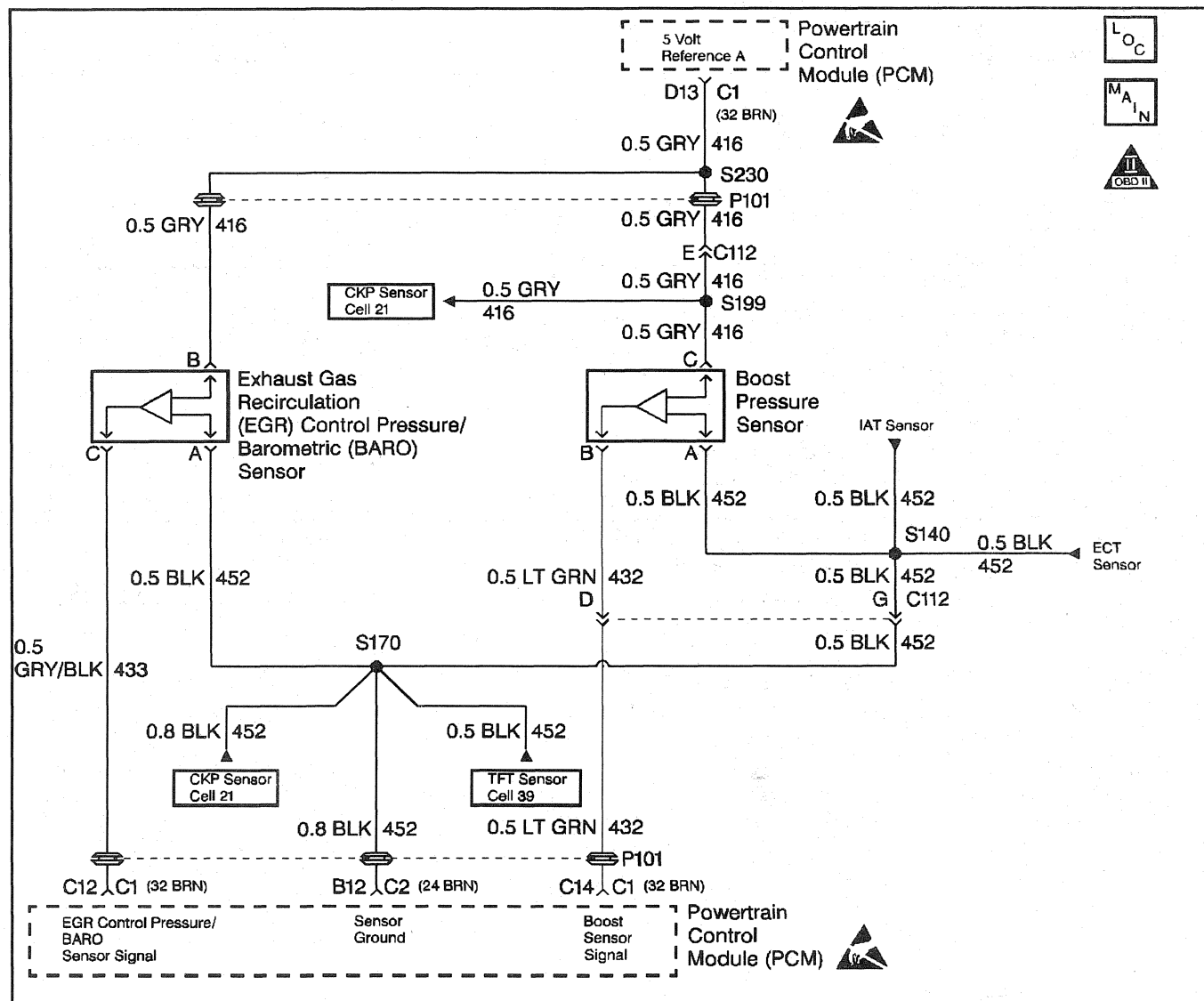
DTC P0405 EGR Sensor Circuit Low Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) system check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Install Scan tool. 2. Engine idling. 3. Observe EGR Sensor display on scan tool. Does the scan tool display EGR Sensor less than or equal to the specified value?	0.24 V	Go to Step 3	Go to Step 5
3	1. Turn the Ignition OFF. 2. Disconnect the EGR Control Pressure/Baro sensor electrical connector. 3. Jumper the sensor 5 volt reference circuit to the sensor signal circuit at the harness connector. 4. Turn the Ignition ON. Does the scan tool display EGR Sensor voltage greater than the specified value?	4.0 V	Go to Step 6	Go to Step 4
4	1. Turn the Ignition OFF. 2. Remove the jumper wire. 3. Probe the sensor signal circuit at the harness connector with a test light connected to B+ 4. Turn the Ignition ON. Does the scan tool display EGR Sensor voltage greater than the specified value?	4.0 V	Go to Step 9	Go to Step 7
5	The DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs are stored refer to those chart(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
6	Check for a faulty connection at the EGR sensor. Was a problem found?	—	Go to Step 12	Go to Step 11
7	Check for an open EGR sensor signal circuit. Was a problem found?	—	Go to Step 12	Go to Step 8
8	Check the EGR sensor signal circuit for a short to ground. Was a problem found?	—	Go to Step 12	Go to Step 13
9	Check for an open in the EGR sensor 5 volt reference circuit. Was a problem found?	—	Go to Step 12	Go to Step 10
10	Check for a short to ground in the EGR sensor 5 volt reference circuit. Was a problem found?	—	Go to Step 12	Go to Step 13

DTC P0405 EGR Sensor Circuit Low Voltage (cont'd)

Step	Action	Value(s)	Yes	No
11	Replace the faulty EGR sensor. Refer to <i>EGR Valve</i> . Is the action complete?	—	Go to Step 14	—
12	Repair the circuit as necessary. Is the action complete?	—	Go to Step 14	—
13	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 14	—
14	<ol style="list-style-type: none"> Using the Scan Tool, select DTC, Clear Info. Start engine and idle at normal operating temperature. Select DTC, Specific, then enter the DTC number which was set. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 15	Go to Step 2
15	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0406 EGR Sensor Circuit High Voltage



29574

Circuit Description

A EGR Control Pressure/Baro sensor is used to monitor the amount of vacuum in the EGR circuit. It senses the actual vacuum in the EGR vacuum line and sends a signal back to the PCM. This signal is used to control EGR duty cycle calculated by the PCM. This is a type B DTC.

Conditions for Setting the DTC

- Actual EGR greater than or equal to 3.96 volts (85 kPa).
- Desired EGR is less than or equal to 60 kPa.
- EGR vent is closed.
- Conditions met for 2 seconds.

Action Taken When the DTC Sets

PCM will shut off EGR system.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

With the ignition ON and the engine stopped, the manifold pressure is equal to atmospheric pressure with the signal voltage being high. This information is used by the PCM as an indicator of vehicle altitude. Comparison of the reading with a known good vehicle with the same sensor is a good way to

check accuracy of a 'suspect' sensor. Readings should be the same + .4 volt. A DTC P0406 will result if the ground circuit is open. If DTC P0406 is intermittent, refer to *Symptoms*.

Test Description

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

2. This Step will check for EGR Vent Solenoid DTC.

3. This Step determines if DTC P0406 is a hard failure or an intermittent condition.
4. This Step simulates conditions for a DTC P0405. If the PCM recognizes the change, the PCM and the signal circuit are OK.

DTC P0406 EGR Sensor Circuit High Voltage

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	Is DTC P1653 set?	—	Go to the Applicable DTC Table	Go to Step 3
3	1. Connect the scan tool. 2. Engine idling. Does the scan tool display EGR Sensor voltage greater than the specified value?	4.0 V	Go to Step 4	Go to Step 5
4	1. Turn the ignition OFF. 2. Disconnect the EGR Control Pressure/Baro sensor electrical connector. 3. Turn the ignition ON. Does the scan tool display a EGR Sensor voltage less than the specified value?	1.0 V	Go to Step 6	Go to Step 10
5	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs are stored refer to those chart(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
6	1. Ignition ON, engine Off. 2. With a J 39200 connected to ground, probe the 5 volt reference circuit at the EGR Control Pressure/Baro Sensor harness connector. Is voltage greater than the specified value?	5.2V	Go to Step 11	Go to Step 7
7	Probe the EGR Control Pressure/Baro sensor ground circuit with a test light to B+. Is the test light ON?	—	Go to Step 8	Go to Step 12
8	Check the EGR vacuum source for a restriction. Was a problem found?	—	Go to Step 13	Go to Step 9
9	Replace the faulty EGR Control Pressure/Baro sensor. Refer to <i>EGR Control Pressure Sensor</i> . Is the action complete?	—	Go to Step 15	—
10	Check for a short to voltage in the sensor signal circuit. Was a problem found?	—	Go to Step 13	Go to Step 14
11	1. Check for a short to voltage in the 5 volt reference circuit 2. If a problem is found, repair as necessary. Was a repair performed?	—	Go to Step 15	Go to Step 14

DTC P0406 EGR Sensor Circuit High Voltage (cont'd)

Step	Action	Value(s)	Yes	No
12	Repair the open in the sensor ground circuit. Is the action complete?	—	Go to Step 15	—
13	Repair as necessary. Is the action complete?	—	Go to Step 15	—
14	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 15	—
15	<ol style="list-style-type: none"> Using the Scan Tool, select DTC, Clear Info. Start engine and idle at normal operating temperature. Select DTC, Specific, then enter the DTC number which was set. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 16	Go to Step 2
16	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0501 Vehicle Speed Sensor Circuit

Refer to *Transmission - Vehicle Speed Sensor and Buffer*.

Circuit Description

The speed sensor circuit consists of a magnetic induction type sensor, a vehicle speed sensor buffer module and wiring. Gear teeth pressed on the output shaft induce an alternating current in the sensor. This signal is transmitted to the buffer. The buffer compensates for various axle ratios and converts the signal into a square wave for use by the speedometer, cruise control, antilock brake and PCM. The buffer sends two different signals to the PCM. This is a type D DTC.

Conditions for Setting the DTC

- Vehicle speed greater than 20 mph.
- Four wheel low not selected.
- VSS buffer calculated speed is less than half the transmission calculated speed.

or

- VSS buffer calculated speed is greater than transmission calculated speed by 20 mph.
- All conditions must be met for 2 seconds.

Action Taken When the DTC Sets

No cruise control.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

Check connections at VSS buffer and PCM. Refer to 4L80E Diagnostic Diagnostic Trouble Codes in Section 10 if DTC P0722 or DTC P0723 is also set.

Test Description

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

3. This tests for B+ at VSS buffer.
4. This tests for proper ground path for vehicle speed sensor signal buffer.

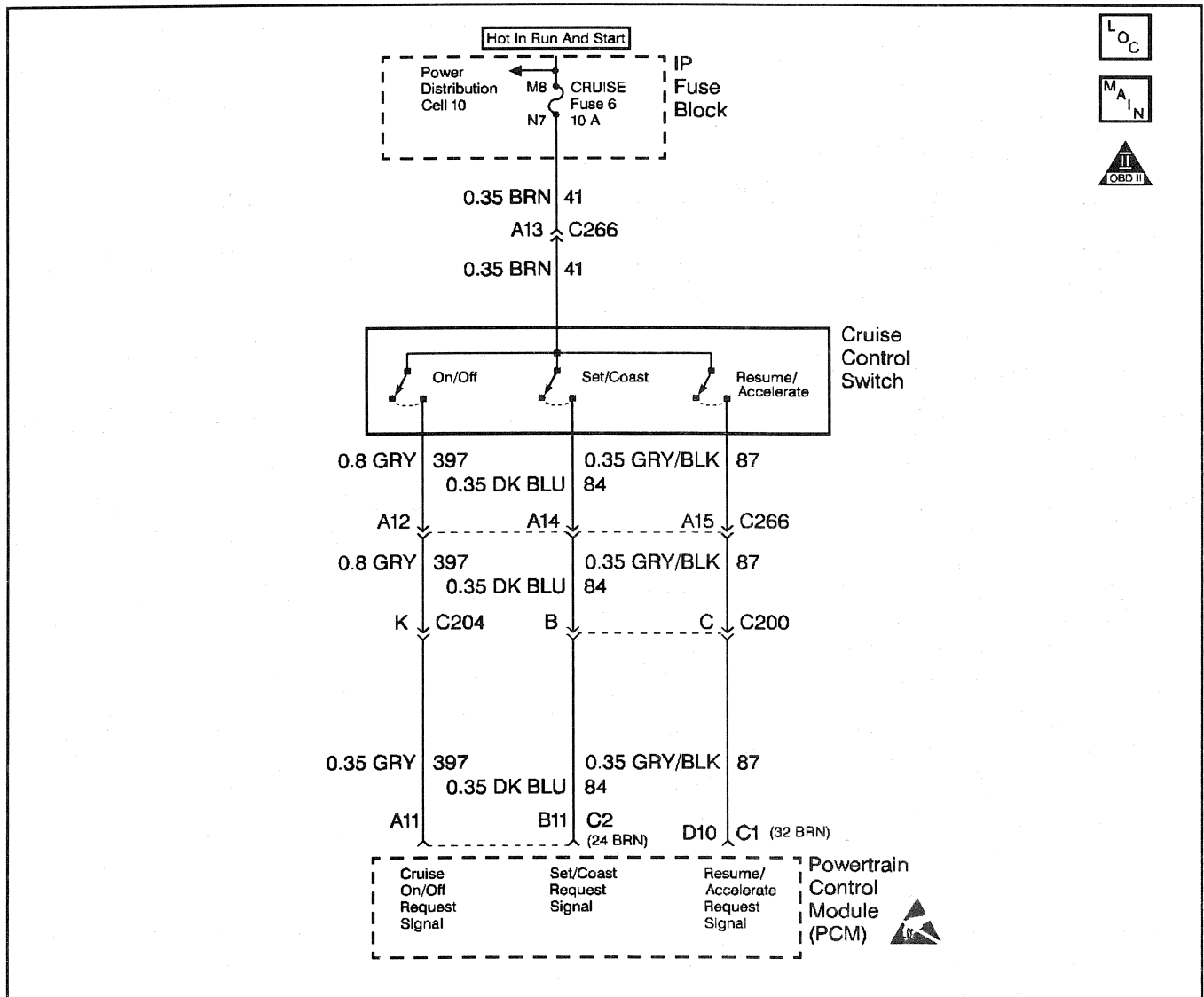
DTC P0501 Vehicle Speed Sensor Circuit

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Install scan tool. 2. Raise drive wheels. 3. Engine operating. 4. Transmission in any drive range. With drive wheels rotating, does vehicle speed increase with drive wheel speed increase?	—	Go to Step 7	Go to Step 3
3	1. Transmission in park. 2. Back probe VSS buffer module ignition feed circuit with a test light connected to ground. Is test light ON?	—	Go to Step 4	Go to Step 8
4	Back probe VSS buffer module ignition feed circuit to the ground circuit with a test light. Is the test light ON?	—	Go to Step 5	Go to Step 9
5	1. Back probe VSS buffer module at VSS input circuit (C7) to the other VSS input circuit (C12) with a J 39200 on the AC scale. 2. Transmission in any drive range with drive wheels rotating. Does voltage increase on J 39200 with drive wheel increase?	—	Go to Step 6	Go to Step 10
6	Does scan tool display a trans output speed (MPH) increase with drive wheel increase?	—	Go to Step 11	Go to Step 13

DTC P0501 Vehicle Speed Sensor Circuit (cont'd)

Step	Action	Value(s)	Yes	No
7	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs are stored refer to those chart(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
8	Repair the open in the ignition feed circuit. Is the action complete?	—	Go to Step 15	—
9	Repair the open in the ground circuit. Is the action complete?	—	Go to Step 15	—
10	Check the complete VSS input circuit for an open or short to ground. Was a repair performed?	—	Go to Step 15	—
11	Check VSS output circuit for an open or short to ground. Was a repair performed?	—	Go to Step 15	Go to Step 12
12	Check VSS output circuit for a poor connections at buffer module and PCM. Was a repair performed?	—	Go to Step 15	Go to Step 14
13	Replace VSS Buffer module. Refer to <i>Vehicle Speed Signal Buffer</i> . Is the action complete?	—	Go to Step 15	—
14	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 15	—
15	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 16	Go to Step 2
16	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0567 Cruise Resume Circuit



29564

Circuit Description

The cruise Resume/Accel switch is an input to the fuel control portion of the PCM. These inputs allow the PCM to control and hold a requested speed. Cruise Resume/Accel switch sends ignition voltage to the PCM when the switch is switch is closed (ON). This is a type D DTC.

Conditions for Setting the DTC

- Cruise switch OFF.
 - Ignition voltage on Resume switch signal circuit.
- or
- Cruise switch ON.
 - Resume switch ON for longer than 25.5 seconds.

Action Taken When the DTC Sets

- Will not turn on the MIL.
- The PCM will disallow all cruise inputs.
- TCC shift schedules may be affected.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

Check for a resume/accel switch stuck in the engage position or the signal circuit is shorted to voltage.

Test Description

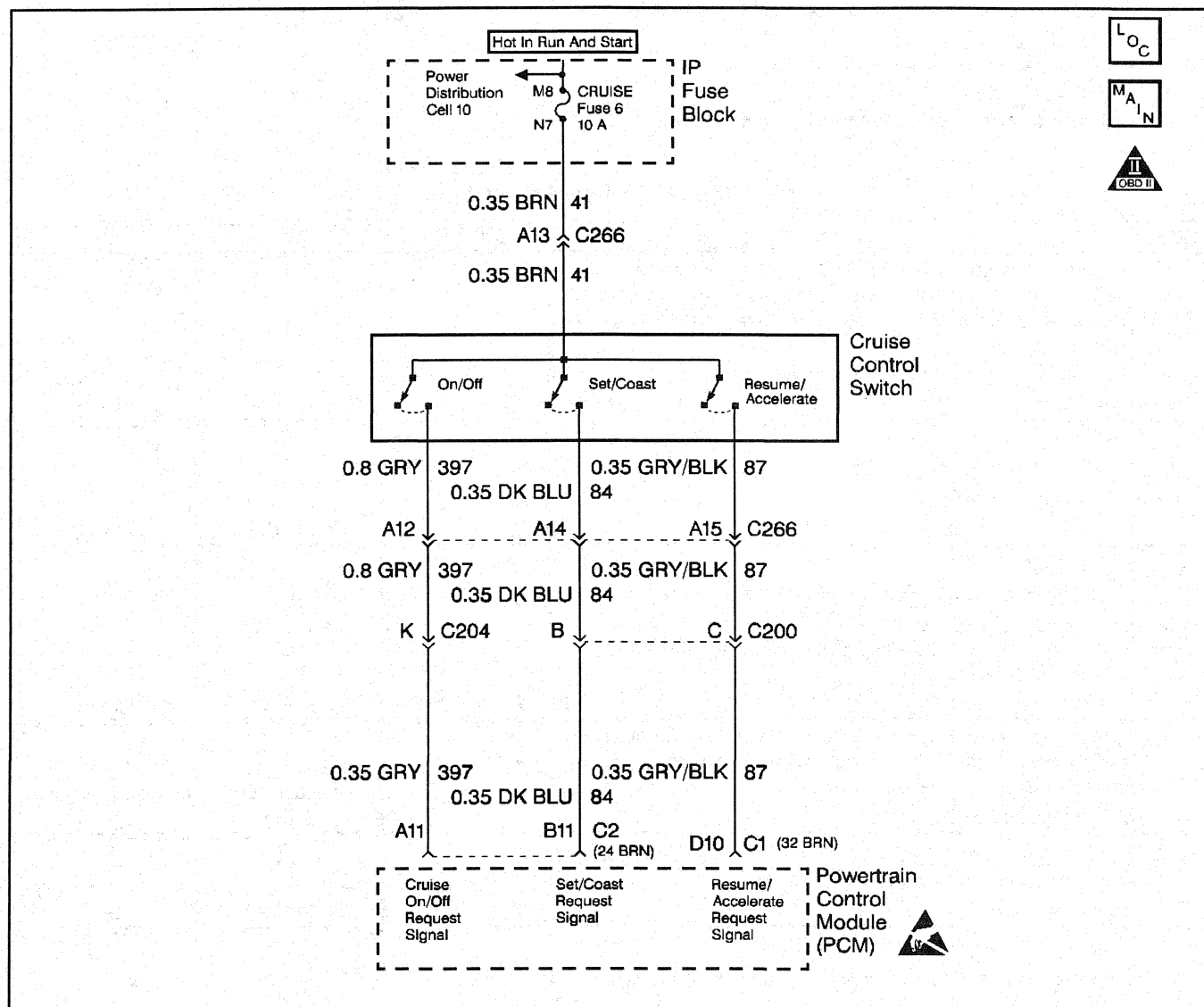
Number(s) below refer to the Step number(s) on the Diagnostic Table.

2. This Step determines if the signal circuit is shorted to voltage.
3. This Step determines if the PCM or switch is at fault.

DTC P0567 Cruise Resume Circuit

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan tool connected. 2. Ignition ON, engine OFF. 3. Cruise switch OFF. Does scan tool display Resume Switch ON?	—	Go to Step 3	Go to Step 4
3	1. Ignition ON. 2. Disconnect the PCM brown 32 way connector. 3. Probe the Resume switch signal circuit at the PCM harness with a test light connected to chassis ground. Is the test light ON?	—	Go to Step 5	Go to Step 7
4	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
5	1. Resume switch signal circuit is shorted to voltage. 2. Repair as necessary. Is the action complete?	—	Go to Step 8.	—
6	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 7	—
7	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 8	Go to Step 2
8	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0568 Cruise Set Circuit



29564

Circuit Description

The cruise Set/Coast switch is an input to the fuel control portion of the PCM. These inputs allow the PCM to control and hold a requested speed. Cruise Set/Coast switch sends a ignition voltage signal to the PCM when the Set/Coast switch is ON. This is a type D DTC.

Conditions for Setting the DTC

- Cruise switch OFF.
 - Ignition voltage on Resume switch signal circuit.
- or
- Cruise switch ON.
 - Resume switch ON for longer than 25.5 seconds.

Action Taken When the DTC Sets

- The PCM will disallow all cruise inputs.
- TCC shift schedules may be affected.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

If the Set/Coast switch is stuck in the ON position or the driver is holding the Set/Coast switch ON for longer than 25.5 seconds, DTC P0568 will set. DTC P0568 only checks the signal circuit for a short to voltage.

Test Description

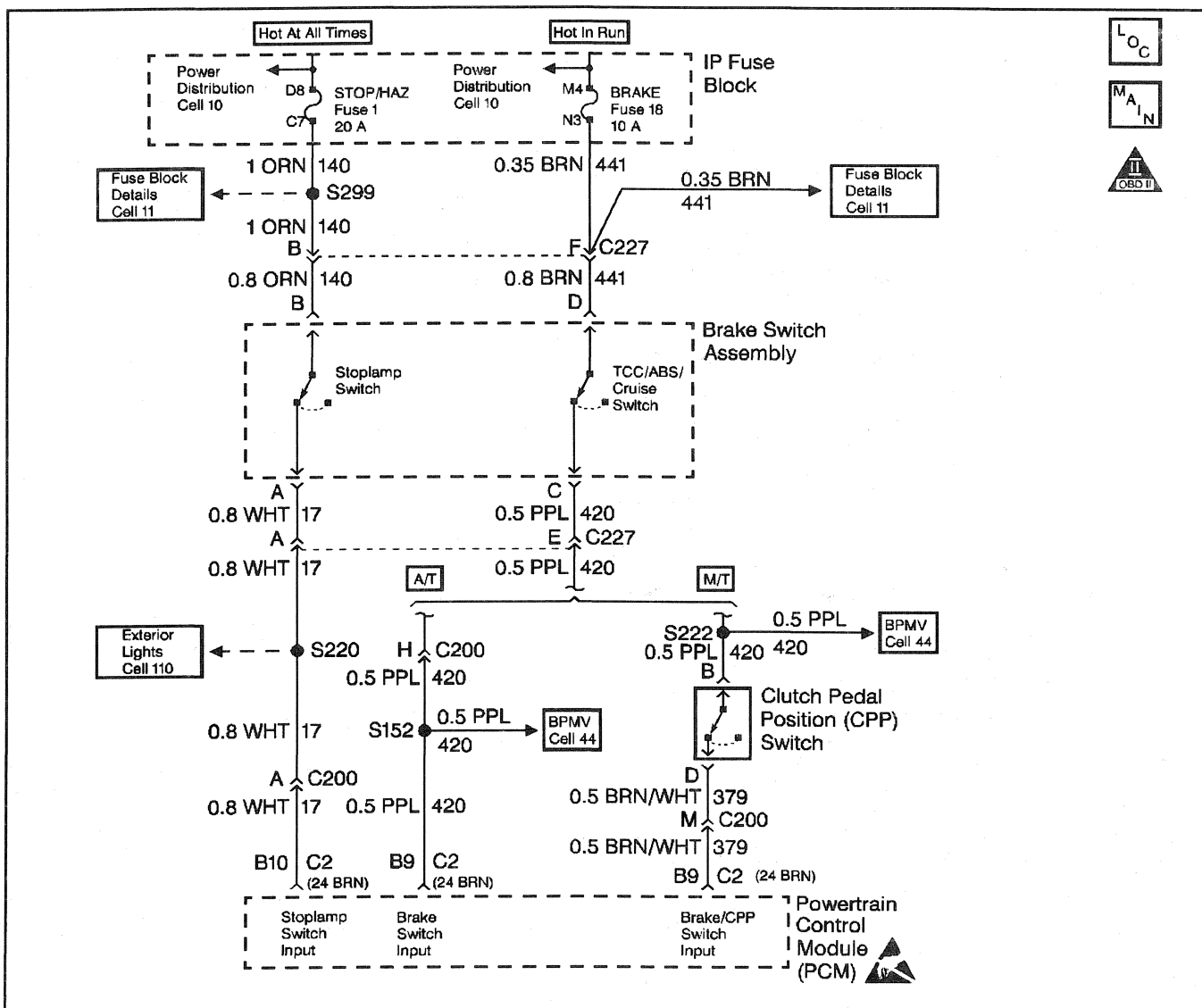
Number(s) below refer to the Step number(s) on the Diagnostic Table.

2. This Step determines if the signal circuit is shorted to voltage.
3. This Step determines if the PCM or switch is at fault.

DTC P0568 Cruise Set Circuit

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Scan tool connected. 2. Ignition ON, engine OFF. 3. Cruise switch OFF. Does scan tool display Set switch ON?	—	Go to Step 3	Go to Step 4
3	1. Ignition ON. 2. Disconnect the PCM brown 24 way connector. 3. Probe the Set switch signal circuit at the PCM harness with a test light connected to chassis ground. Is the test light ON?	—	Go to Step 5	Go to Step 7
4	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
5	1. Resume switch signal circuit is shorted to voltage. 2. Repair as necessary. Is the action complete?	—	Go to Step 8	—
6	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 7	—
7	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 8	Go to Step 2
8	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0571 Cruise Brake Switch Circuit



29566

Circuit Description

The TCC normally closed brake switch supplies a B+ signal on CKT 420 to the PCM. The circuit is opened when the brakes are applied. The stop lamp/cruise control normally open brake switch supplies a B+ signal on CKT 820 to the PCM when the brake is applied. This is a type D DTC.

Conditions for Setting the DTC

- Switches disagree for 10 consecutive minutes.
- or
- TCC and cruise control brake switches are not toggling open and closed, during 6 brake applications on same ignition cycle.

Action Taken When the DTC Sets

Fourth gear operation in hot mode, and cruise control operation.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

Refer to PCM Intermittent Diagnostic Trouble Codes or Performance. Check customer driving habits and/or unusual traffic conditions (i.e. stop and go, expressway traffic).

Test Description

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

2. This test simulates brake switch closed or brakes OFF.
3. This test checks the feed circuit.

DTC P0571 Cruise Brake Switch Circuit

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan tool installed. 2. Ignition ON, engine OFF? 3. Apply brakes. Does scan tool display Cruise Brake switch Closed and then Open when brake is released?	—	Go to Step 3	Go to Step 4
3	Apply brakes again. Does scan tool display Brake switch Open and then Closed when brake is released?	—	Go to Step 8	Go to Step 6
4	1. Ignition ON, engine OFF. 2. Stop lamp switch disconnected. 3. With a test light connected to ground, probe normally open feed circuit (terminal B). Is test light ON?	—	Go to Step 5	Go to Step 9
5	1. Disconnect stop lamp switch. 2. Jumper normally open (terminal A) feed circuit and the normally open signal circuits (terminal B) together. Does scan tool display Cruise Brake switch Closed?	—	Go to Step 6	Go to Step 10
6	1. Ignition ON, engine OFF. 2. Stop lamp switch disconnected. 3. With a test light connected to ground, probe normally closed feed circuit (terminal F). Is test light ON?	—	Go to Step 7	Go to Step 12
7	1. Stop lamp switch disconnected. 2. Jumper normally closed (terminal F) feed circuit and the normally closed signal circuits (terminal E) together. Does scan tool display Cruise Brake switch Closed?	—	Go to Step 6	Go to Step 14
8	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
9	Check normally open feed circuit (terminal B) for and open or short to ground. Is the action complete?	—	Go to Step 17	—
10	Check normally open Cruise Brake switch signal circuit for and open or short to ground. Was a repair performed?	—	Go to Step 17	Go to Step 11

DTC P0571 Cruise Brake Switch Circuit (cont'd)

Step	Action	Value(s)	Yes	No
11	Check the normally open Cruise Brake switch signal circuit for a poor connection at PCM? Was a repair performed?	—	Go to Step 17	Go to Step 16
12	Check normally closed feed circuit (terminal F) for and open or short to ground. Is the action complete?	—	Go to Step 17	—
13	Check normally closed Brake switch signal circuit for and open or short to ground. Was a repair performed?	—	Go to Step 17	Go to Step 14
14	Check the normally closed Brake switch signal circuit for a poor connection at PCM? Was a repair performed?	—	Go to Step 17	Go to Step 16
15	Replace stop lamp switch. Is the action complete?	—	Go to Step 17	—
16	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 17	—
17	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 18	Go to Step 2
18	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0601 Internal Control Module Memory Check Sum

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	Replace the faulty PC Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 3	—
3	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 4	Go to Step 2
4	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

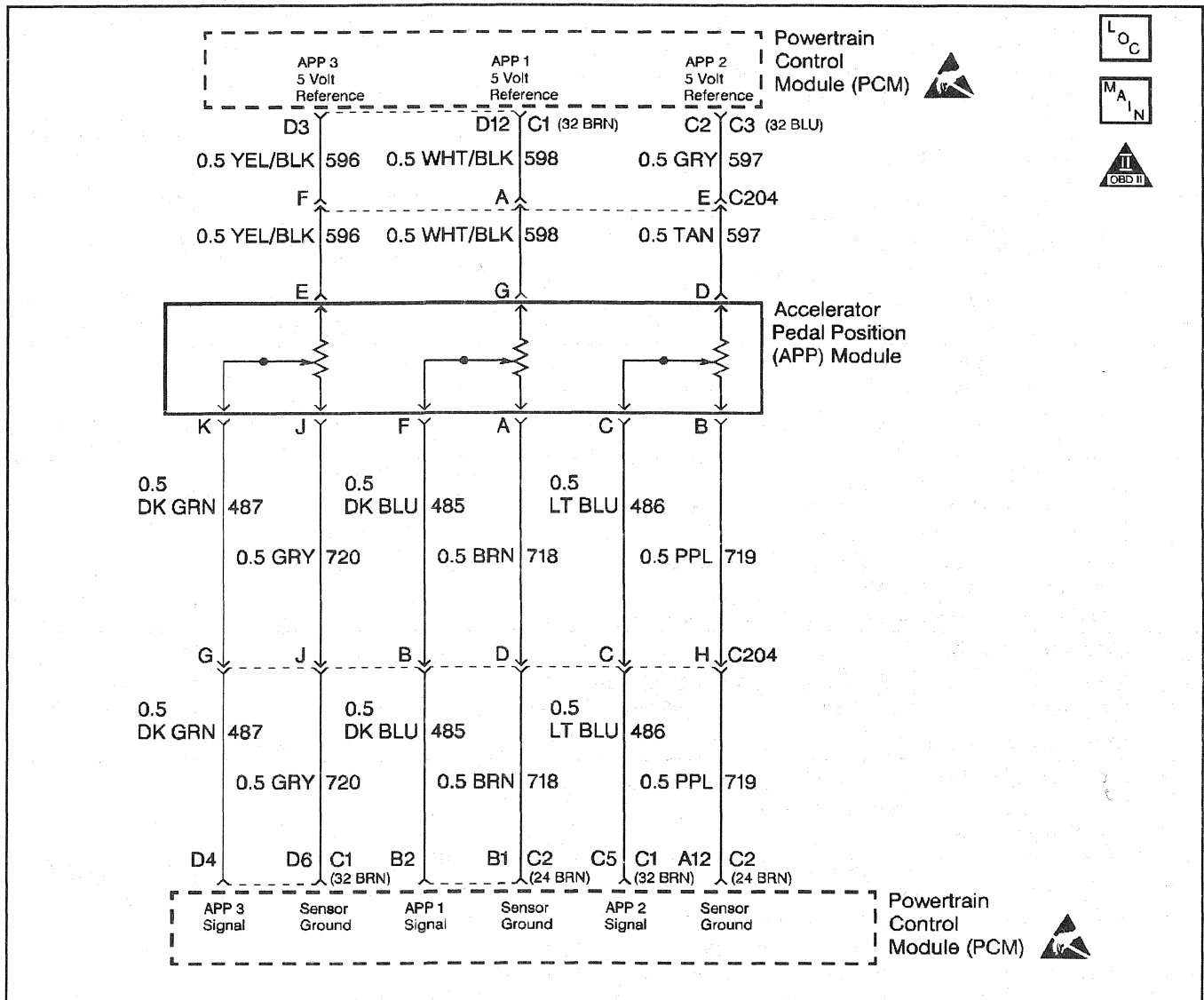
DTC P0602 Control Module Programming

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	Check all PCM connections. Was a problem found?	—	Go to Step 4	Go to Step 3
3	Check Techline terminal/equipment for latest software. Was a problem found?	—	Go to Step 4	Go to Step 5
4	Try again to reprogram. Is programming complete?	—	Go to Step 6	Go to Step 5
5	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 6	—
6	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 7	Go to Step 2
7	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P0606 PCM Internal Communication Interrupted

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	Is DTC P0370 set?	—	Refer to the Applicable DTC Table	Go to Step 3
3	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 4	—
4	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 5	Go to Step 2
5	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P1125 APP System



29555

Circuit Description

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently. This is a type D DTC.

Conditions for Setting the DTC

PCM has recognized an intermittent APP fault and there are no other current APP faults stored.

Action Taken When the DTC Sets

Vehicle will operate at limited power.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

A DTC P1125 will set along with multiple APP DTCs. All other DTCs should be diagnosis first.

Test Description

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

- This Step determines if DTC P1125 is a hard failure or an intermittent condition.

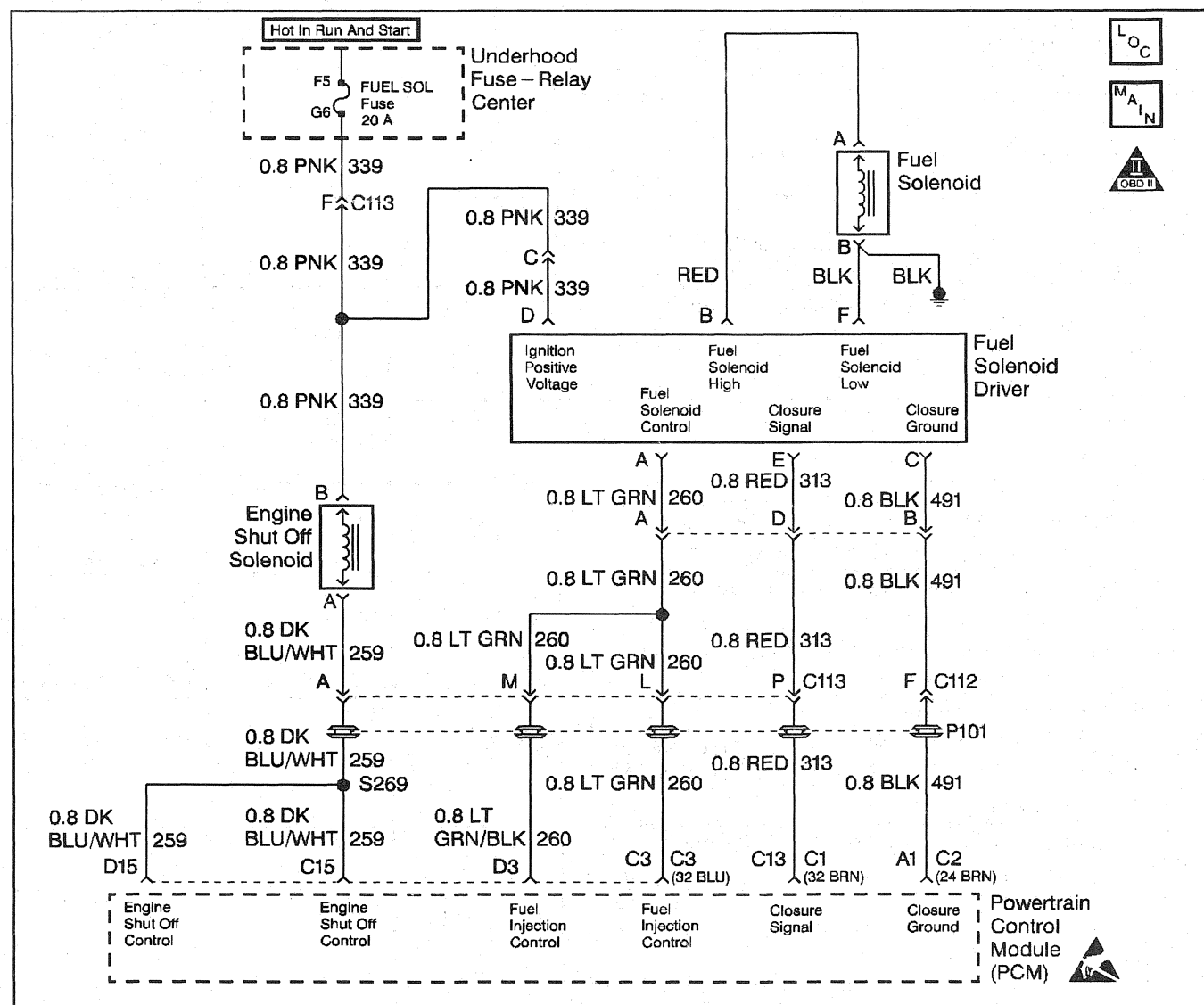
DTC P1125 APP System

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Disconnect the APP sensor electrical connector. 2. Ignition ON, engine OFF. 3. With <i>J 39200</i> connected to ground, check all APP 5 volt reference circuits at APP harness. Is voltage less than specified value?	4.8 V	Go to Step 4	Go to Step 3
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	1. Ignition OFF. 2. Disconnect the PCM and check the 5 volt reference circuit for a short to ground. 3. If the 5 volt reference circuit is shorted to ground, repair it as necessary. Was the 5 volt reference circuit shorted to ground?	—	Go to Step 6	Go to Step 5
5	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 6	—
6	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 7	Go to Step 2
7	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P1214 Injection Pump Timing Offset

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	Install scan tool. Does scan tool display a DTC Offset greeter than or less than the specified values?	+2.5 or -2.5	Go to Step 4	Go to Step 3
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored rthe applicable table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
4	Are there any other DTCs set?	—	Go to the Applicable DTC Table	Go to Step 5
5	Clear all codes and reset injection timing until TDC Offset is between specified values. Refer to <i>TDC Offset</i> . Is timing within specified value?	-.25 to -.75	Go to Step 8	Go to Step 6
6	Check the crankshaft position sensor for the following. • Proper installation. • Loose or broken sensor mounting tab. Was a repair performed?	—	Go to Step 8	Go to Step 7
7	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 8	—
8	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 9	Go to Step 2
9	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P1216 Fuel Solenoid Response Time Too Short



29571

Circuit Description

The injection pump delivers fuel to individual cylinders by opening and closing a solenoid control fuel valve. The PCM monitors the amount of time it takes for the fuel solenoid valve to physically close after commanded to close. Closure time out of range is seen as a fault. This response time is measured in milli seconds. This is a type D DTC.

Conditions for Setting the DTC

- Battery voltage greater than 10 volts and less than 16 volts.
- Engine coolant temperature greater than -1°C (34°F).
- ENGINE SPEED greater than 506 rpm.
- Requested fuel rate is greater than 0.0 mm
- Inj. Pump Closure Time less than .75 ms.

Action Taken When the DTC Sets

Possible poor performance or no start.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

If DTC P1216 is set with any other DTCs, diagnose them first. If the vehicle is running close to the DTC setting closure time, vehicle should be checked during cold start ups and during hot conditions.

Test Description

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

2. This Step will determine if the ground circuit is open which causes the vehicle not to start.
3. This Step will determine if the signal circuit is open or an injection pump (fuel solenoid) is at fault.

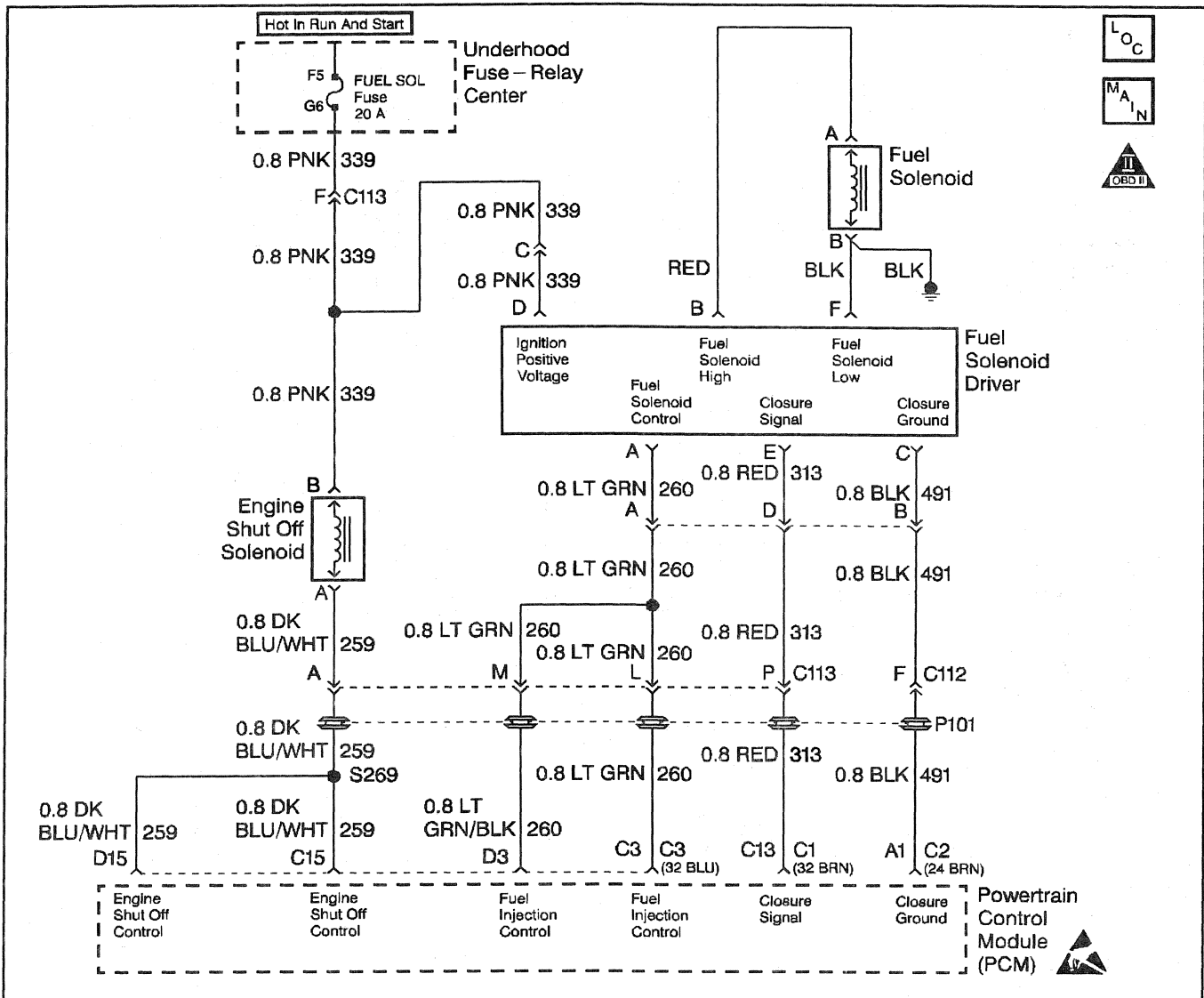
DTC P1216 Fuel Solenoid Response Time Too Short

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	Is DTC P0219 set?	—	Go to DTC P0219 Engine Overspeed Condition	Go to Step 3
3	Will engine start?	—	Go to Step 4	Go to Step 7
4	1. Engine at operating temperature. 2. Observe Inj. Pump Closure Time on scan tool. Is the scan tool display less than or equal to the specified value?	0.75 ms	Go to Step 5	Go to Step 6
5	1. Engine running. 2. Again, observe Inj. Pump Closure Time on scan tool. Does Inj. Pump Closure Time display the specified value?	0.0 ms	Go to Step 8	Go to Step 10
6	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to those applicable DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	—
7	1. Check the Closure ground circuit for an open. 2. If the Closure ground circuit is open, repair as necessary. Was a repair performed?	—	Go to Step 12	—
8	1. Check the Closure signal circuit for an open or short to ground. 2. If the Closure signal circuit is open or shorted to ground, repair as necessary. Was a repair performed?	—	Go to Step 12	Go to Step 9
9	Check the Closure signal circuit for a poor connection at the PCM and replace terminal if necessary. Did the terminal require replacement?	—	Go to Step 12	Go to Step 10
10	Replace the Injection pump. Refer to <i>Fuel Injection Pump</i> . Important: If the injection pump is faulty, the new injection pump must be timed. Refer to <i>Checking/Adjust Injection Timing</i> . Is the action complete?	—	Go to Step 11	—
11	Replace the faulty PCM. If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 12	—

DTC P1216 Fuel Solenoid Response Time Too Short (cont'd)

12	<ol style="list-style-type: none"> Using the Scan Tool, select DTC, Clear Info. Start engine and idle at normal operating temperature. Select DTC, Specific, then enter the DTC number which was set. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. <p>Does the Scan Tool indicate that this diagnostic Ran and Passed?</p>	—		
			<i>Go to Step 13</i>	<i>Go to Step 2</i>
13	<p>Using the Scan Tool, select Capture Info, Review Info.</p> <p>Are any DTCs displayed that have not been diagnosed?</p>	—	Go to the Applicable DTC Table	System OK

DTC P1217 Fuel Solenoid Response Time Too Long



29571

Circuit Description

The injection pump delivers fuel to individual cylinders by opening and closing a solenoid control fuel valve. The PCM monitors the amount of time it takes for the fuel solenoid valve to physically close after commanded to close. Closure time out of range is seen as a fault. This response time is measured in milli seconds. This is a type D DTC.

Conditions for Setting the DTC

- Battery voltage greater than 10 volts and less than 16 volts.
- Engine coolant temperature greater than -1°C (34°F).
- ENGINE SPEED greater than 506 rpm.
- Requested fuel rate is greater than 0.0 mm
- Closure Time less than 2.5 ms.

Action Taken When the DTC Sets

Possible poor performance

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

A weak (mechanical failure) fuel solenoid will result in a DTC P1217. If DTC P1217 is set with any other DTCs, diagnose them first. If the vehicle is running close to the DTC setting closure time, vehicle should be checked during cold start ups and during hot conditions.

Test Description

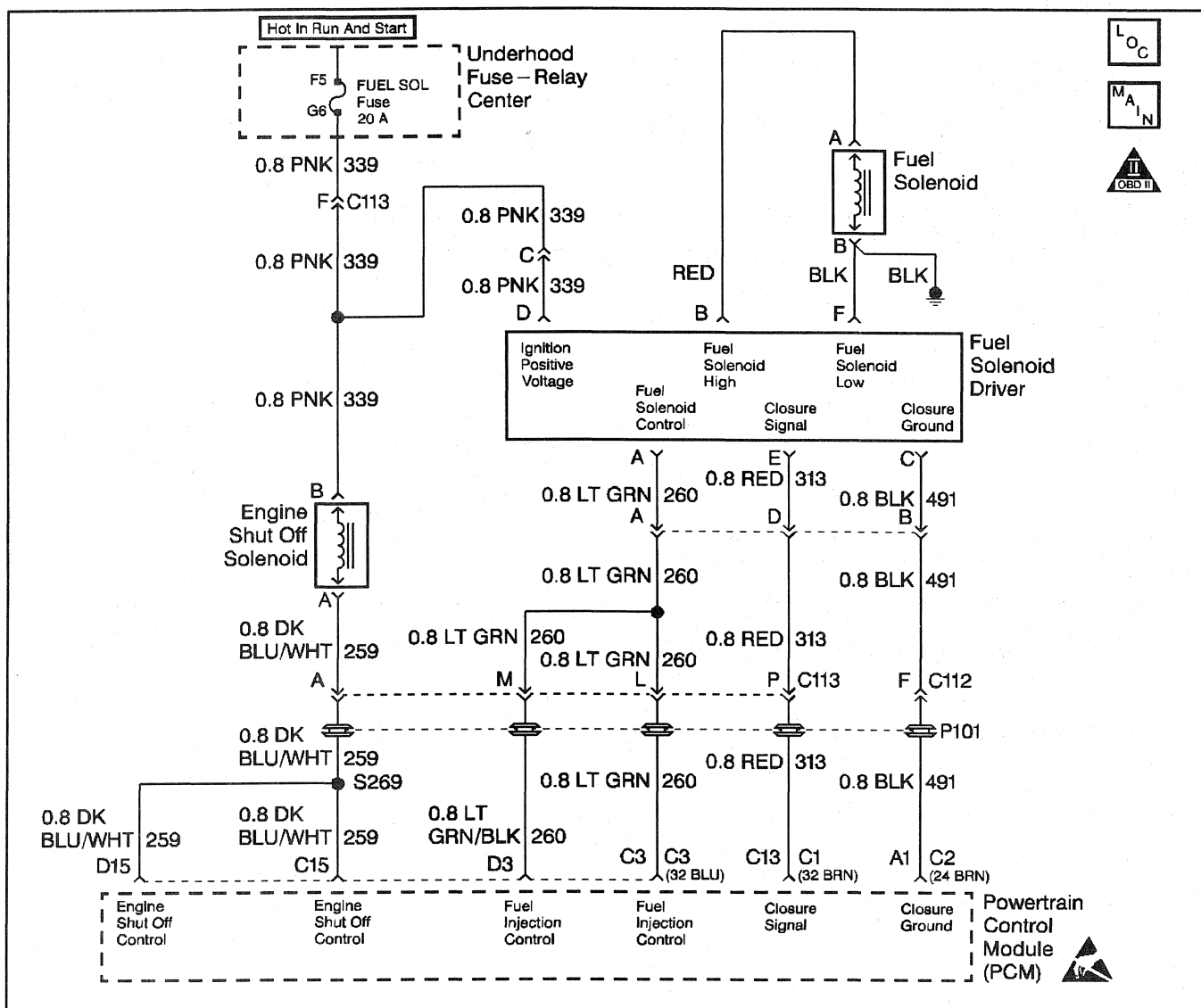
Number(s) below refer to the Step number(s) on the Diagnostic Table.

3. This Step determines if DTC 1217 is a hard failure or an intermittent.
6. This Step will determine if the solenoid is at fault, or if there is a problem with the PCM or wiring.

DTC P1217 Fuel Solenoid Response Time Too Long

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	Is DTC P0370 set?	—	Go to <i>DTC P0370 Timing Reference High Resolution</i>	Go to Step 3
3	1. Start and idle engine. 2. Observe Inj. Pump Closure Time display on scan tool. Is the scan tool display greater than the specified value?	2.4 ms	Go to Step 4	Go to Step 5
4	1. All accessories on (includes aftermarket add-ons). 2. Engine idling. 3. All post glow plug cycles completed 4. With a J 39200 connected to ground, measure voltage at the FUEL SOL fuse (fuel solenoid driver ignition feed circuit) in the U/H relay center. Is voltage between specified value?	11 - 16V	Go to Step 7	Go to Step 6
5	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to those DTC table(s) first. Are additional DTCs stored?	—	Go to the Applicable DTC Table	—
6	Check the fuel solenoid driver ignition feed circuit for poor connections or aftermarket add-ons <i>Connect Add-On Electrical Operated Equipment to Battery</i> . Was a repair performed?	—	Go to Step 8	—
7	Replace the Injection pump. Refer to <i>Fuel Injection Pump</i> . Important: If injection pump is faulty, the new injection pump must be timed. Refer to <i>Checking/Adjust Injection Timing</i> . Is the action complete?	—	Go to Step 8	—
8	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 9	Go to Step 2
9	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P1218 Injection Pump Calibration Circuit



29571

Circuit Description

The PCM uses a calibrated resistor mounted internally in the injection pump to determine fuel rates. The resistor value is stored in the PCM memory. If the PCM memory has been disturbed or the PCM has been replaced, the PCM will relearn the resistor value on the next ignition cycle. This is a type B DTC.

Conditions for Setting the DTC

- PCM currently does not have a valid resistor valve.
- PCM is unable to read a resistor value

Action Taken When the DTC Sets

The lowest fuel table. Possible poor performance problem.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5 °C (40 °F) from start up coolant temperature and engine coolant temperature exceeds 71 °C (160 °F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

Check connection at fuel injector driver. Clear DTC, and cycle ignition. If DTC clears, treat condition as an intermittent.

Test Description

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

3. This Step will determine if there is a problem with the connection at the fuel solenoid driver or faulty injection pump.

DTC P1218 Injection Pump Calibration Circuit

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	Are there any other DTCs set?	—	Refer to Applicable DTC Table	Go to Step 3
3	1. Check connection at Fuel Solenoid Driver. 2. Clear DTC, and cycle ignition. Does the DTC clear?	—	Go to Step 5	Go to Step 4
4	Replace injection pump. Refer to <i>Fuel Injection Pump</i> . Is the action complete?	—	Go to Step 5	—
5	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 6	Go to Step 2
6	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

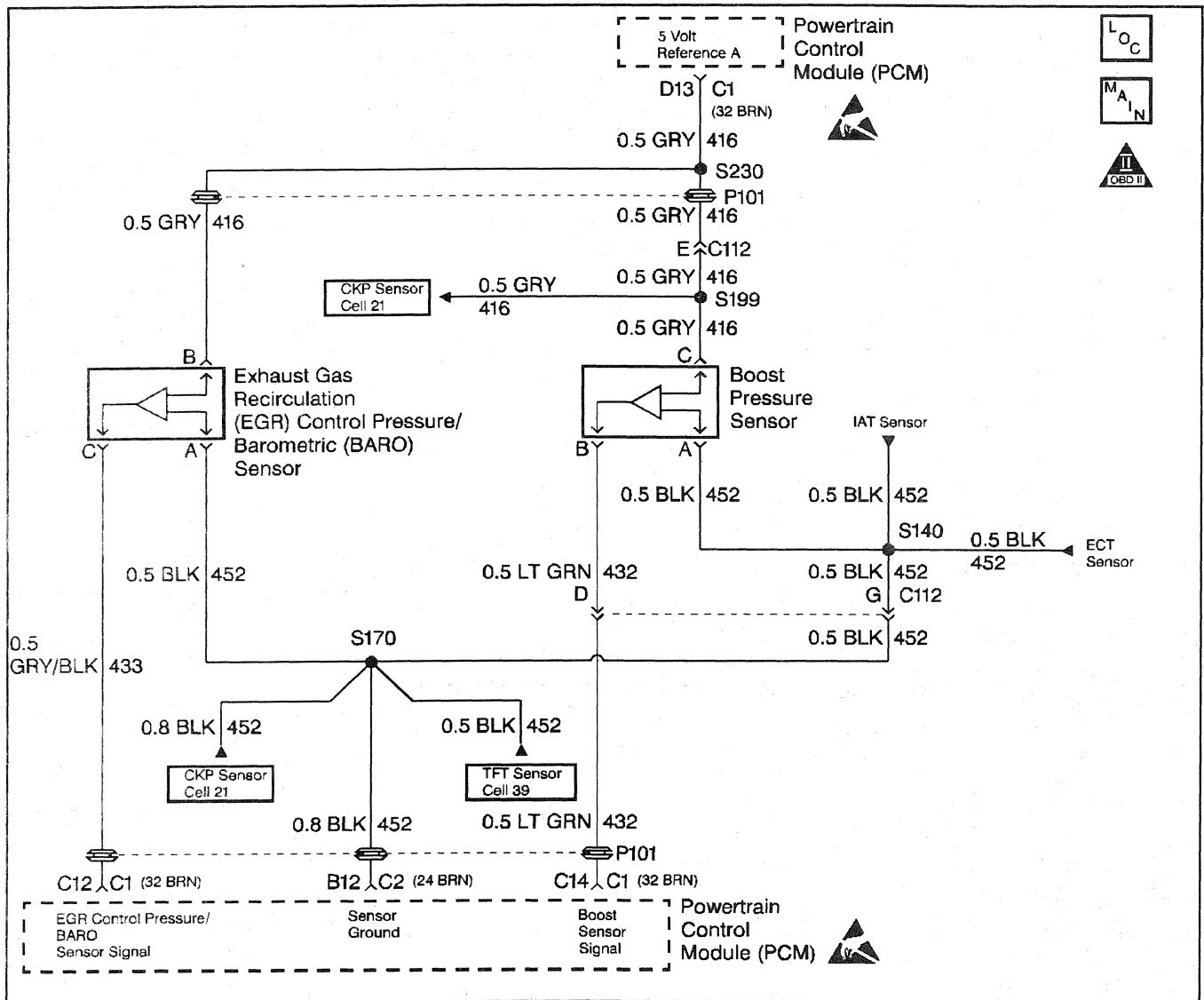
DTC P1621 PCM Memory Performance

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 3	—
3	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 4	Go to Step 2
4	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P1627 A/D Performance

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 3	—
3	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 4	Go to Step 2
4	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P1635 5 Volt Reference Low



29574

Circuit Description

The PCM provides a 5 volt supply for use in powering up sensors. This test monitors the voltage present at terminals BRD13 (shared by Boost, EGR Control Pressure/Baro and Crankshaft Position sensors) and BRD14 (Optical/Fuel temperature sensor (Cam/HI.Res). This is a type D DTC.

Conditions for Setting the DTC

5 volt reference is less than 1 volt.

Action Taken When the DTC Sets

- Backup fuel
- No EGR.
- No turbo boost.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

During the time the failure is present, the setting of additional DTCs that share a 5 volt reference may also set.

Test Description

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

2. Checks to confirm that a DTC is still present.

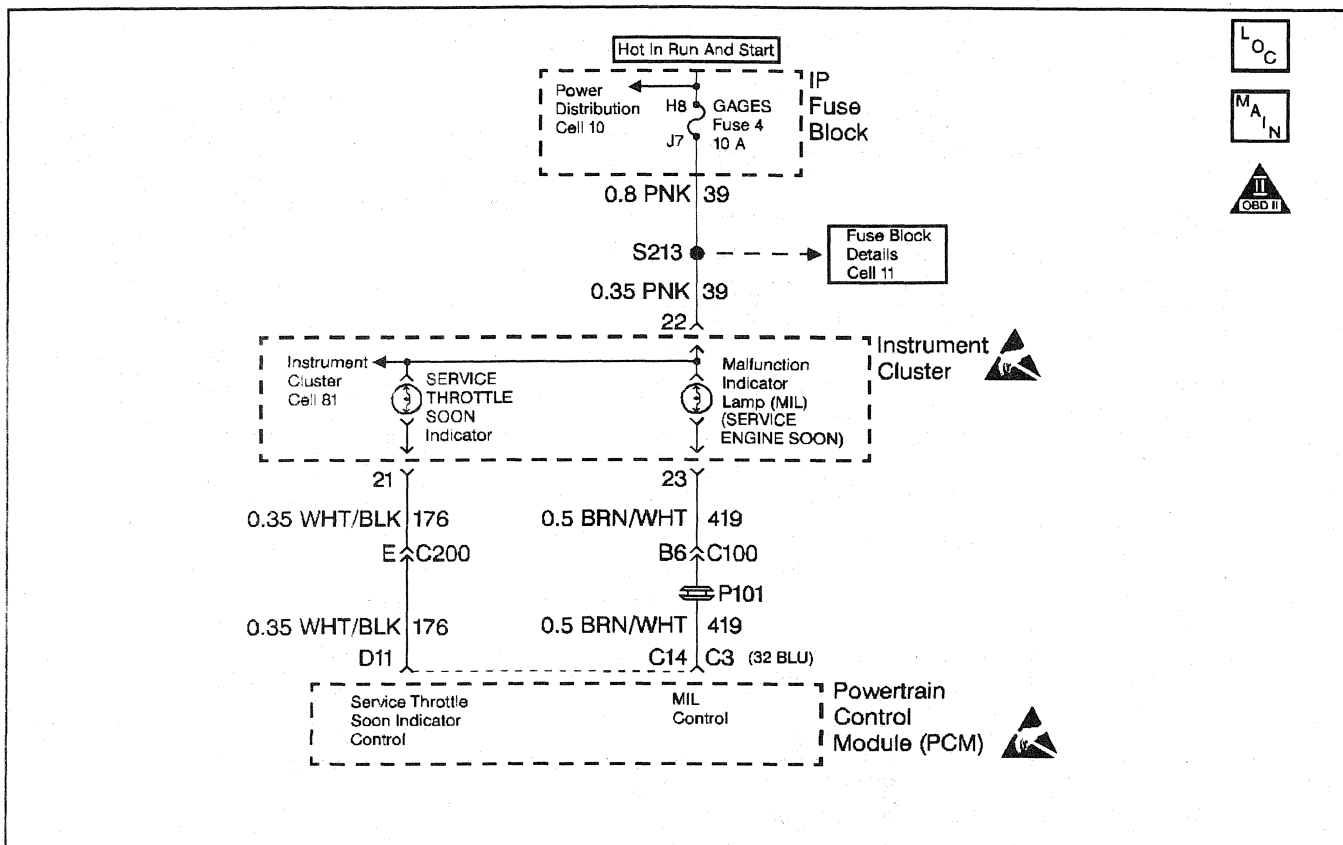
3. Checks to determine if there is a 5 volt reference from the PCM.

4. Checks to determine if there is a short-to-ground in the reference circuit or a short-to-ground in the PCM.

DTC P1635 5 Volt Reference Low

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to <i>Powertrain OBD System Check</i>
2	1. Scan Tool installed. 2. Crank engine for 15 seconds or start up. Does DTC reset?	—	Go to Step 3	Go to Step 5
3	1. Ignition ON, engine OFF. 2. Disconnect EGR Control Pressure/BARO sensor. 3. With J 39200 DVM, probe 5 volt reference circuit at harness connector. Is voltage less than the specified value?	4.0 V	Go to Step 4	Go to Step 6
4	1. Disconnect PCM connector with EGR sensor 5 volt reference circuit. 2. With test light connected to B+, probe 5 volt reference circuit at PCM harness. Is test light ON?	—	Go to Step 7	Go to Step 8
5	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to those table(s). Are additional DTCs stored?	—	Go to the applicable DTC table	Go to Diagnostic Aids
6	Replace EGR Control Pressure/BARO sensor. Refer to <i>EGR Control Pressure Sensor</i> . Is the action complete?	—	Go to Step 8	—
7	Repair short to ground in 5 volt reference circuit. Is the action complete?	—	Go to Step 8	—
8	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 9	—
9	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 10	Go to Step 2
10	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC table	System OK

DTC P1641 MIL Control Circuit



29548

Circuit Description

A dash light is illuminated by the PCM if diagnostics have detected certain errors related to the engine performance or engine sensor status. When the PCM is commanding the MIL ON, the voltage potential of the circuit will be low (near 0 volts). When the PCM is commanding the MIL OFF, the voltage potential of the circuit will be high (near battery volts). The primary function of the PCM is to supply the ground for the MIL circuit. This is a type D DTC

Conditions for Setting the DTC

- MIL requested ON.
- Voltage on MIL control circuit high (near battery volts).

or

- MIL requested OFF.
- Voltage on MIL control circuit low (near 0 volts).

Action Taken When the DTC Sets

Will not turn ON the MIL.

Conditions for Clearing the MIL/DTC

- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan tool

Diagnostic Aids

A faulty bulb or the control circuit shorted to ground will cause a P1641 to set.

Test Description

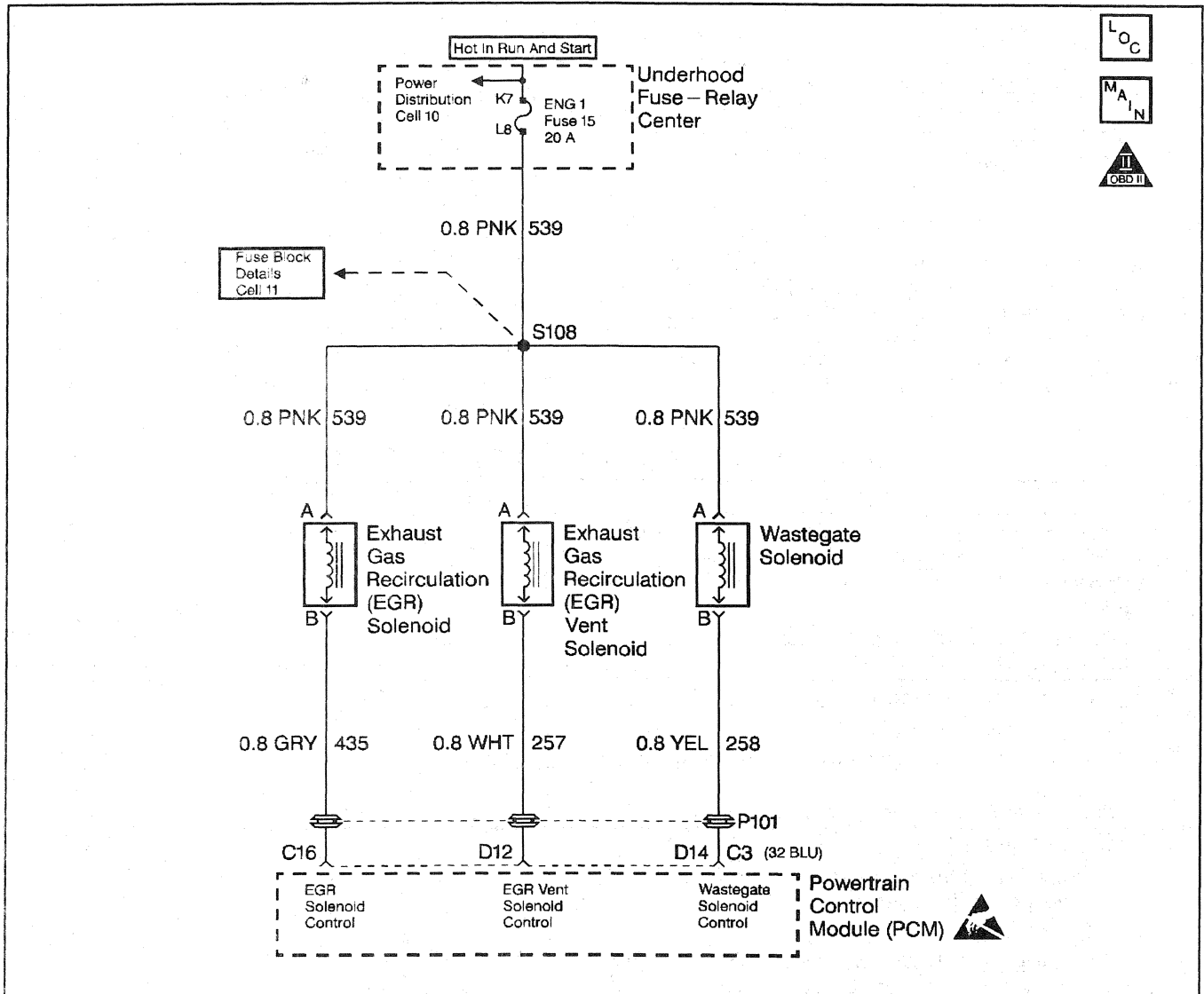
Number(s) below refer to the Step number(s) on the Diagnostic Table.

2. Be sure that both the ON and the OFF states are commanded. Repeat the commands as many times as necessary.
9. If no trouble is found in the control circuit or the connection at the PCM, the PCM maybe faulty, however, this is an extremely unlikely failure.

DTC P1641 MIL Control Circuit

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Ignition ON, engine OFF. 2. Using a scan tool, command the lamp ON and OFF. Does the lamp turn ON and OFF with each command?	—	Go to Step 3	Go to Step 4
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to those table(s). Are additional DTCs stored?	—	Go to the applicable DTC table	Go to Diagnostic Aids
4	1. Ignition OFF. 2. Disconnect the PCM connector containing the lamp control circuit. 3. Ignition ON, engine OFF. Is the lamp OFF?	—	Go to Step 5	Go to Step 7
5	1. Ignition ON, engine OFF. 2. With a fused jumper wire connected to ground, probe the lamp control circuit in the PCM harness connector. Is the lamp ON?	—	Go to Step 6	Go to Step 8
6	1. Check for poor connections at PCM. 2. If a problem was found, repair as necessary. Was a repair performed?	—	Go to Step 10	Go to Step 9
7	MIL control circuit is shorted to ground, repair as necessary. Is the action complete?	—	Go to Step 10	—
8	Check the MIL circuit for the following: • Open ignition feed to the bulb. • Faulty bulb. • Control circuit open or shorted to B+. Is the repair complete?	—	Go to Step 10	—
9	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 10	—
10	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 11	Go to Step 2
11	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go the Applicable DTC Table	System OK

DTC P1653 EGR Vent Solenoid Control Circuit



29560

Circuit Description

The EGR flow is controlled by the vacuum actuated EGR valve. The EGR vent solenoid purges to atmosphere the vacuum level at the EGR valve actuator as commanded by the PCM. This is done when the EGR flow is desired to turn off quickly. When the PCM is commanding the EGR vent ON, the voltage potential of the circuit will be low (near 0 volts). When the PCM is commanding the EGR vent OFF, the voltage potential of the circuit will be high (near battery volts). The primary function of the PCM in this circuit is to supply the ground for the EGR vent solenoid. This is a type B code.

Conditions for Setting the DTC

- PCM requested EGR vent ON.
 - Voltage on EGR vent control circuit high (near battery volts).
 - Conditions met for 2 seconds.
- or
- PCM requested EGR vent solenoid OFF.
 - Voltage on EGR vent control circuit low (near 0 volts).
 - Conditions met for 2 seconds.

Action Taken When the DTC Sets

- No EGR.
- Possible black smoke on acceleration.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

The scan tool has a 5 second ON time abort. The EGR vent solenoid can be commanded ON for as many times as needed, in 5 second intervals. Its possible other EGR DTCs may set along with DTC P1653. This diagnostic can be checked at key up. A quick operational check can be made by

commanding the EGR vent solenoid ON and OFF with the scan tool while monitoring Actual EGR. Actual EGR will display BARO (approximately) when EGR solenoid is OFF.

Test Description

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

2. Be sure that both the ON and OFF states are commanded. Repeat the commands as many times as necessary.
3. This check can detect a partially shorted coil which would cause excessive current flow. Leaving the circuit energized for 2 minutes allows the coil to warm up. When warm, the coil may open (Amps drop to zero, or short (Amp draw greater than 0.75 A).
7. Listen for an audible click when the solenoid operates.

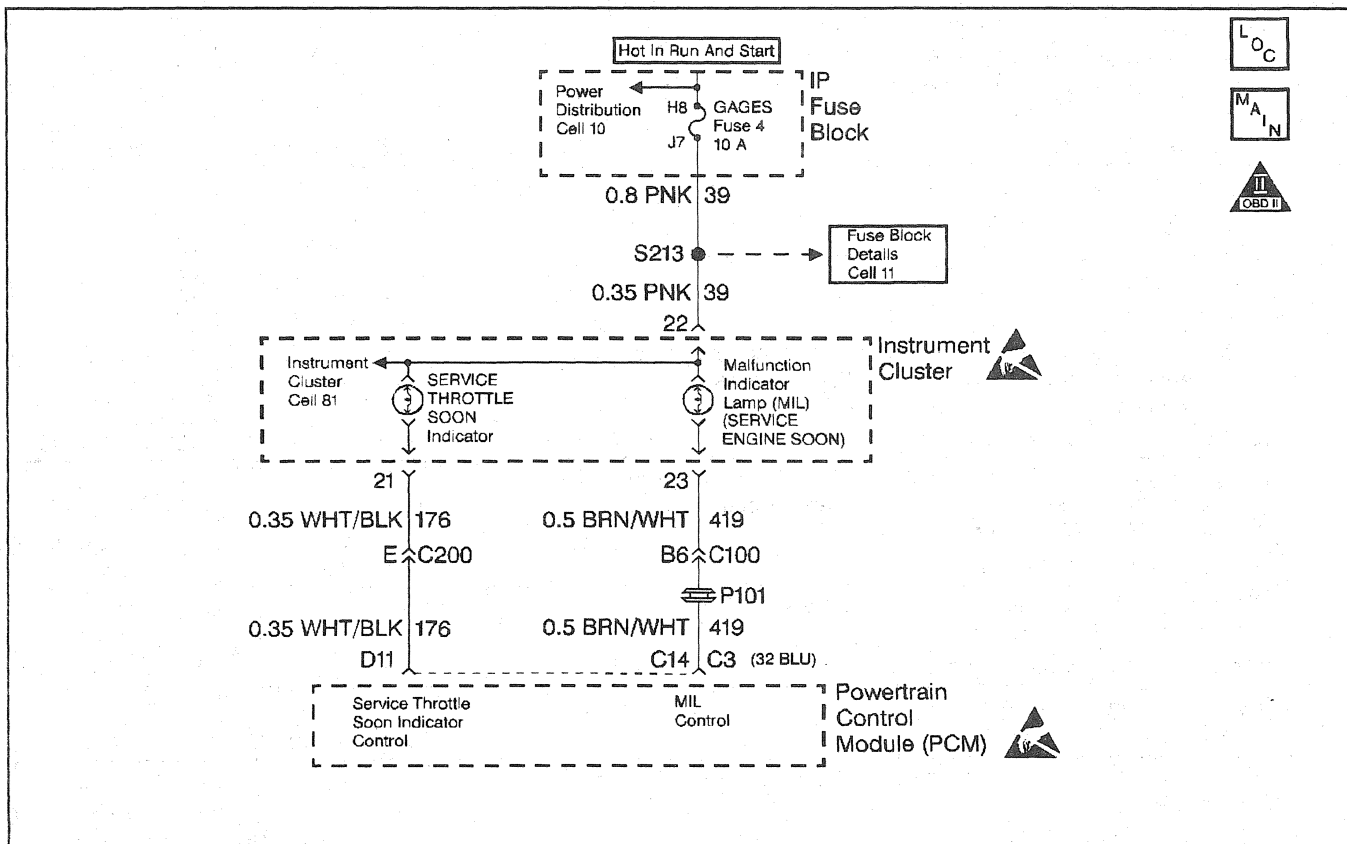
DTC P1653 EGR Vent Solenoid Control Circuit

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Scan tool connected. 2. Start and idle engine. 3. With scan tool, command EGR vent solenoid ON and OFF. Does Actual EGR respond to scan tool commands?	—	Go to Step 3	Go to Step 5
3	1. Ignition OFF. 2. Disconnect the PCM connector containing the EGR vent solenoid control circuit. 3. Ignition ON. 4. Using DVM J 39200 on 10 Amp scale, measure current from the solenoid control circuit in the PCM harness connector to ground for 2 minutes. Is current draw less then the specified value, but not zero?	0.75 A	Go to Step 8	Go to Step 4
4	1. Ignition OFF. 2. PCM connector still disconnected. 3. Disconnect EGR vent solenoid. 4. Using DVM J 39200, measure resistance from the solenoid control circuit in the PCM harness connector to ground. Does DVM display infinite resistance?	—	Go to Step 13	Go to Step 10
5	1. Disconnect EGR vent solenoid 2. Ignition ON, engine OFF. 3. Connect a test light between the EGR vent solenoid control circuit and the ignition feed circuit at the harness connector. 4. Using a scan tool, command the solenoid ON and OFF. Does test light turn ON and OFF with each command?	—	Go to Step 9	Go to Step 6

DTC P1653 EGR Vent Solenoid Control Circuit (cont'd)

Step	Action	Value(s)	Yes	No
6	1. Ignition ON engine OFF. 2. With a test light connected to ground, probe the ignition feed circuit at the EGR vent solenoid harness connector. Is the test light ON?	—	Go to Step 7	Go to Step 12
7	1. Ignition OFF. 2. Reconnect solenoid. 3. Disconnect the PCM harness containing the solenoid control circuit. 4. Ignition ON. 5. With a fused jumper wire connected to ground, probe the solenoid control circuit in the PCM harness connector. Does the solenoid operate?	—	Go to Step 11	Go to Step 10
8	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are any additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
9	Check for a poor connection at the EGR vent solenoid and replace terminals as necessary. Did the terminal require replacement?	—	Go to Step 15	Go to Step 13
10	Repair EGR vent solenoid control circuit. Is the action complete?	—	Go to Step 15	—
11	Check for a poor connection at the PCM, EGR vent control circuit. Was a problem found?	—	Go to Step 15	Go to Step 14
12	Repair the open in the ignition feed circuit. Is the action complete?	—	Go to Step 15	—
13	Replace the EGR vent solenoid. Is the action complete?	—	Go to Step 15	—
14	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete?	—	Go to Step 15	—
15	1. Using the scan tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic Ran and Passed?	—	Go to Step 15	Go to Step 2
16	Using the scan tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P1654 Service Throttle Soon Lamp Control CKT



29548

Circuit Description

A dash light is illuminated by the PCM if the diagnostics has detected certain errors related to the Accelerator Pedal Position (APP) sensor. When the PCM is commanding the Service Throttle Soon Lamp ON, the voltage potential of the circuit will be low (near 0 volts). When the PCM is commanding the Service Throttle Soon Lamp OFF, the voltage potential of the circuit will be high (near battery volts). The primary function of the PCM in this circuit is to supply the ground for the Service Throttle Soon Lamp. This is a type D DTC.

Conditions for Setting the DTC

- Service Throttle Soon lamp requested ON.
- Voltage on the Service Throttle Soon control circuit high (near battery volts).

or

- Service Throttle Soon lamp requested OFF.
- Voltage on the Service Throttle Soon control circuit low (near 0 volts).

Action Taken When the DTC Sets

Will not turn ON the MIL.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

A faulty bulb or the control circuit shorted to ground will cause a P1654 to set.

Test Description

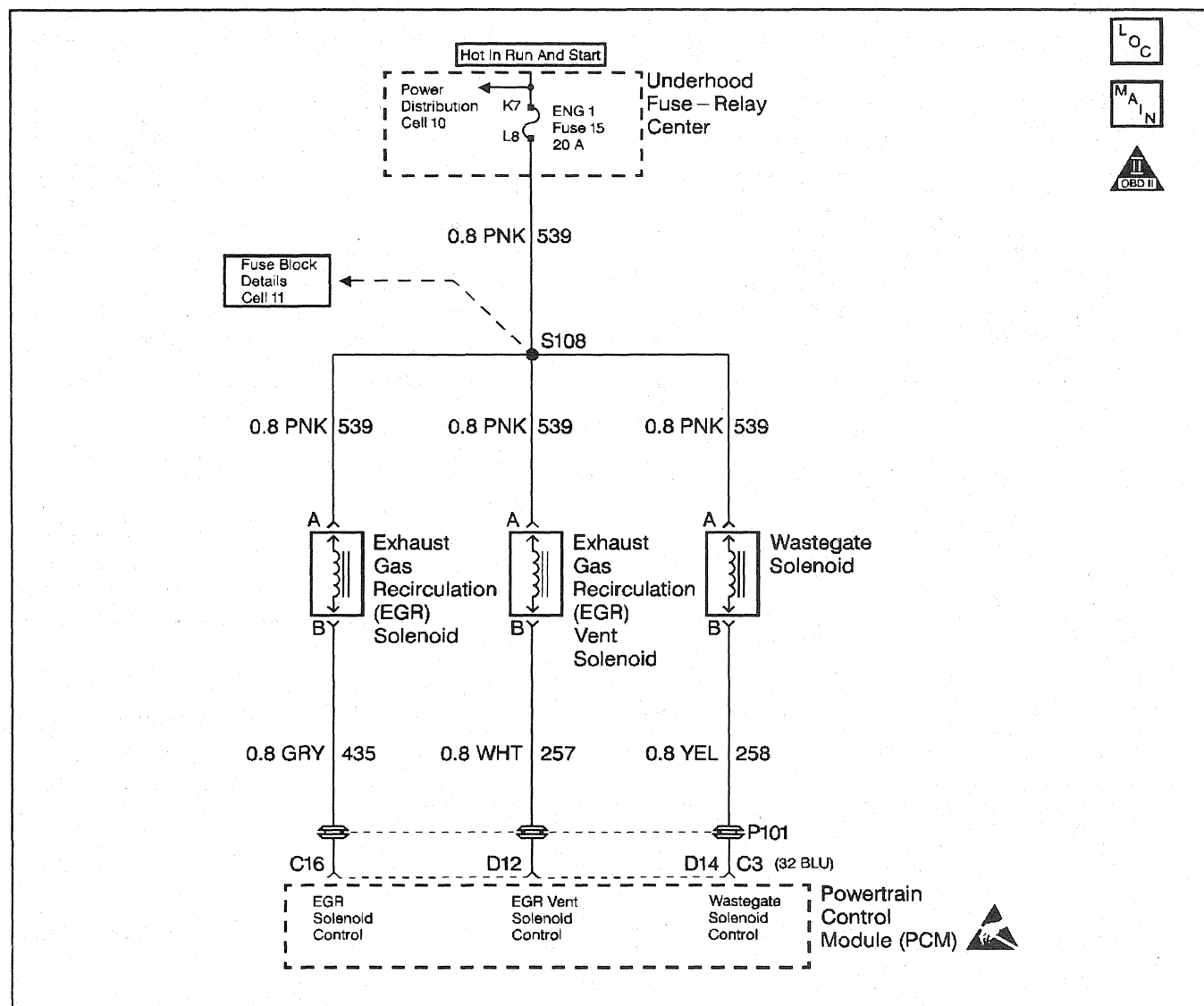
Number(s) below refer to the Step number(s) on the Diagnostic Table.

2. Be sure that both the ON and the OFF states are commanded. Repeat the commands as many times as necessary.
9. If no trouble is found in the control circuit or the connections at the PCM, the PCM maybe faulty, however, this is an extremely unlikely failure.

DTC P1654 Service Throttle Soon Lamp Control CKT

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Ignition ON, engine OFF. 2. Using a scan tool, command the lamp ON and OFF. Does the lamp turn ON and OFF with each command?	—	Go to Step 3	Go to Step 4
3	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to those table(s). Are additional DTCs stored?	—	Go to the applicable DTC table	Go to Diagnostic Aids
4	1. Ignition OFF. 2. Disconnect the PCM connector containing the lamp control circuit. 3. Ignition ON, engine OFF. Is the lamp OFF?	—	Go to Step 5	Go to Step 7
5	With a fused jumper wire connected to ground, probe the lamp control circuit in the PCM harness connector. Is the lamp ON?	—	Go to Step 6	Go to Step 8
6	1. Check for poor connections at PCM. 2. If a problem was found, repair as necessary. Was a repair performed?	—	Go to Step 10	Go to Step 9
7	Service Throttle Soon lamp control circuit is shorted to ground, repair as necessary. Is the action complete?	—	Go to Step 10	—
8	Check the Service Throttle Soon circuit for the following: • Open ignition feed to the bulb. • Faulty bulb. Is the repair complete?	—	Go to Step 10	—
9	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Got to PCM Replacement/Programming. Is the action complete?	—	Go to Step 10	—
10	1. Using the Scan Tool, select DTC, Clear Info. 2. Start engine and idle at normal operating temperature. 3. Select DTC, Specific, then enter the DTC number which was set. 4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the Scan Tool indicate that this diagnostic Ran and Passed?	—	Go to Step 11	Go to Step 2
11	Using the Scan Tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P1655 EGR Solenoid Control Circuit



29560

Circuit Description

The EGR flow is controlled by the vacuum actuated EGR valve. The EGR pulse width modulated solenoid meters the vacuum level at the EGR valve actuator as commanded by the PCM. When the PCM is commanding the EGR solenoid ON, the voltage potential of the circuit will be low (near 0 volts). When the PCM is commanding the EGR solenoid OFF, the voltage potential of the circuit will be high (near battery volts). The primary function of the PCM in this circuit is to supply the ground for the EGR solenoid. This is a type B code.

Conditions for Setting the DTC

- PCM requested EGR solenoid ON.
 - Voltage on EGR solenoid control circuit high (near battery volts).
 - 2 consecutive faults detected.
 - Conditions met for 2 seconds.
- or
- PCM requested EGR solenoid OFF.
 - Voltage on EGR solenoid control circuit low (near 0 volts).
 - 2 consecutive faults detected.
 - Conditions met for 2 seconds.

Action Taken When the DTC Sets

No EGR. Possible black smoke on acceleration.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

The scan tool has a 5 second ON time abort. The EGR solenoid can be commanded ON for as many times as needed, in 5 second intervals. Its possible other EGR DTCs may set along with DTC P1655. This diagnostic can be checked at key up. A quick operational check can be made by commanding the EGR solenoid ON and OFF with the scan tool while

monitoring Actual EGR. Actual EGR will display Baro (approximately) when EGR solenoid is OFF. Full EGR will be achieved when EGR solenoid is commanded ON with the scan tool.

Test Description

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

2. Be sure that both the ON and OFF states are commanded. Repeat the commands as many times as necessary. This Step will determine if this DTC is a current or intermittent.
3. This check can detect a partially shorted coil which would cause excessive current flow. Leaving the circuit energized for 2 minutes allows the coil to warm up. When warm, the coil may open (Amps drop to zero, or short (Amp draw greater than 0.75A)).
7. Listen for an audible click when the solenoid operates. This Step checks the ignition feed circuit for an open.

DTC P1655 EGR Solenoid Control Circuit

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Scan tool connected. 2. Start and idle engine. 3. With scan tool, command EGR solenoid ON and OFF. Does Actual EGR respond to scan tool commands?	—	Go to Step 3	Go to Step 5
3	1. Ignition OFF. 2. Disconnect the PCM connector containing the EGR solenoid control circuit. 3. Ignition ON. 4. Using DVM J 39200 on 10 Amp scale, measure current from the solenoid control circuit in the PCM harness connector to ground for 2 minutes. Is current draw less then the specified value, but not zero?	0.75 A	Go to Step 8	Go to Step 4
4	1. Ignition OFF. 2. PCM connector still disconnected. 3. Disconnect EGR solenoid. 4. Using DVM, J 39200 measure resistance from the solenoid control circuit in the PCM harness connector to ground. Does DVM display infinite resistance?	—	Go to Step 13	Go to Step 10

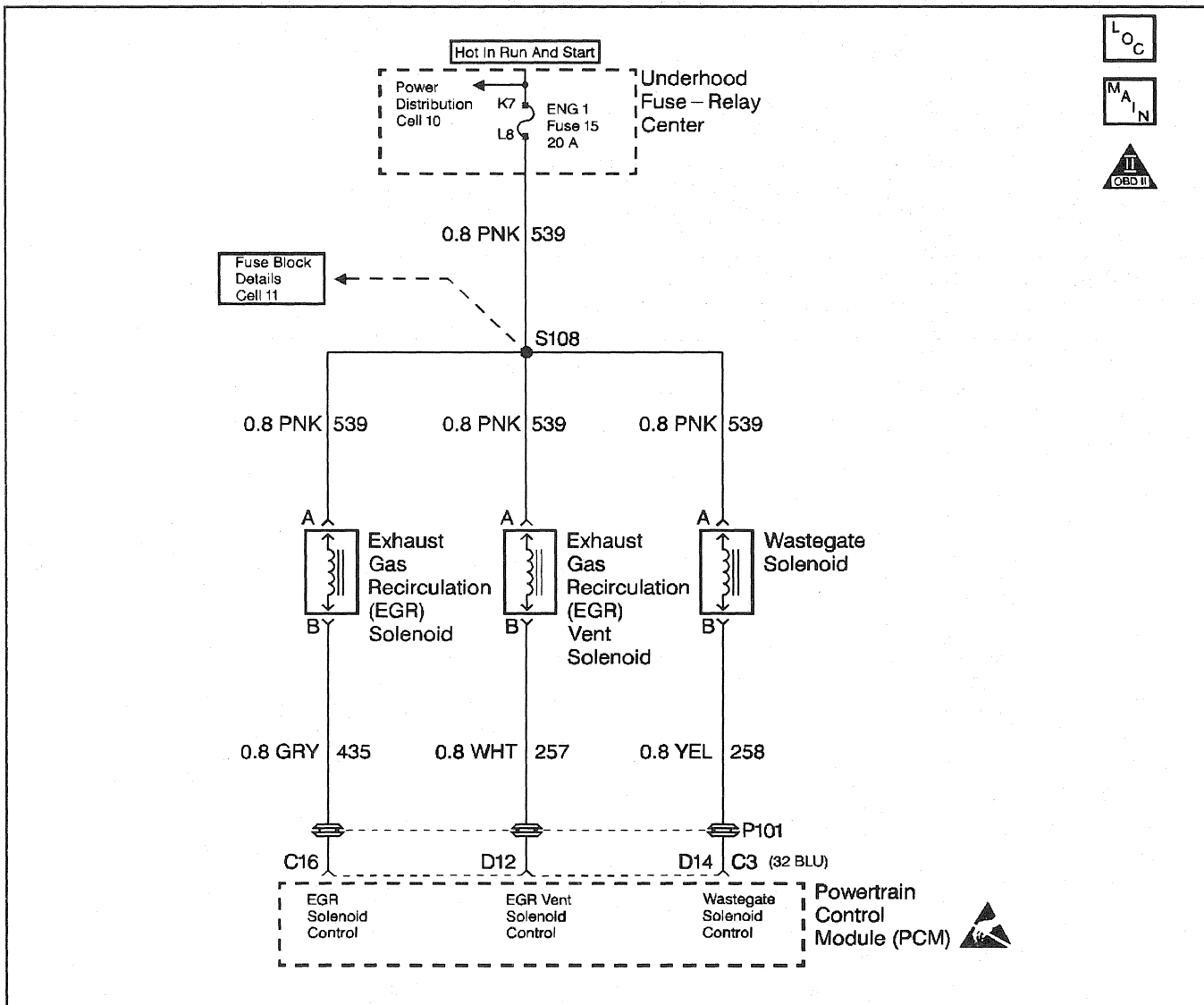
DTC P1655 EGR Solenoid Control Circuit (cont'd)

Step	Action	Value(s)	Yes	No
5	1. Disconnect EGR solenoid 2. Ignition ON, engine OFF. 3. Connect a test light between the EGR solenoid control circuit and the ignition feed circuit at the harness connector. 4. Using a scan tool, command the solenoid ON and OFF. Does test light turn ON and OFF with each command?	—	Go to Step 9	Go to Step 6
6	1. Ignition ON engine OFF. 2. With a test light connected to ground, probe the ignition feed circuit at the EGR solenoid harness connector. Is the test light ON?	—	Go to Step 7	Go to Step 12
7	1. Ignition OFF. 2. Reconnect solenoid. 3. Disconnect the PCM harness containing the solenoid control circuit. 4. Ignition ON. 5. With a fused jumper wire connected to ground, probe the solenoid control circuit in the PCM harness connector. Does the solenoid operate?	—	Go to Step 11	Go to Step 10
8	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer the applicable DTC table(s) first. Are any additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
9	Check for a poor connection at the EGR solenoid and replace terminals as necessary. Did the terminal require replacement?	—	Go to Step 15	Go to Step 13
10	Repair EGR solenoid control circuit. Is the action complete?	—	Go to Step 15	—
11	Check for a poor connection at the PCM, EGR control circuit. Was a problem found?	—	Go to Step 15	Go to Step 14
12	Repair the open in the ignition feed circuit. Is the action complete?	—	Go to Step 15	—
13	Replace the EGR solenoid. Refer to <i>EGR Solenoid</i> . Is the action complete?	—	Go to Step 15	—
14	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Go to <i>PCM Replacement/Programming</i> . Is the action complete ?	—	Go to Step 15	—

DTC P1655 EGR Solenoid Control Circuit (cont'd)

Step	Action	Value(s)	Yes	No
15	<ol style="list-style-type: none">Using the scan tool, select DTC, Clear Info.Start engine and idle at normal operating temperature.Select DTC, Specific, then enter the DTC number which was set.Operate vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic Ran and Passed?	—	Go to Step 15	Go to Step 2
16	Using the scan tool, select Capture Info, Review Info. Are any DTCs displayed that have not been diagnosed?	—	Go to the Applicable DTC Table	System OK

DTC P1656 Wastegate Solenoid Control Circuit



29560

Circuit Description

The turbocharger wastegate is a vacuum actuated valve used to control the exhaust gas heat sent to the turbo. The wastegate pulse width modulated solenoid meters the vacuum level at the wastegate valve actuator as commanded by the PCM. When the PCM is commanding the Wastegate solenoid ON, the voltage potential of the circuit will be low (near 0 volts). When the PCM is commanding the wastegate solenoid OFF, the voltage potential of the circuit will be high (near battery volts). The primary function of the PCM in this circuit is to supply the ground for the wastegate solenoid. This is a type B code.

Conditions for Setting the DTC

- PCM requested Wastegate solenoid ON.
 - Voltage on Wastegate solenoid control circuit high (near battery volts).
 - 2 consecutive faults detected.
 - Conditions met for 2 seconds.
- or
- PCM requested Wastegate solenoid OFF.
 - Voltage on Wastegate solenoid control circuit low (near 0 volts).
 - 2 consecutive faults detected.
 - Conditions met for 2 seconds.

Action Taken When the DTC Sets

Low power.

Conditions for Clearing the MIL/DTC

- The PCM will turn the MIL off after three consecutive trips without a fault condition.
- A History DTC will clear when forty consecutive warm-up cycles that the diagnostic does not fail (coolant temperature has risen 5°C (40°F) from start up coolant temperature and engine coolant temperature exceeds 71°C (160°F) that same ignition cycle.
- Use of a Scan Tool

Diagnostic Aids

This diagnostic will set when control circuit does not follow the PCM command (when the solenoid is requested ON voltage will drop, when the solenoid is OFF ignition voltage will be present). The scan tool has a 5 second ON time abort. The wastegate solenoid can be commanded ON for as many times as needed, in 5 second intervals. Its possible DTC P0236 may set along with DTC P1656. This

diagnostic can be checked during key up. The engine will not respond to scan tool commands at idle (engine unable to achieve boost pressures greater than BARO at idle) or at any engine speed greater than idle (PCM control abort to prevent engine damage).

Test Description

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

2. Be sure that both the ON and OFF states are commanded. Repeat the commands as many times as necessary. This Step will determine if this DTC is a current or intermittent.
3. This check can detect a partially shorted coil which would cause excessive current flow. Leaving the circuit energized for 2 minutes allows the coil to warm up. When warm, the coil may open (Amps drop to 'zero', or short (Amp draw greater than 0.75A).
7. Listen for an audible 'click' when the solenoid operates.. This Step checks the ignition feed circuit for an open.

DTC P1656 Wastegate Solenoid Control Circuit

Step	Action	Value(s)	Yes	No
1	Important: Before clearing DTCs use the scan tool Capture Info to record freeze frame and failure records for reference, as data will be lost when Clear Info function is used. Was the On-Board Diagnostic (OBD) System Check performed?	—	Go to Step 2	Go to Powertrain OBD System Check
2	1. Scan tool connected. 2. Ignition ON, engine OFF. 3. Observe Wastegate duty cycle on scan tool. 4. With scan tool, command Wastegate solenoid ON and OFF. Does Wastegate duty cycle respond to scan tool commands?	—	Go to Step 3	Go to Step 5
3	1. Ignition OFF. 2. Disconnect the PCM connector containing the wastegate solenoid control circuit. 3. Ignition ON. 4. Using DVM J 39200 on 10 Amp scale, measure current from the solenoid control circuit in the PCM harness connector to ground for 2 minutes. Is current draw less then the specified value, but not zero?	0.75 A	Go to Step 8	Go to Step 4
4	1. Ignition OFF. 2. PCM connector still disconnected. 3. Disconnect wastegate solenoid. 4. Using DVM J 39200, measure resistance from the solenoid control circuit in the PCM harness connector to ground. Does DVM display infinite resistance?	—	Go to Step 13	Go to Step 10

DTC P1656 Wastegate Solenoid Control Circuit (cont'd)

Step	Action	Value(s)	Yes	No
5	1. Disconnect wastegate solenoid 2. Ignition ON, engine OFF. 3. Connect a test light between the wastegate solenoid control circuit and the ignition feed circuit at the harness connector. 4. Using a scan tool, command the solenoid ON and OFF. Does test light turn ON and OFF with each command?	—	Go to Step 9	Go to Step 6
6	1. Ignition ON engine OFF. 2. With a test light connected to ground, probe the ignition feed circuit at the wastegate solenoid harness connector. Is the test light ON?	—	Go to Step 7	Go to Step 12
7	1. Ignition OFF. 2. Reconnect solenoid. 3. Disconnect the PCM harness containing the solenoid control circuit. 4. Ignition ON. 5. With a fused jumper wire connected to ground, probe the solenoid control circuit in the PCM harness connector. Does the solenoid operate?	—	Go to Step 11	Go to Step 10
8	DTC is intermittent. If no additional DTCs are stored, refer to Diagnostic Aids. If additional DTCs were stored refer to the applicable DTC table(s) first. Are any additional DTCs stored?	—	Go to the Applicable DTC Table	Go to Diagnostic Aids
9	Check for a poor connection at the wastegate solenoid and replace terminals as necessary. Did the terminal require replacement?	—	Go to Step 15	Go to Step 13
10	Repair wastegate solenoid control circuit. Is the action complete?	—	Go to Step 15	—
11	Check for a poor connection at the PCM, wastegate control circuit. Was a problem found?	—	Go to Step 15	Go to Step 14
12	Repair the open in the ignition feed circuit. Is the action complete?	—	Go to Step 15	—
13	Replace the wastegate solenoid. Refer to <i>Wastegate Solenoid</i> . Is the action complete?	—	Go to Step 15	—
14	Replace the faulty PCM. Important: If the PCM is faulty, the new PCM must be programmed. Refer to <i>PCM Replacement/Programming</i> . Is the action complete ?	—	Go to Step 15	—

DTC P1656 Wastegate Solenoid Control Circuit (cont'd)

Step	Action	Value(s)	Yes	No
15	<p>1. Using the scan tool, select DTC, Clear Info.</p> <p>2. Start engine and idle at normal operating temperature.</p> <p>3. Select DTC, Specific, then enter the DTC number which was set.</p> <p>4. Operate vehicle within the conditions for setting this DTC as specified in the supporting text.</p> <p>Does the scan tool indicate that this diagnostic Ran and Passed?</p>	—	<i>Go to Step 15</i>	<i>Go to Step 2</i>
16	<p>Using the scan tool, select Capture Info, Review Info.</p> <p>Are any DTCs displayed that have not been diagnosed?</p>	—	Go to the Applicable DTC Table	System OK