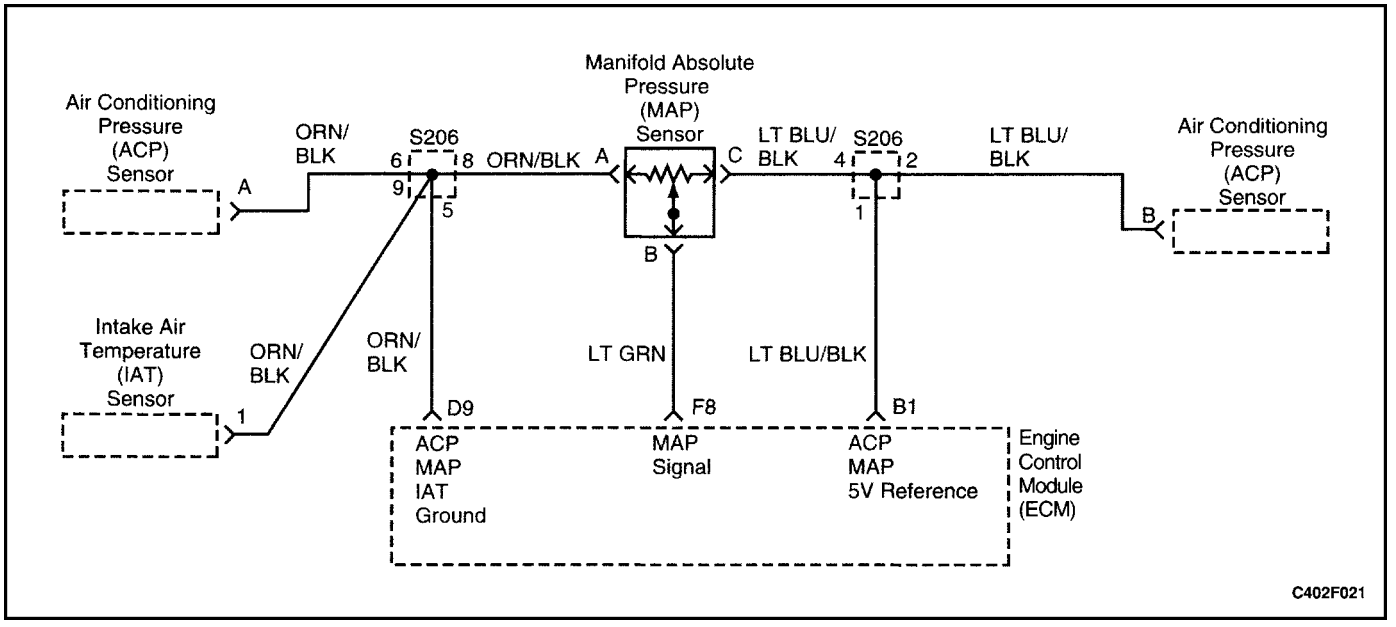


DIAGNOSTIC TROUBLE CODE (DTC) P1106

MANIFOLD ABSOLUTE PRESSURE INTERMITTENT HIGH VOLTAGE

Circuit Description

The Manifold Absolute Pressure (MAP) sensor responds to changes in intake manifold pressure (vacuum). The MAP signal voltage to the engine control module (ECM) varies from below 2 volts at idle (high vacuum) to above 4 volts with the key in the ON position, engine not running or at wide open throttle (WOT) (low vacuum).

A ”speed density” method of determining engine load is used. This is calculated using inputs from the MAP sensor, the rpm (58X), and the Intake Air Temperature (IAT) sensor. The MAP sensor is the main sensor used in this calculation, and measuring engine load is its main function.

The MAP sensor is also used to determine manifold pressure changes while the linear Exhaust Gas Recirculation (EGR) flow test diagnostic is being run (refer toDTC P0401). This determines the engine vacuum level for some other diagnostics and determines Barometric Pressure (BARO). The ECM compares the MAP sensor signal to calculated MAP based on Throttle Position (TP) and various other engine load factors. If the ECM detects a MAP signal voltage that is intermittently above the calculated value, DTC P1106 will set.

Conditions for Setting the DTC

- No TP sensor DTCs are present.
- TP sensor is less than 37% if rpm is less than or equal to 2500.
- TP sensor less than 56% if rpm is greater than 2500.
- The MAP is greater than 103 kPa.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will not illuminate.
- The ECM will store conditions which were present when the DTC was set as Failure Records data only.
- This information will not be stored in the Freeze Frame data.

Conditions for Clearing the MIL/DTC

- A history DTC will clear after 40 consecutive warm–up cycles without a fault.
- DTC P1106 can be cleared by using the scan tool CLEAR INFO function or by disconnecting the ECM battery feed.

Diagnostic Aids

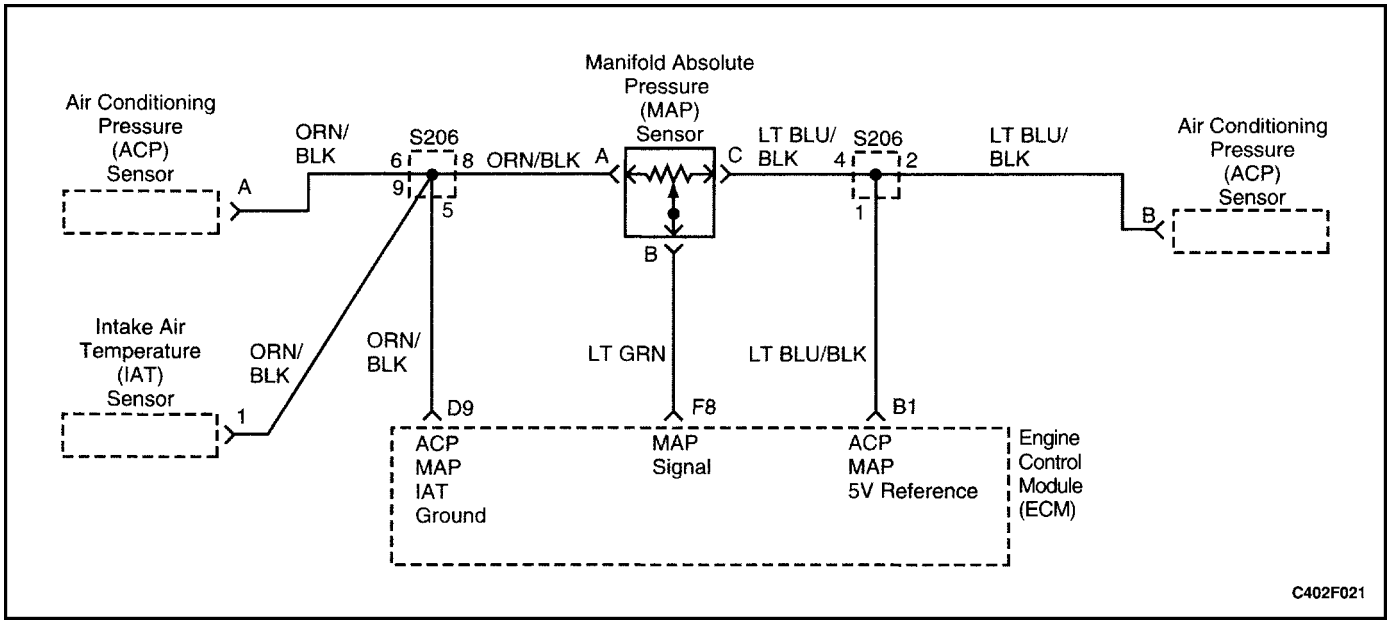
Check for the following conditions:

- Leaking or plugged vacuum supply line to the MAP sensor.
- Inspect ECM harness connectors for backed–out terminals, improper mating, broken locks, improperly formed or damaged terminals, and poor terminal–to–wire connection.
- Inspect the wiring harness for damage. If the harness appears to be OK, observe the MAP display on the scan tool while moving connectors and wiring harnesses related to the sensor. A change in the display will indicate the location of the fault.

Reviewing the Fail Records vehicle mileage since the diagnostic test last failed may help determine how often the condition that caused the DTC to be set occurs. This may assist in diagnosing the condition.

DTC P1106 Manifold Absolute Pressure Intermittent High Voltage

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to*Step 2*	Go to"On–Board Diagnostic System Check"
2	1. Select Diagnostic Trouble Code (DTC) information. 2. Check Last Test Fail and note any other DTCs set. Is DTC P0108 also set?		Go to "Applicable DTC table"	Go to *Step 3*
3	Check for a poor sensor ground circuit terminal A connection at the Manifold Absolute Pressure (MAP) sensor. Is a repair necessary?		Go to *Step 8*	Go to *Step 4*
4	Check the MAP signal circuit between the MAP sensor connector and the engine control module (ECM) for an intermittent short to voltage. Is a problem found?		Go to *Step 9*	Go to *Step 5*
5	Check for an intermittent short to voltage on the 5 volt reference B1 circuit between the ECM and the MAP Sensor Is a problem found?		Go to *Step 9*	Go to *Step 6*
6	Check for a poor sensor ground circuit terminal D9 connection at the ECM. Is a problem found?		Go to *Step 8*	Go to *Step 7*
7	Check for an intermittent open or a faulty splice in the sensor ground circuit. Is a problem found?		Go to *Step 10*	Go to "Diagnostic Aids"
8	Replace the faulty harness connector terminal for sensor ground circuit. Is the repair complete?		Go to *Step 10*	
9	Locate and repair intermittent open/short circuit in the wiring harness as necessary. Is the repair complete?		Go to *Step 10*	
10	1. Using the scan tool, clear the DTCs. 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 11*	Go to *Step 2*
11	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to "Applicable DTC table"	System OK



DIAGNOSTIC TROUBLE CODE (DTC) P1107

MANIFOLD ABSOLUTE PRESSURE INTERMITTENT LOW VOLTAGE

Circuit Description

The Manifold Absolute Pressure (MAP) sensor responds to changes in intake manifold pressure (vacuum). The MAP signal voltage to the engine control module (ECM) varies from below 2 volts at idle (high vacuum) to above 4 volts with the key in the ON position, engine not running or at wide open throttle (WOT) (low vacuum).

A ”speed density” method of determining engine load is used. This is calculated using inputs from the MAP sensor, the rpm (58X), and the Intake Air Temperature (IAT) sensor. The MAP sensor is the main sensor used in this calculation, and measuring engine load is its main function.

The MAP sensor is also used to determine manifold pressure changes while the linear Exhaust Gas Recirculation (EGR) flow test diagnostic is being run (refer toDTC P0401). This determines the engine vacuum level for some other diagnostics and determines Barometric Pressure (BARO). The ECM compares the MAP sensor signal to calculated MAP based on Throttle Position (TP) and various other engine load factors. If the ECM detects a MAP signal voltage that is intermittently above the calculated value, DTC P1107 will set.

Conditions for Setting the DTC

- Engine running.
- No TP sensor DTCs are present.
- The MAP is less than 103 kPa.
- TP sensor is greater than or equal to 2% if rpm is less than or equal to 2000.
- TP sensor is greater than 5% if rpm is greater than 2000.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will not illuminate.
- The ECM will store conditions which were present when the DTC was set as Failure Records data only.
- This information will not be stored in the Freeze Frame data.

Conditions for Clearing the MIL/DTC

- A history DTC will clear after 40 consecutive warm–up cycles without a fault.
- DTC P1107 can be cleared by using the scan tool CLEAR INFO function or by disconnecting the ECM battery feed.

Diagnostic Aids

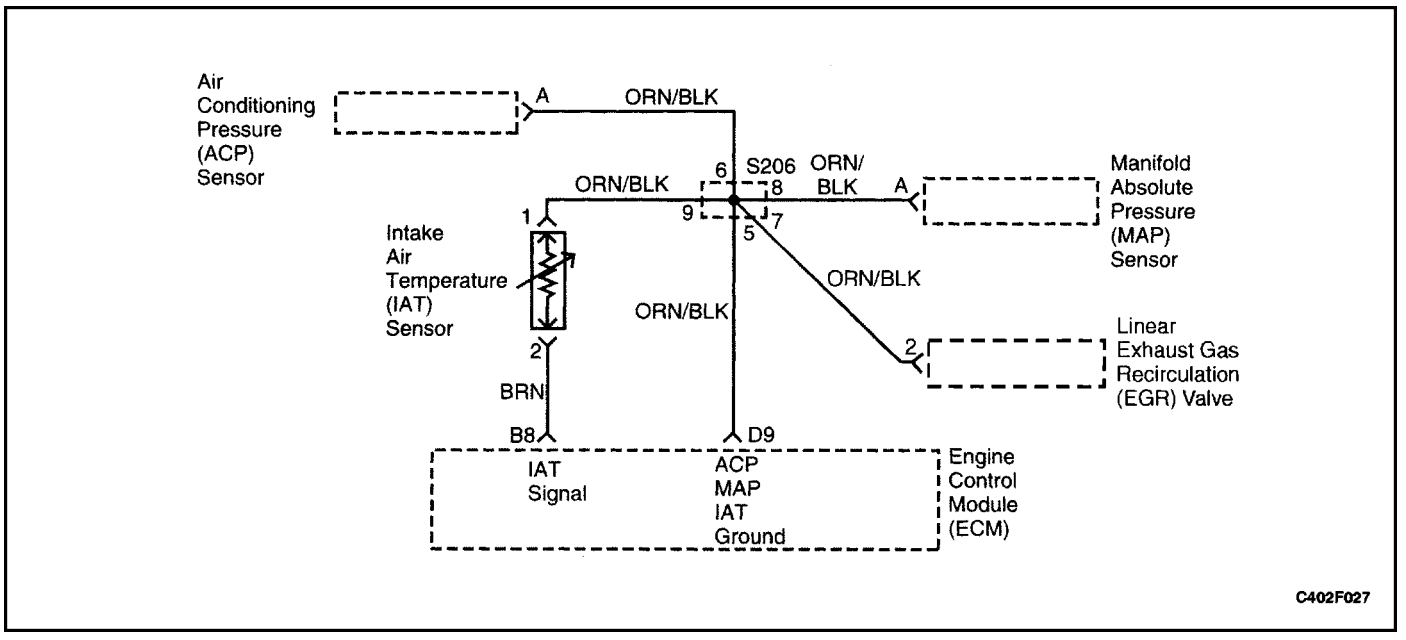
Check for the following conditions:

- Leaking or plugged vacuum supply line to the MAP sensor.
- Inspect ECM harness connectors for backed–out terminals, improper mating, broken locks, improperly formed or damaged terminals, and poor terminal–to–wire connection.
- Inspect the wiring harness for damage. If the harness appears to be OK, observe the MAP display on the scan tool while moving connectors and wiring harnesses related to the sensor. A change in the display will indicate the location of the fault.

Reviewing the Fail Records vehicle mileage since the diagnostic test last failed may help determine how often the condition that caused the DTC to be set occurs. This may assist in diagnosing the condition.

DTC P1107 Manifold Absolute Pressure Intermittent Low Voltage

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to"On–Board Diagnostic System Check"
2	1. Select Diagnostic Trouble Code (DTC) information. 2. Check Last Test Fail and note any other DTCs set. Is DTC P0107 also set?		Go to "Applicable DTC table"	Go to *Step 3*
3	Check for a poor 5 volt reference circuit or Manifold Absolute Pressure (MAP) signal circuit terminal connection at the MAP sensor. Is a repair necessary?		Go to *Step 5*	Go to *Step 4*
4	Check the MAP signal circuit between the MAP sensor connector and the engine control module (ECM) for an intermittent short to voltage. Is a problem found?		Go to *Step 6*	Go to *Step 7*
5	Replace the faulty harness connector terminal for the 5 volt reference circuit and/or the MAP signal circuit. Is the repair complete?		Go to *Step 7*	
6	Repair intermittent open/short circuit in the wiring harness. Is the repair complete?		Go to *Step 7*	
7	1. Using the scan tool, clear the DTCs. 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 8*	Go to *Step 2*
8	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to "Applicable DTC table"	System OK



DIAGNOSTIC TROUBLE CODE (DTC) P1111

INTAKE AIR TEMPERATURE INTERMITTENT HIGH VOLTAGE

Circuit Description

The Intake Air Temperature (IAT) sensor is a thermistor which measures the temperature of the air entering the engine. The engine control module (ECM) applies 5 volts through a pull–up resistor to the IAT sensor. When the intake air is cold, the resistance is high, and the ECM will monitor a high signal voltage on the IAT signal circuit. If the intake air is warm, the sensor resistance is lower causing the ECM to monitor a lower voltage. Diagnostic Trouble Code (DTC) P1111 will set when the ECM detects an excessively high signal voltage on the intake air temperature sensor signal circuit.

Conditions for Setting the DTC

- DTC P0502 not set
- Engine has been running for over 120 seconds.
- Vehicles speed is less than 113 km/h (70 mph).
- Calculated air flow is less than 30 g/second.
- Engine Coolant Temperature (ECT) is above –8 ˚C (18 ˚F).

Action Taken When the DTC Sets

- The ECM will substitute a default value for IAT.
- The ECM will store conditions which were present when the DTC set as Failure Records data only. This information will not be stored as Freeze Frame data.
- DTC P1111 does not illuminate the Malfunction Indicator Lamp (MIL).

Conditions for Clearing the MIL/DTC

- A history DTC will clear after 40 consecutive warm–up cycles without a fault.
- DTC P1111 can be cleared by using the scan tool CLEAR INFO function or by disconnecting the ECM battery feed.

Diagnostic Aids

Check for the following conditions:

- Poor connection at the ECM. Inspect harness connectors for backed–out terminals, improper mating, broken locks, improperly formed or damaged terminals, and poor terminal–to–wire connection.
- Damaged harness. Inspect the wiring harness for damage. If the harness appears to be OK, observe the IAT display on the scan tool while moving connectors and wiring harnesses related to the IAT sensor. A change in the IAT display will indicate the location of the fault.
- Reviewing the Fail Records vehicle mileage since the diagnostic test last failed may help determine how often the condition that caused the DTC to be set occurs.
- This may assist in diagnosing the condition. Use the Temperature vs. Resistance Values table to evaluate the possibility of a skewed sensor. Refer to ”Temperature vs. Resistance” in this section.

Intake Air Temperature Sensor

C	F	OHMS
Temperature Vs. Resistance Values (approximate)		
100	212	177
80	176	332
60	140	667
45	113	1188
35	95	1802
25	77	2796
15	59	4450
5	41	7280
–5	23	12300
–15	5	21450
–30	–22	52700
–40	–40	100700

Test Description

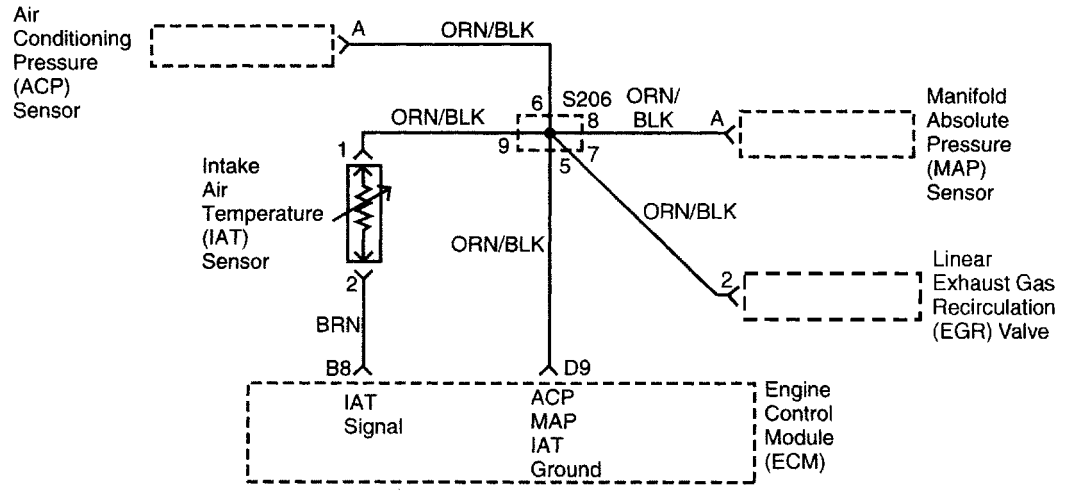
Number(s) below refer to the step number(s) on the Diagnostic Table.

1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.

DTC P1111 Intake Air Temperature Intermittent High Voltage

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Turn the ignition ON. 2. Install the scan tool. Is DTC P0113 set?		Go to ”Applicable DTC table”	Go to *Step 3*
3	Check the scan tool. Is DTC P1106 set?		Go to *Step 6*	Go to *Step 4*
4	1. Check for a poor sensor ground circuit terminal 1 connection at the Idle Air Temperature (IAT) sensor. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 10*	Go to *Step 5*
5	1. Check for a poor IAT signal circuit terminal 2 connection at the IAT sensor. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 10*	Go to *Step 6*
6	1. Check the IAT signal circuit between the IAT sensor connector and the engine control module (ECM) for an intermittent open. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 10*	Go to *Step 7*
7	1. Check the IAT signal circuit between the IAT sensor connector and the ECM for an intermittent short to voltage. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 10*	Go to *Step 8*
8	1. Check for a poor sensor ground circuit terminal D9 connection at the ECM. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 10*	Go to *Step 9*

Step	Action	Value(s)	Yes	No
9	1. Check for an intermittent open or a faulty splice in the sensor ground circuit. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 10*	Go to ”Diagnostic Aids”
10	1. Using the scan tool, clear the Diagnostic Trouble Codes (DTCs). 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 11*	Go to *Step 2*
11	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to ”Applicable DTC table”	System OK



DIAGNOSTIC TROUBLE CODE (DTC) P1112

INTAKE AIR TEMPERATURE INTERMITTENT LOW VOLTAGE

Circuit Description

The Intake Air Temperature (IAT) sensor is a thermistor which measures the temperature of the air entering the engine. The engine control module (ECM) applies 5 volts through a pull–up resistor to the IAT sensor. When the intake air is cold, the resistance is high, and the ECM will monitor a high signal voltage on the IAT signal circuit. If the intake air is warm, the sensor resistance is lower causing the ECM to monitor a lower voltage. Diagnostic Trouble Code (DTC) P1112 will set when the ECM detects an intermittently low signal voltage on the intake air temperature sensor signal circuit.

Conditions for Setting the DTC

- DTC P0502 not set
- Engine has been running for over 120 seconds.
- Vehicle speed is greater than 25 mph.

Action Taken When the DTC Sets

- The ECM will substitute a default value for intake air temperature.
- The Malfunction Indicator Lamp (MIL) will not illuminate.
- The ECM will store conditions which were present when the DTC was set as Failure Records data only. This information will not be stored as Freeze Frame data.
- DTC P1111 does not illuminate the MIL.

Conditions for Clearing the MIL/DTC

- A history DTC will clear after 40 consecutive warm–up cycles without a fault.
- DTC(s) can be cleared by using the scan tool CLEAR INFO function or by disconnecting the ECM battery feed.

Diagnostic Aids

Check for the following conditions:

- Poor connection at the ECM. Inspect harness connectors for backed–out terminals, improper mating, broken locks, improperly formed or damaged terminals, and poor terminal–to–wire connection.
- Damaged harness. Inspect the wiring harness for damage. If the harness appears to be OK, observe the IAT display on the scan tool while moving connectors and wiring harnesses related to the IAT sensor. A change in the IAT display will indicate the location of the fault.
- Reviewing the Fail Records vehicle mileage since the diagnostic test last failed may help determine how often the condition that caused the DTC to be set occurs. This may assist in diagnosing the condition.
- Use the Temperature vs. Resistance Values table to evaluate the possibility of a skewed sensor. Refer to ”Temperature vs. Resistance” in this section.

Intake Air Temperature Sensor

C	F	OHMS
Temperature Vs. Resistance Values (approximate)		
100	212	177
80	176	332
60	140	667
45	113	1188
35	95	1802
25	77	2796
15	59	4450
5	41	7280
–5	23	12300
–15	5	21450
–30	–22	52700
–40	–40	100700

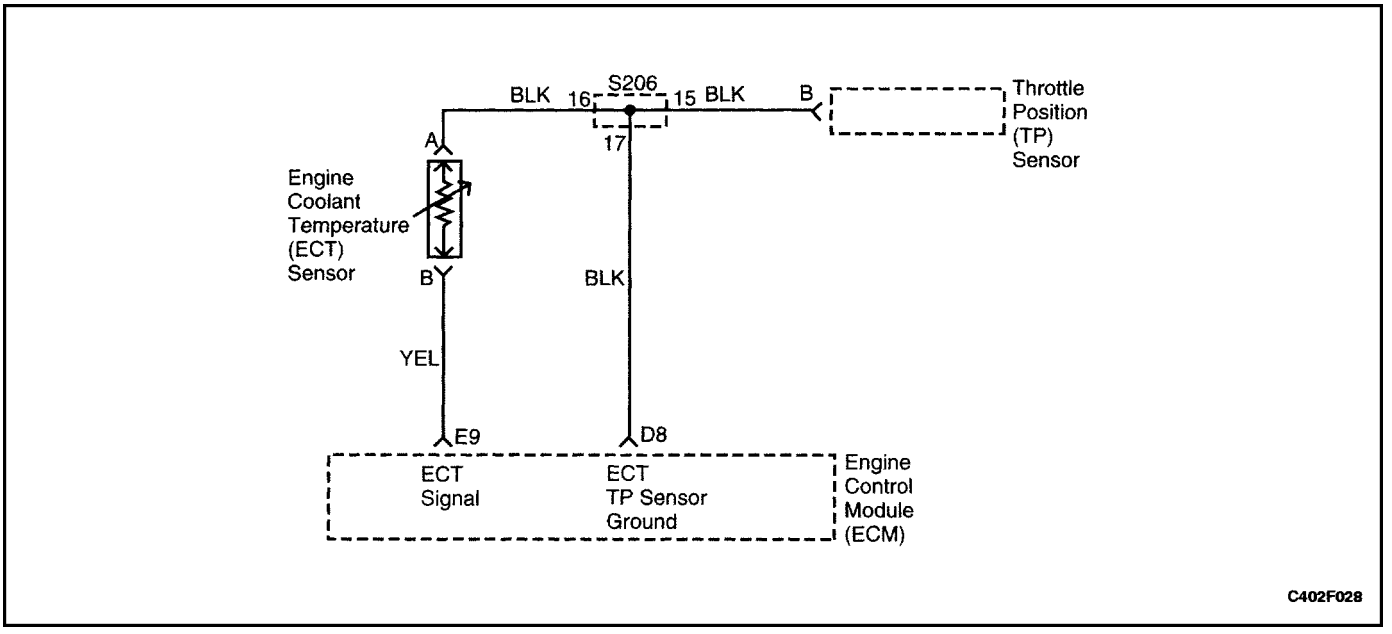
Test Description

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

1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
2. Verifies the fault is present.
3. If DTC P1112 can be repeated only by duplicating the Fail Records conditions, refer to the Temperature Vs. Resistance Value Chart. The chart may be used to test the IAT sensor at various temperatures to evaluate the possibility of a ”shifted” sensor that may be shorted above or below a certain temperature. If this is the case, replace the IAT sensor.

DTC P1112 Intake Air Temperature Intermittent Low Voltage

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Turn the Ignition ON. 2. Install the scan tool. Is DTC P0112 also set?		Go to ”Applicable DTC table”	Go to *Step 3*
3	1. Check the Idle Air Temperature (IAT) signal circuit between the IAT sensor connector and the engine control module (ECM) for an intermittent short to ground. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 5*	Refer to ”Diagnostic Aids”
4	1. Using the scan tool, clear the Diagnostic Trouble Codes (DTCs). 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 5*	Go to *Step 2*
5	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to ”Applicable DTC table”	System OK



DIAGNOSTIC TROUBLE CODE (DTC) P1114

ENGINE COOLANT TEMPERATURE INTERMITTENT LOW VOLTAGE

Circuit Description

The Engine Coolant Temperature (ECT) sensor is a thermistor mounted in the engine coolant stream. The engine control module (ECM) applies a voltage (about 5.0 volts) through a pull–up resistor to the ECT signal circuit. When the engine coolant is cold, the sensor resistance is high, and the ECM will monitor a high signal voltage. As the engine coolant warms, the sensor resistance is less, and the ECT signal voltage measured at the ECM drops. With a fully warmed up engine, the ECT signal voltage should measure about 1.5 to 2.0 volts. If the ECM detects an ECT signal that is intermittently below the range of the ECT sensor, Diagnostic Trouble Code (DTC) P1114 will set.

Conditions for Setting the DTC

- Engine run time is longer than 2 minute.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will not illuminate. .
- The ECM will store conditions which were present when the DTC set as Failure Records data only. This information will not be stored as Freeze Frame data

Conditions for Clearing the MIL/DTC

- A history DTC will clear after 40 consecutive warm–up cycles without a fault.
- DTC(s) can be cleared by using the scan tool CLEAR INFO function or by disconnecting the ECM battery feed.

Diagnostic Aids

Check for the following conditions:

- Poor connection at the ECM. Inspect harness connectors for backed–out terminals, improper mating, broken locks, improperly formed or damaged terminals, and poor terminal–to–wire connection.
- Damaged harness. Inspect the wiring harness for damage. If the harness appears to be OK, observe the ECT display on the scan tool while moving connectors and wiring harnesses related to the ECT sensor. A change in the ECT display will indicate the location of the fault.
- Reviewing the Fail Records vehicle mileage since the diagnostic test last failed may help determine how often the condition that caused the DTC to be set occurs. This may assist in diagnosing the condition.
- Use the Temperature vs. Resistance Values table to evaluate the possibility of a skewed sensor. Refer to ”Temperature vs. Resistance” in this section.

Engine Coolant Temperature Sensor

C	F	OHMS
Temperature Vs. Resistance Values (approximate)		
100	212	177
80	176	332
60	140	667
45	113	1188
35	95	1802
25	77	2796
15	59	4450
5	41	7280
–5	23	12300
–15	5	21450
–30	–22	52700
–40	–40	100700

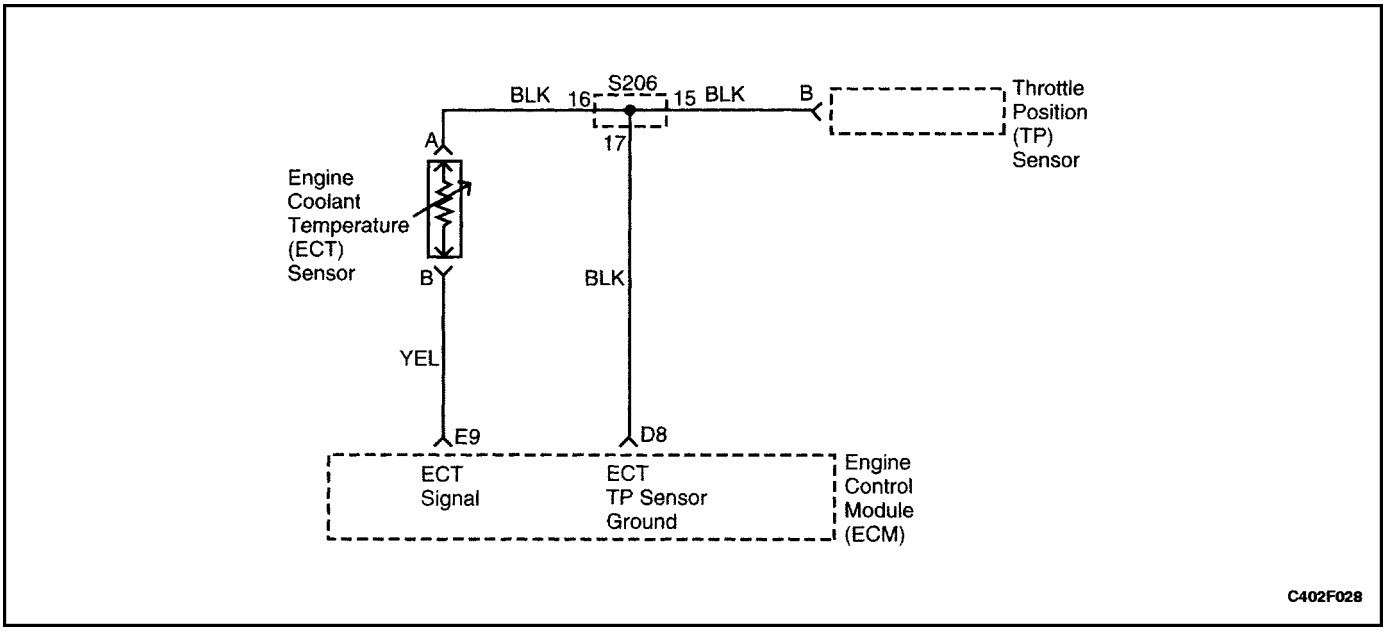
Test Description

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

1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference

DTC P1114 Engine Coolant Temperature Intermittent Low Voltage

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Turn the Ignition ON. 2. Install the scan tool. Is Diagnostic Trouble Code (DTC) P0117 set?		Go to ”Applicable DTC table”	Go to *Step 3*
3	1. Check the Engine Coolant Temperature (ECT) signal circuit between the ECT sensor connector and the engine control module (ECM) for an intermittent short to ground. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 5*	Refer to ”Diagnostic Aids”
4	1. Using the scan tool, clear the DTCs. 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 5*	Go to *Step 2*
5	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to ”Applicable DTC table”	System OK



DIAGNOSTIC TROUBLE CODE (DTC) P1115

ENGINE COOLANT TEMPERATURE INTERMITTENT HIGH VOLTAGE

Circuit Description

The Engine Coolant Temperature (ECT) sensor is a thermistor mounted in the engine coolant stream. The engine control module (ECM) applies a voltage (about 5.0 volts) through a pull–up resistor to the ECT signal circuit. When the engine coolant is cold, the sensor resistance is high, and the ECM will monitor a high signal voltage. As the engine coolant warms, the sensor resistance is less, and the ECT signal voltage measured at the ECM drops. With a fully warmed up engine, the ECT signal voltage should measure about 1.5 to 2.0 volts. If the ECM detects an ECT signal that is intermittently above the range of the ECT sensor, Diagnostic Trouble

Conditions for Setting the DTC

- Engine run time is greater than 2 minutes.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will not illuminate.
- The ECM will store conditions which were present when the DTC was set as Failure Records data only. This information will not be stored as Freeze Frame data.

Conditions for Clearing the MIL/DTC

- A history DTC will clear after 40 consecutive warm–up cycles without a fault.
- DTC(s) can be cleared by using the scan tool CLEAR INFO function or by disconnecting the ECM battery feed.

Diagnostic Aids

Check for the following conditions:

- Poor connection at the ECM. Inspect harness connectors for backed–out terminals, improper mating, broken locks, improperly formed or damaged terminals, and poor terminal–to–wire connection.
- Damaged harness. Inspect the wiring harness for damage. If the harness appears to be OK, observe the ECT display on the scan tool while moving connectors and wiring harnesses related to the ECT sensor. A change in the ECT display will indicate the location of the fault.
- Reviewing the Fail Records vehicle mileage since the diagnostic test last failed may help determine how often the condition that caused the DTC to be set occurs. This may assist in diagnosing the condition.
- Use the Temperature vs. Resistance Values table to evaluate the possibility of a skewed sensor. Refer to ”Temperature vs. Resistance” in this section.

Engine Coolant Temperature Sensor

C	F	OHMS
Temperature Vs. Resistance Values (approximate)		
100	212	177
80	176	332
60	140	667
45	113	1188
35	95	1802
25	77	2796
15	59	4450
5	41	7280
–5	23	12300
–15	5	21450
–30	–22	52700
–40	–40	100700

Test Description

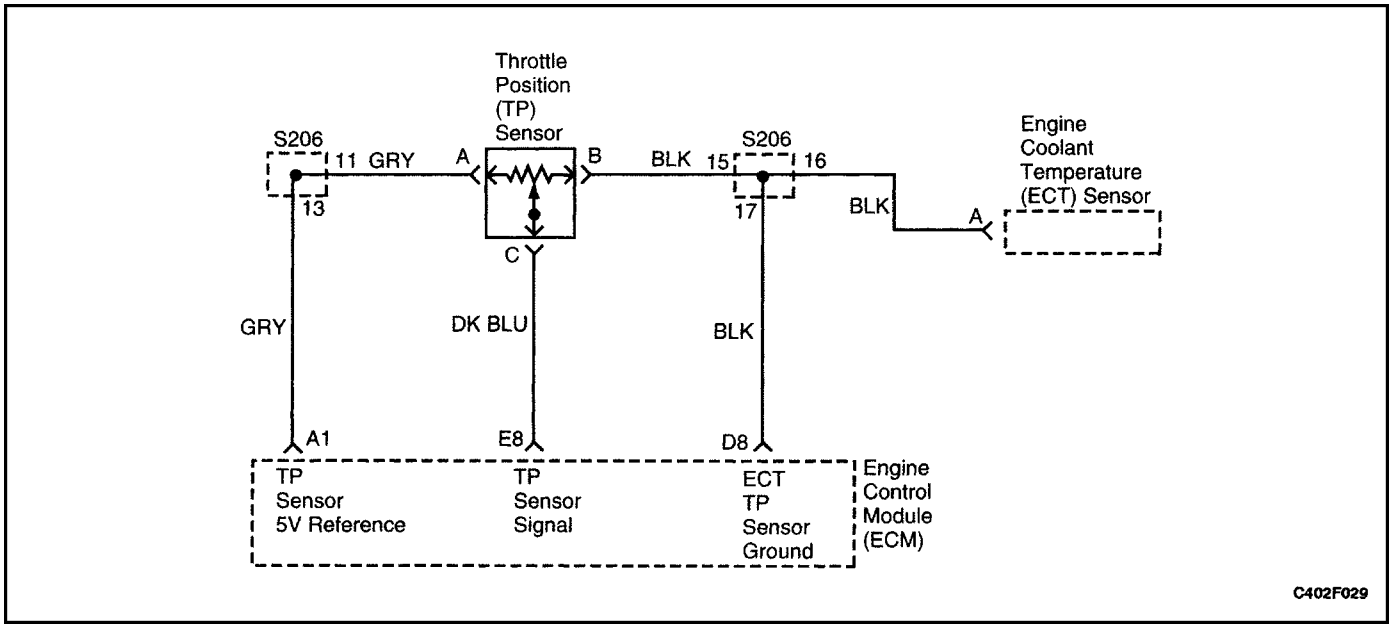
Number(s) below refer to the step number(s) on the Diagnostic Table.

1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.

DTC P1115 Engine Coolant Temperature Intermittent High Voltage

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Turn the ignition ON. 2. Install the scan tool. Is Diagnostic Trouble Code (DTC) P0118 set?		Go to ”Applicable DTC table”	Go to *Step 3*
3	Check the scan tool. Is DTC P1121 also set?		Go to *Step 8*	Go to *Step 4*
4	1. Check for a poor sensor ground circuit terminal A connection at the Engine Coolant Temperature (ECT) sensor. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 10*	Go to *Step 5*
5	1. Check for a poor ECT signal circuit terminal B connection at the ECT sensor. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 10*	Go to *Step 6*
6	1. Check the ECT signal circuit between the ECT sensor connector and the engine control module (ECM) for an intermittent open. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 10*	Go to *Step 7*
7	1. Check the ECT signal circuit between the ECT sensor connector and the ECM for an intermittent short to voltage. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 10*	Go to *Step 8*
8	1. Check for a poor sensor ground circuit terminal D8 connection at the ECM. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 10*	Go to *Step 9*

Step	Action	Value(s)	Yes	No
9	1. Check for an intermittent open or a faulty splice in the sensor ground circuit. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 10*	Go to ”Diagnostic Aids”
10	1. Using the scan tool, clear the DTCs. 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 11*	Go to *Step 2*
11	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to ”Applicable DTC table”	System OK



DIAGNOSTIC TROUBLE CODE (DTC) P1121

THROTTLE POSITION SENSOR INTERMITTENT HIGH VOLTAGE

Circuit Description

The Throttle Position (TP) sensor circuit provides a voltage signal that changes relative to throttle blade angle. The TP sensor sends a voltage signal back to the engine control module (ECM) relative to the throttle plate opening. The voltage signal will vary from approximately 1 volt at closed throttle, to over 4.9 v at wide open throttle (WOT).

The TP signal is used by the ECM for fuel control and for most of the ECM controlled outputs. The TP signal is one of the most important inputs used by the ECM for fuel control and most of the ECM controlled outputs. If the ECM detects a TP signal that is intermittently above the range of the TP sensor, Diagnostic Trouble Code (DTC) P1121 will be set.

Conditions for Setting the DTC

- The ignition is ON.
- TP sensor voltage indicates a throttle voltage intermittently greater than 4.9 volts.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will not illuminate.
- The ECM will store conditions which were present when the DTC set as Failure Records data only. This information will not be stored as Freeze Frame data.

Conditions for Clearing the MIL/DTC

- The history DTC P1121 will clear after 40 consecutive warm–up cycles in which the diagnostic runs without a fault.
- DTC(s) can be cleared by using the scan tool CLEAR INFO function or be disconnecting the ECM power feed.

Diagnostic Aids

Check for the following conditions:

- Poor connection at the ECM. Inspect harness connectors for backed–out terminals, improper mating, broken locks, improperly formed or damaged terminals, and poor terminal–to–wire connection.
- Damaged harness. Inspect the wiring harness for damage. If the harness appears OK, observe the throttle position display on the scan tool while moving connectors and wiring harnesses related to the TP sensor. A change in the display will indicate the location of the fault.

If DTC P1121 cannot be duplicated, reviewing the Fail Records vehicle mileage since the diagnostic test last failed may help determine how often the condition that caused the DTC to be set occurs. This may assist in diagnosing the condition.

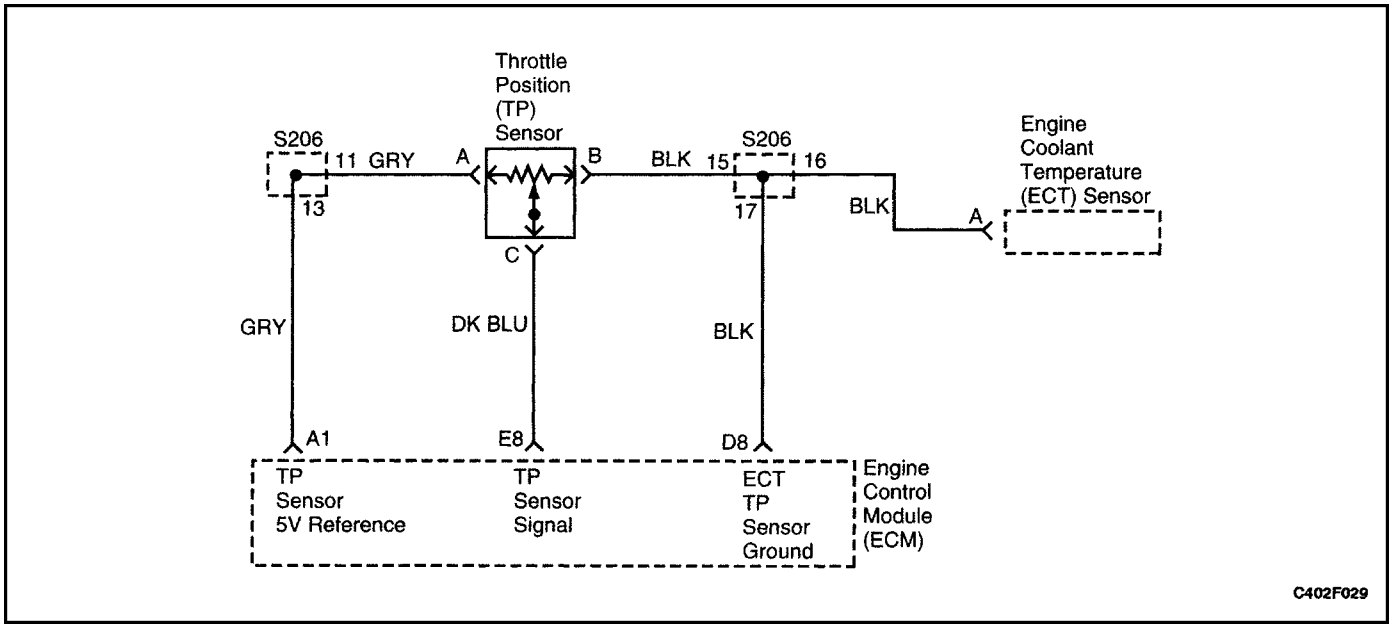
Test Description

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

1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.

DTC P1121 Throttle Position Sensor Intermittent High Voltage

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to "On–Board Diagnostic System Check"
2	1. Turn the ignition ON with engine OFF. 2. Install the scan tool. Is Diagnostic Trouble Code (DTC) P0123 also set?		Go to "Applicable DTC table"	Go to *Step 3*
3	Check for a poor sensor ground circuit terminal B connection at the Throttle Position (TP) sensor. Is a problem found?		Go to *Step 7*	Go to *Step 4*
4	Check the Throttle Position (TP) signal circuit between the TP sensor connector and the engine control module (ECM) for an intermittent short to voltage. Is a problem found?		Go to *Step 8*	Go to *Step 5*
5	Check for a poor sensor ground terminal D8 connection at the ECM. Is a problem found?		Go to *Step 7*	Go to *Step 6*
6	Check for an intermittent open or a faulty splice in the sensor ground circuit. Is a problem found?		Go to *Step 8*	Go to "Diagnostic Aids"
7	Replace the faulty harness connector terminal for sensor ground circuit. Is the repair complete?		Go to *Step 9*	
8	Repair the intermittent open/short circuit in wiring harness as necessary. Is the action complete?		Go to *Step 9*	
9	1. Using the scan tool, clear the DTCs. 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 10*	Go to *Step 2*
10	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to "Applicable DTC table"	System OK



DIAGNOSTIC TROUBLE CODE (DTC) P1122

THROTTLE POSITION SENSOR INTERMITTENT LOW VOLTAGE

Circuit Description

The Throttle Position (TP) sensor circuit provides a voltage signal that changes relative to throttle blade angle. The TP sensor sends a voltage signal back to the engine control module (ECM) relative to the throttle plate opening. The voltage signal will vary from approximately 1 volt at closed throttle, to over 4.9 v at wide open throttle (WOT). The TP signal is used by the ECM for fuel control and for most of the ECM controlled outputs. The TP signal is one of the most important inputs used by the ECM for fuel control and most of the ECM controlled outputs. If the ECM detects a TP signal that is intermittently above the range of the TP sensor, Diagnostic Trouble Code (DTC) P1122 will be set.

Conditions for Setting the DTC

- The ignition is ON.
- TP sensor indicates a throttle position signal intermittently less than 0.14 volt.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will not illuminate.
- The ECM will store conditions which were present when the DTC set as Failure Records data only. This information will not be stored as Freeze Frame data.

Conditions for Clearing the MIL/DTC

- The history DTC P1122 will clear after 40 consecutive warm–up cycles in which the diagnostic runs without a fault.
- DTC P1122 can be cleared by using the scan tool CLEAR INFO function or by disconnecting the ECM battery feed.

Diagnostic Aids

Check for the following conditions:

- Poor connection at the ECM. Inspect harness connectors for backed–out terminals, improper mating, broken locks, improperly formed or damaged terminals, and poor terminal–to–wire connection.
- Damaged harness. Inspect the wiring harness for damage. If the harness appears OK, observe the throttle position display on the scan tool while moving connectors and wiring harnesses related to the TP sensor. A change in the display will indicate the location of the fault.

Reviewing the Fail Records vehicle mileage since the diagnostic test last failed may help determine how often the condition that caused the DTC to be set occurs. This may assist in diagnosing the condition.

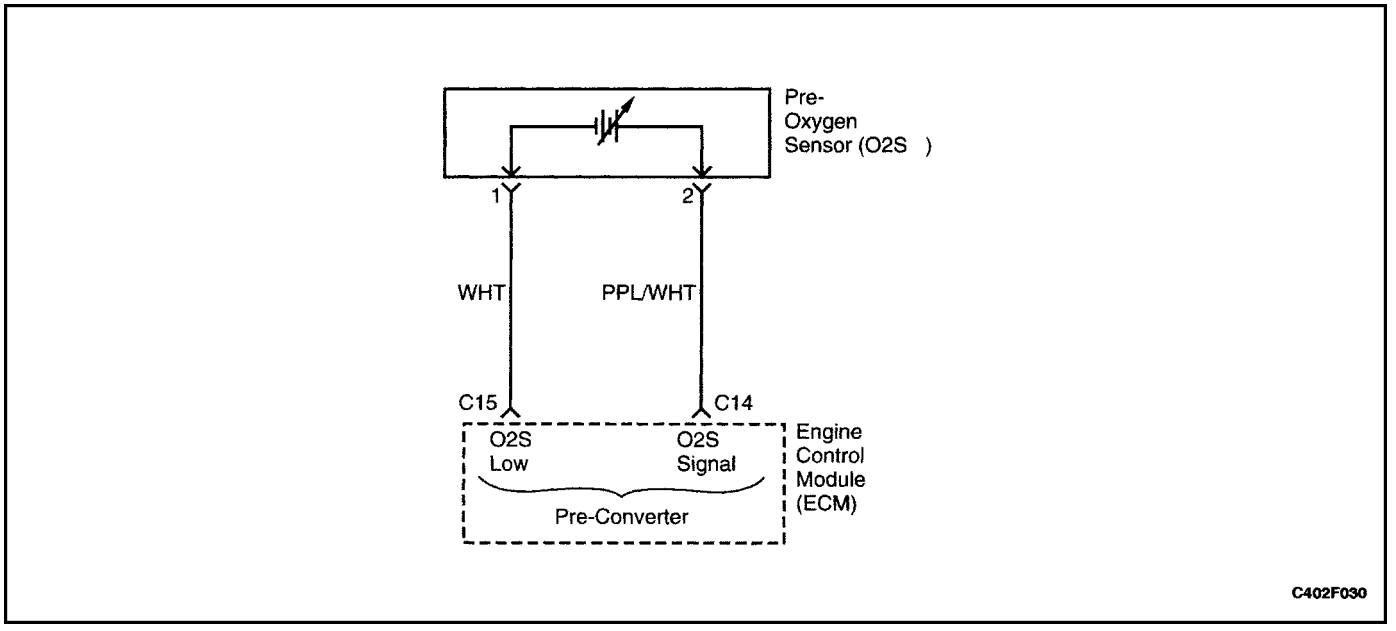
Test Description

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

1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.

DTC P1122 Throttle Position Sensor Intermittent Low Voltage

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Turn the ignition ON. 2. Install the scan tool. Is Diagnostic Trouble Code (DTC) P0122 also set?		Go to ”Applicable DTC table”	Go to *Step 3*
3	Check for a poor 5 volt reference circuit terminal A connection at the Throttle Position (TP) sensor. Is a problem found?		Go to *Step 9*	Go to *Step 5*
4	Check the TP signal circuit between the TP sensor connector and the engine control module (ECM) for an intermittent open or short to ground. Is a problem found?		Go to *Step 8*	Go to *Step 6*
5	Check for a poor 5 volt reference circuit terminal A1 connection at the ECM. Is a problem found?		Go to *Step 7*	Go to *Step 6*
6	Check for an intermittent open or a faulty splice in the 5 volt reference circuit. Is a problem found?		Go to *Step 18*	Go to ”Diagnostic Aids”
7	Replace the faulty harness connector terminal for the 5 volt reference circuit and/or the TP signal circuit as necessary. Is the repair complete?		Go to *Step 9*	
8	Repair the intermittent open/short circuit in wiring harness as necessary. Is the repair complete?		Go to *Step 9*	
9	1. Using the scan tool, clear the DTCs. 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 10*	Go to *Step 2*
10	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to ”Applicable DTC table”	System OK



DIAGNOSTIC TROUBLE CODE (DTC) P1133
O2 BANK 1 SENSOR 1 TOO FEW TRANSITIONS

Circuit Description

The engine control module (ECM) constantly monitors the oxygen sensor (O2S 1) activity for 100 seconds. During the monitor period, the ECM counts the number of times that the O2S 1 switches from rich to lean and from lean to rich. With this information, a total for all switches can be determined. If the number of switches is too low, Diagnostic Trouble Code (DTC) P1133 will set. The lean–to–rich and the rich–to–lean are greater than 20 switches (M/T) / 10 switches (A/T).

Conditions for Setting the DTC

- DTCs P0106, P0107, P0108, P0117, P0118, P0121, P0122, P0123, P0131, P0132, P0134, P0171, P0172, P0201, P0202, P0203, P0204, P0300, P0336, P0337, P0351, P0352, P0402, P0404, P0405, P0406, P0443, P0506, P0507, P1130, P1404 and P1627 not set.
- Closed Loop stoichiometry.
- Purge duty cycle is greater than 0%.
- Engine coolant temperature (ECT) is greater than 72˚C (162˚F).
- The engine has been operating for at least 120 seconds.
- Calculated airflow is between 9 and 40 grams/sec.
- Engine speed is between 1600 rpm and 4000 rpm.
- 0 second delay after closed loop.

Action Taken When the DTC Sets

- The ECM will illuminate the malfunction indicator lamp (MIL).
- Open loop fuel control will be in effect.
- The ECM will store conditions which were present when the DTC was set as Freeze Frame and in the Failure Records data.
- A history DTC is stored.
- Coolant fan turns on.

Conditions for Clearing the MIL/DTC

- The ECM will turn the MIL off on the third consecutive trip cycle during which the diagnostic has been run and the fault condition is no longer present.
- A history DTC P1133 will clear after 40 consecutive warm–up cycles have occurred without a fault.
- DTC P1133 can be cleared by using the scan tool CLEAR INFO function or by disconnecting the ECM battery feed.

Diagnostic Aids

DTC P1133 is most likely caused by one of the following items:

- Fuel Pressure – The system will go rich if the fuel pressure is too high. The ECM can compensate for some increase. However, if it gets too high, a DTC P1133 may set. Refer to ”Fuel System Diagnosis” in this section.
- Leaking injector – A leaking or malfunctioning injector can cause the system to go rich.
- Manifold Absolute Pressure (MAP) sensor – An output that causes the ECM to sense a higher than normal manifold pressure (low vacuum) can cause the system to go rich. Disconnecting the MAP sensor will allow the ECM to set a fixed value for the MAP sensor. Substitute a different MAP sensor if the rich condition is gone while the sensor is disconnected.
- Pressure regulator – Check for a leaking fuel pressure regulator diaphragm by checking for the presence of liquid fuel in the vacuum line to the pressure regulator.

- Throttle Position (TP) sensor – An intermittent TP sensor output can cause the system to go rich due to a false indication of the engine accelerating.
- O2S 1 contamination – Inspect the O2S 1 for silicone contamination from fuel or improper use of room temperature vulcanizing (RTV) sealant. The sensor may have a white powdery coating and result in a high but false voltage signal (rich exhaust indication). The ECM will then reduce the amount of fuel delivered to the engine causing a severe surge or driveability problem.

Test Description

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

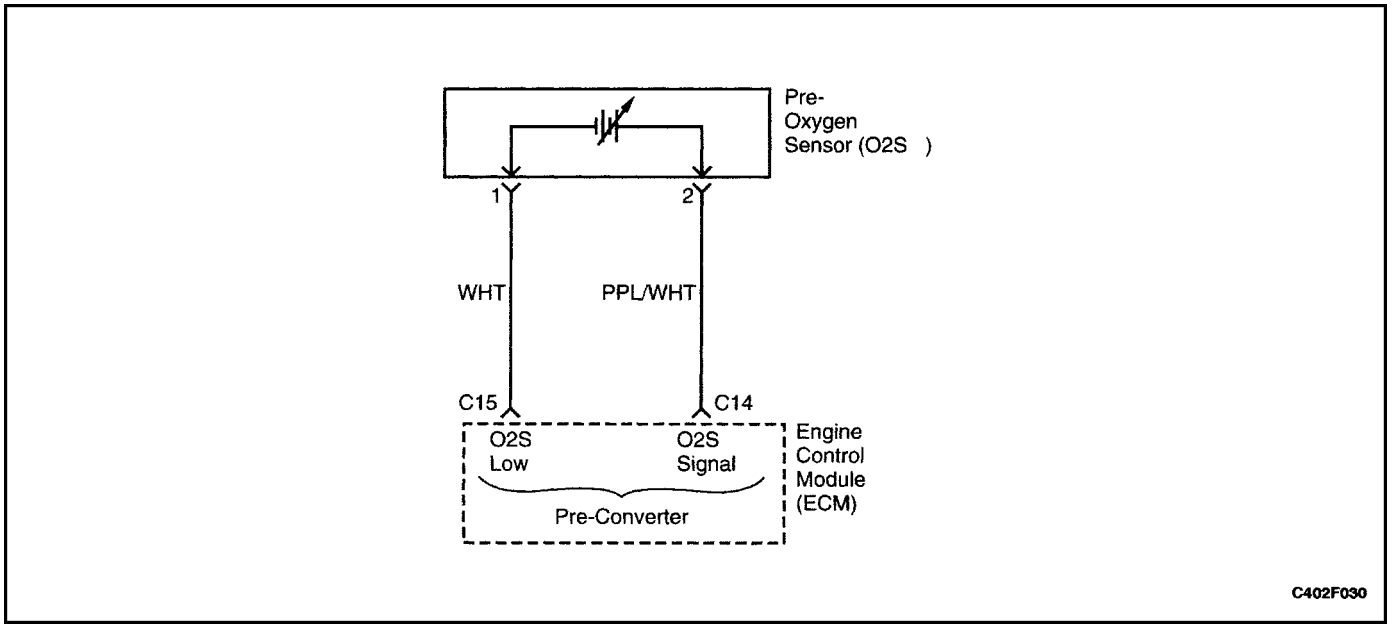
1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
16. The replacement ECM must be reprogrammed. Refer to the latest Techline procedure for ECM reprogramming.
18. If no malfunctions have been found at this point and no additional DTCs are set, refer to ”Diagnostic Aids” in this section for additional checks and information.

DTC P1133 O2 Bank 1 Sensor 1 Too Few Transitions

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Turn the ignition ON. 2. Install the scan tool. Are any additional Diagnostic Trouble Codes (DTCs) set?		Go to ”Applicable DTC table”	Go to *Step 3*
3	1. Engine running at operating temperature. 2. Operate the vehicle within the parameters specified under Conditions for Setting the DTC. 3. Monitor the LEAN/RICH TRANSITION and RICH/LEAN TRANSITION noting the number of switches. Do the parameters show fewer transitions than the specified value.	30–40 (auto) 10–15 (man)	Go to *Step 4*	Go to *Step 18*
4	Visually/physically inspect the following items: • Oxygen sensor (O2S 1) is securely installed. • Corrosion on terminals. • Terminal tension (at O2S 1 and at the engine control module [ECM]). • Damaged wiring. Is a problem found in any of the above areas?		Go to *Step 7*	Go to *Step 5*
5	Check the exhaust manifold for a leak near the engine and repair as necessary. Is a leak found and repaired?		Go to *Step 3*	Go to *Step 6*
6	1. Turn the Ignition OFF. 2. Disconnect the O2S 1 at the sensor. 3. Using a scan tool, monitor the O2S 1 voltage. Does the scan tool voltage indicate the O2S 1 voltage within the specified value?	407–509 mv	Go to *Step 7*	Go to *Step 10*
7	1. Jumper the O2S 1 high circuit signal circuit, at terminal 2 to ground. 2. Using a scan tool, monitor the O2S 1 voltage.. Does the scan tool voltage indicate the voltage below the specified value?	200 mV	Go to *Step 8*	Go to *Step 11*

Step	Action	Value(s)	Yes	No
8	1. Replace the O2S 1. **Notice :** Before replacing the sensor, the cause of the contamination must be determined and corrected in order to prevent further damage to the sensor. Check for the following: • Fuel contamination. • Use of improper Room Temperature Vulcanizing (RTV) sealant. • Engine oil/coolant consumption. Is the repair complete?		Go to *Step 17*	
9	Repair the condition as necessary. Is the repair complete?		Go to *Step 17*	
10	Repair the O2S 1 sensor signal circuit for a short to ground. Is the repair complete?		Go to *Step 17*	
11	1. Remove the jumper wire. 2. Using a digital voltmeter (DVM) measure the voltage between the O2S 1 high signal circuit, terminal 2 and ground. Does the O2S 1 voltage measure above the specified value?	407 mV	Go to *Step 12*	Go to *Step 13*
12	1. Turn the ignition OFF. 2. Disconnect the ECM connectors and check the O2S 1 low circuit, at terminal C15 for continuity. 3. If the O2S 1 low circuit measures over the specified value, repair the open or poor connection as necessary. Is an O2S 1 low circuit problem found and corrected?	5 Ω	Go to *Step 17*	Go to *Step 14*
13	1. Turn the ignition OFF. 2. Disconnect the ECM connectors and check the O2S 1 sensor signal circuit, at terminal C14 for 3. If the O2S 1 sensor signal circuit measures over the specified value, repair the open or poor connection as necessary. Is an O2S 1 sensor signal circuit problem found and corrected?	5 Ω	Go to *Step 17*	Go to *Step 15*
14	Check the O2S 1 sensor low circuit terminal C15 connection at the ECM and then replace the terminal if necessary. Does the terminal require replacement?		Go to *Step 17*	Go to *Step 16*
15	Check the O2S 1 sensor signal circuit terminal C14 connection at the ECM and then replace the terminal if necessary. Does the terminal require replacement?		Go to *Step 17*	Go to *Step 16*
16	Replace the ECM Is the repair complete?		Go to *Step 17*	

Step	Action	Value(s)	Yes	No
17	1. Using the scan tool, clear the Diagnostic Trouble Codes (DTCs). 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 18*	Go to *Step 2*
18	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to ”Applicable DTC table”	System OK



DIAGNOSTIC TROUBLE CODE (DTC) P1134
O2 BANK 1 SENSOR 1 TRANSITION RATIO

Circuit Description

The engine control module (ECM) monitors the oxygen sensor (O2S 1) activity for 60 seconds after closed loop and stoichiometric operation have been established. During the monitoring period the ECM counts the number of times that the O2S 1 responds from rich to lean and adds the amount of time it took to complete all transitions. With this information, an average time for all transitions can be determined. The ECM then divides the rich–to–lean average by the lean–to–rich average to obtain a ratio. If the O2S 1 transition time ratio is not within this range, Diagnostic Trouble Code (DTC) P1134 will be set, indicating that the O2S 1 is not responding as expected to changes in exhaust oxygen content.

Conditions for Setting the DTC

- DTCs P0106, P0107, P0108, P0117, P0118, P0121, P0122, P0123, P0131, P0132, P0134, P0171, P0172, P0201, P0202, P0203, P0204, P0300, P0336, P0337, P0351, P0352, P0402, P0404, P0405, P0406, P0443, P0506, P0507, P1130, P1404 and P1627 not set.
- Closed Loop stoichiometry.
- Purge duty cycle is greater than 0%.
- Engine coolant temperature (ECT) is above 72˚C (162˚F).
- The engine has been operating for at least 120 seconds.
- Calculated air flow is between 9 and 40 grams/sec.
- Engine speed is between 1600 rpm and 4000 rpm.
- 0.9 second delay after closed loop.

Action Taken When the DTC Sets

- The ECM will illuminate the malfunction indicator lamp (MIL) after the second consecutive trip in which the fault is detected.
- Open loop fuel control will be in effect.
- The ECM will store conditions which were present when the DTC was set as Freeze Frame and in the Failure Records data.

Conditions for Clearing the MIL/DTC

- The ECM will turn the MIL OFF on the third consecutive trip cycle during which the diagnostic has been run and the fault condition is no longer present.
- A history DTC P1134 will clear after 40 consecutive warm–up cycles have occurred without a fault.
- DTC P1134 can be cleared by using the scan tool CLEAR INFO function or by disconnecting the ECM battery feed.

Diagnostic Aids

A malfunction in the O2S 1 ignition feed or ground circuit may cause a DTC P1134 to set. Check O2S 1 circuitry for intermittent faults or poor connections. If connections and wiring are OK and DTC P1134 continues to set, replace the Bank 1 Sensor 1 (O2S 1).

Reviewing the Failure Records vehicle mileage since the diagnostic test last failed may help determine how often the condition that caused the DTC to be set occurs. This may assist in diagnosing the condition.

Test Description

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

3. A condition that affects pre–converter and post–converter oxygen sensors indicates probable contamination. To avoid damaging replacement sen-

sors, correct the condition which caused the contamination before replacing the affected sensors.

5. This step checks for conditions which may cause the O2S 1 to appear faulty. Correct any of the described conditions if present.
8. To avoid damaging replacement sensors, correct the condition which caused the contamination before replacing the affected sensors

DTC P1134 O2 Bank 1 Sensor 1 Transition Ratio

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	**Important :** If any Diagnostic Trouble Codes (DTCs) are set (except P1153 and/or P1154), refer to those DTCs before proceeding with this diagnostic chart. 1. Idle the engine at operating temperature. 2. Operate the vehicle within parameters specified under Conditions for Setting the DTC. 3. Using a scan tool, monitor specific DTC info for DTC P1134 until the DTC P1134 test runs. 4. Note the test result. Does the scan tool indicate DTC P1134 failed this ignition?		Go to *Step 3*	Refer to ”Diagnostic Aids”
3	1. Perform an exhaust system leak test. 2. If an exhaust leak is found, repair as necessary. Is the exhaust leak isolated?		Go to *Step 14*	Go to *Step 4*
4	Visually/physically inspect the following items: • Oxygen Sensor (O2S 1) is securely installed. • Corrosion on terminals. • Terminal tension (at O2S 1 and at the engine control module [ECM]). • Damaged wiring. Is a problem found in any of the above areas?		Go to *Step 7*	Go to *Step 5*
5	1. Disconnect the O2S 1. 2. Turn the ignition ON. 3. Using a digital voltmeter (DVM) at the ECM side of the O2S 1 connector, measure the voltage between the high signal circuit, terminal 2 and ground. 4. Also measure the voltage between the low signal circuit, terminal 1 and ground. Are both voltages in the specified range?	3–4 v	Go to *Step 6*	Go to *Step 8*
6	1. With the O2S 1 disconnected, jumper the high and low signal circuits, terminals 2 and 1 to ground. 2. Turn the ignition ON. 3. Using a scan tool, monitor the O2S 1 voltage. Does the scan tool indicate less than 10 mv and immediately return to about 450 mv when the jumper is removed?		Go to *Step 10*	Go to *Step 11*
7	Repair condition as necessary. Is the action complete?		Go to *Step 14*	

Step	Action	Value(s)	Yes	No
8	Check for faulty ECM connections or terminal damage. Is the action complete?		Go to *Step 14*	
9	Repair open, short, or grounded signal circuit. Is the action complete?		Go to *Step 14*	Go to *Step 6*
10	Remove the O2S 1 and examine it for signs of: • Fuel contamination. • Improper Room Temperature Vulcanizing (RTV) sealant (white powdery coating on sensor). • Engine oil/coolant consumption. Are signs of contamination observed?		Go to *Step 13*	Go to *Step 12*
11	Replace the ECM. Is the repair complete?		Go to *Step 14*	Go to *Step 12*
12	Replace the O2S 1. Is the action complete?		Go to *Step 14*	
13	Determine and correct the cause of contamination before replacing the O2S 1. Is the action complete?		Go to *Step 14*	
14	1. Using the scan tool, clear the DTCs. 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 15*	Go to *Step 2*
15	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to ”Applicable DTC table”	System OK