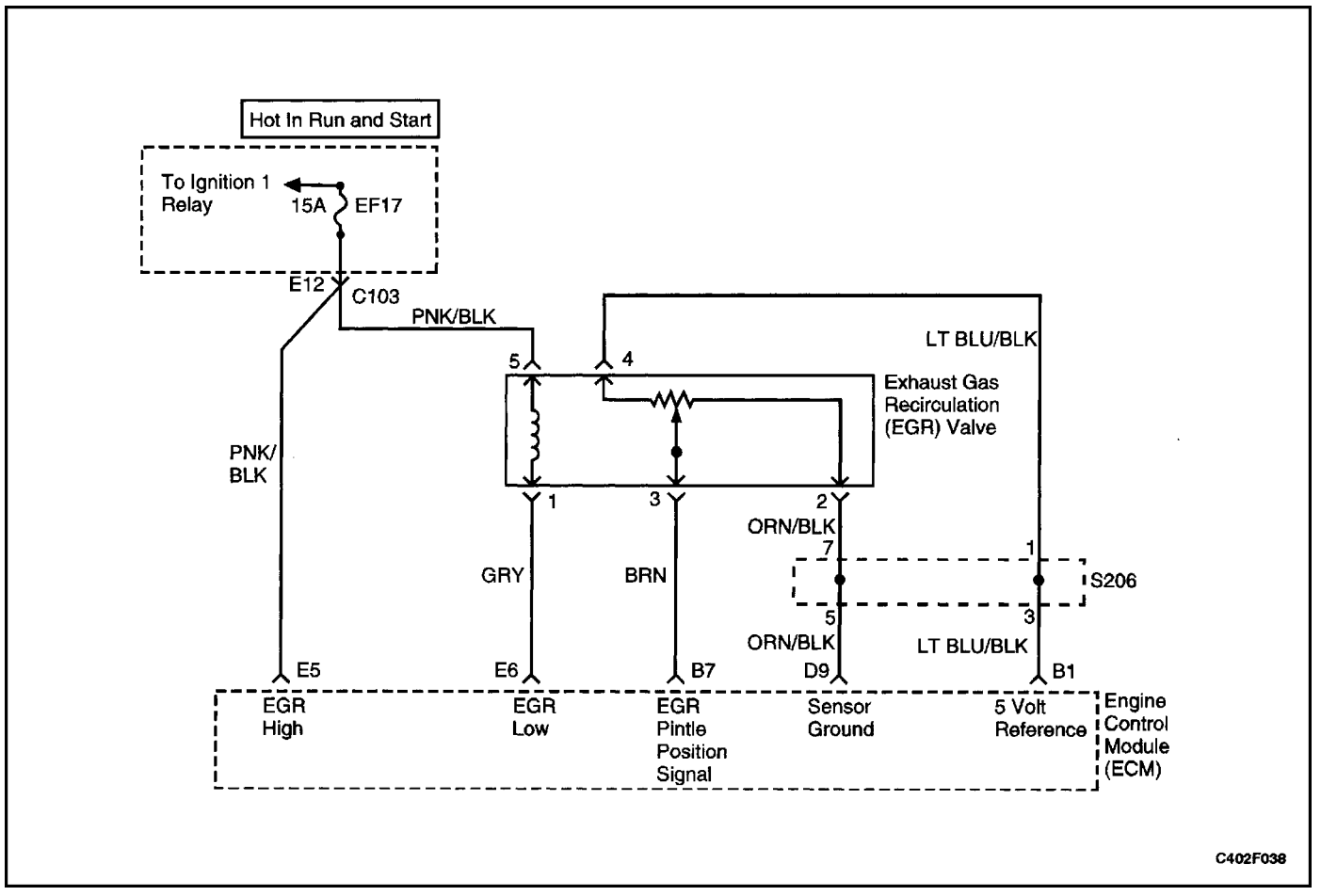


DIAGNOSTIC TROUBLE CODE (DTC) P1404

EXHAUST GAS RECIRCULATION CLOSED VALVE PINTLE ERROR

Circuit Description

An Exhaust Gas Recirculation (EGR) system is used to lower Oxides of Nitrogen (NOx) emission levels caused by high combustion temperatures. It accomplishes this by feeding small amounts of exhaust gases back into the combustion chamber. When the air/fuel mixture is diluted with the exhaust gases, combustion temperatures are reduced.

A linear EGR valve is used on this system. The linear EGR valve is designed to accurately supply exhaust gases to the engine without the use of intake manifold vacuum. The valve controls exhaust flow going into the intake manifold from the exhaust manifold through an orifice with an engine control module (ECM) controlled pintle. The ECM controls the pintle position using inputs from the Throttle Position (TP) and Manifold Absolute Pressure (MAP) sensors. The ECM then commands the EGR valve to operate when necessary by controlling an ignition signal through the ECM. This can be monitored on a scan tool as the Desired EGR Position.

The ECM monitors the results of its command through a feedback signal. By sending a 5 volt reference and a ground to the EGR valve, a voltage signal representing the EGR valve pintle position is sent to the ECM. This feedback signal can also be monitored on a scan tool and is the actual position of the EGR pintle. The Actual EGR Position should always be near the commanded or Desired EGR Position.

Conditions for Setting the DTC

- Engine running.
- Ignition voltage is between 11 and 16 volts.
- Desired EGR position is equal to 0.
- Difference between current and learned low position is greater than 16 A/D counts.
- Failed conditions exist for more than 6.3 seconds for 3 EGR cycles each separated by 5 seconds at the desired position of greater than or equal to 30%.
- Coolant temperature is greater than 2˚C (35.6˚F).

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will illuminate after two consecutive ignition cycles in which the diagnostic runs with the fault active.
- The ECM will record operating conditions at the time the diagnostic fails. This information will be stored in the Freeze Frame and Failure Records buffers.
- A history Diagnostic Trouble Code (DTC) is stored.
- Coolant fan turns on.
- EGR is disabled.

Conditions for Clearing the MIL/DTC

- The MIL will turn off after three consecutive ignition cycles in which the diagnostic runs without a fault.
- A history DTC will clear after 40 consecutive warm–up cycles without a fault.
- DTC(s) can be cleared by using the scan tool.

Diagnostic Aids

Due to moisture associated with exhaust systems, the EGR valve may freeze and stick in cold weather. After the vehicle is brought into a warm shop for repairs, the valve warms and the problem disappears. By watching the Actual EGR and Desired EGR Positions on a cold vehicle with a scan tool, the fault can be easily verified. Check the freeze frame data to determine if the DTC set when the vehicle was cold by viewing the Engine Coolant Temperature (ECT).

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 electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
2. Commanding the EGR valve open determines whether the EGR system can control the EGR valve accurately and if the fault is present.
3. When the EGR valve electrical connector is disconnected, the scan tool should display the Actual EGR Position as 0%. If it does not, the fault lies either in the EGR signal circuit or the ECM.
5. If the ERG valve 5 volt reference is shorted to voltage, the digital voltmeter (DVM) will read battery voltage and additional DTCs may be set and engine performance will be poor.
6. The replacement ECM must be reprogrammed. Refer to the latest Techline procedure for ECM reprogramming.
10. An open or poor connection condition may have caused this DTC to set. Be sure to check the terminals for being backed out, improperly formed or damaged, and for poor tension.
11. All circuits to the EGR valve are OK at this point. The fault lies internally in the EGR valve and therefore must be replaced. Be sure all gasket material is removed from the EGR mounting surface. Even a small amount of material may cause a DTC P0401 to set.
12. Check the terminals for being backed out, improperly formed or damaged, and for poor tension.
13. Clearing DTCs is a very important step for this diagnostic. The clearing function allows the EGR valve to relearn a new pintle position as the old pintle position was inaccurate due to the failure that caused the DTC. The DTC must be cleared with the ignition ON, engine OFF or when the engine is idling. If the ECM sees a EGR command, the new pintle will not be learned.
14. If no malfunctions have been found at this point and no additional DTCs were set, refer to ”Diagnostic Aids” in this section for additional checks and information.

DTC P1404 Exhaust Gas Recirculation Closed Valve Pintle Error

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Turn the ignition switch ON with the engine OFF. 2. Install a scan tool. 3. Command the Exhaust Gas Recirculation (EGR) valve to the specified values. Does the Actual EGR Position follow the Desired EGR Position?	25%, 50%, 75%, 100%	Go to *Step 13*	Go to *Step 3*
3	Disconnect the EGR valve electrical connector. Is the Actual EGR Position near the specified value?	100%	Go to *Step 4*	Go to *Step 5*
4	Check the signal circuit terminal 3 for a short to voltage and repair as necessary. Is a repair necessary?		Go to *Step 13*	Go to *Step 6*
5	With a digital voltmeter (DVM) connected to ground, probe the 5 volt reference circuit terminal 4 to the EGR valve. Does the DVM read near the specified value?	5 v	Go to *Step 7*	Go to *Step 8*
6	Replace the engine control module (ECM). Is the action complete?		Go to *Step 13*	
7	1. Connect a test light to ground. 2. Probe the EGR control circuit to the EGR valve. Does the test light illuminate?		Go to *Step 9*	Go to *Step 10*
8	Check the 5 volt reference circuit for a short to voltage and repair as necessary. Is a repair necessary?		Go to *Step 13*	Go to *Step 6*
9	Check the control circuit for a short to voltage and repair as necessary. Is a repair necessary?		Go to *Step 13*	Go to *Step 6*
10	Check the EGR sensor ground circuit for an open or poor connection at the EGR valve electrical connector and repair as necessary. Is the repair complete?		Go to *Step 13*	Go to *Step 12*
11	Replace the EGR valve. Is the action complete?		Go to *Step 13*	
12	Check the ECM electrical connector for a poor connection and repair as necessary. Is a repair necessary?		Go to *Step 13*	Go to *Step 6*

Step	Action	Value(s)	Yes	No
13	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 14*	Go to *Step 2*
14	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) P1441

EVAPORATIVE EMISSION CONTINUOUS PURGE FLOW

System Description

The Evaporative Emission (EVAP) system includes the following components:

- Fuel tank
- EVAP vent solenoid
- Fuel tank pressure sensor
- Fuel pipes and hoses
- Fuel vapor lines
- Fuel cap
- EVAP canister
- Purge lines
- EVAP canister purge valve
- EVAP service port

The EVAP system is checked by applying vacuum to the EVAP system and monitoring for a vacuum decay. The engine control module (ECM) monitors the vacuum level through the fuel tank pressure sensor signal.

At the appropriate time, the EVAP canister purge valve and the EVAP vent solenoid are turned on, allowing the engine to draw a small vacuum on the entire EVAP system. After the desired vacuum level has been achieved, the EVAP canister purge valve is turned off, sealing the system. The EVAP canister purge valve allows manifold vacuum to purge the canister. The ECM supplies a ground to energize the solenoid valve (purge on). The EVAP canister purge valve control is Pulse Width Modulated (PWM) or turned on and off several times a second. The duty cycle (pulse width) is determined by engine operating conditions including load, throttle position (TP), engine coolant temperature (ECT) and ambient temperature. The duty cycle is calculated by the ECM and the output is commanded when the appropriate conditions have been met.

The system checks for conditions that cause the EVAP system to purge continuously by commanding the EVAP vent solenoid on and the EVAP canister purge valve off (EVAP vent solenoid closed, EVAP purge PWM 0%)

If fuel tank vacuum level increases during the test, a continuous purge flow condition is indicated. This can be caused by the following conditions:

- EVAP Canister Purge Valve leaking
- EVAP purge and engine vacuum lines switched at the EVAP canister purge valve
- EVAP canister purge valve driver circuit grounded

If any of these conditions are present, Diagnostic Trouble Code (DTC) P1441 will set.

Conditions for Setting the DTC

- DTC(s) P0106, P0107, P0108, P0113, P0117, P0118, P0121, P0122, P0123, P0131, P0132, P0133, P0134, P0135, P0137, P0138, P0140, P0141, P0201, P0202, P0203, P0204, P0300, P0402, P0404, P0405, P0406, P0443, P0449, P0452, P0453, P0506, P0507, P1130, P1133, P1134, P1404, P1627 and P1640 not set.
- No system voltage malfunction.
- Fuel tank vacuum is greater than 8 inches of H2O for 0.5 seconds.
- Intake air temperature (IAT) and ECT are between 4˚C (40˚F) and 32˚C (90˚F) at engine start up.
- Barometric Pressure (BARO) is greater than 72.3 kPa.
- Start–up ECT and IAT is between 4˚C (39.2˚F) and 32˚C (89.6˚F).
- IAT is not more than 6.25˚C (43.3˚F) greater than the ECT at start up.
- Engine Coolant Temperature (ECT) is not more than 6.25˚C (44˚F) greater than the Intake Air Temperature (IAT) at start up.
- Fuel tank level is between 15% and 85%.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will illuminate.
- The ECM will record operating conditions at the time the diagnostic fails. This information will be stored in the Freeze Frame and Failure Records buffers.
- A history DTC is stored.
- Coolant fan turns on.

Conditions for Clearing the MIL/DTC

- The MIL will turn off after three consecutive ignition cycles in which the diagnostic runs without a fault.
- A history DTC will clear after 40 consecutive warm–up cycles without a fault.
- DTC(s) can be cleared by disconnecting the battery.

Diagnostic Aids

Although this DTC is considered a type A diagnostic (refer to ”Engine Control Module” in this section), it acts like a type B diagnostic under certain conditions. Whenever this diagnostic reports the system has passed, or if the battery is disconnected, the diagnostic must fail twice before setting a DTC. The initial failure is not reported to the diagnostic executive or displayed on a scan tool. A passing system always reports to the diagnostic executive immediately.

Check for the following conditions:

- Poor connection at ECM. Inspect harness connectors for the following conditions:
  - Backed–out terminals
  - Improper mating
  - Broken locks
  - Improperly formed
  - Damaged terminals
  - Poor terminal–to–wire connection

- Damaged harness. Inspect the wiring harness for damage. If the harness appears to be OK, connect the EVAP pressure/purge cart J–41413 to the EVAP service port, pressurize the EVAP system to 10 in. H2O, and observe the Fuel Tank Vacuum Pressure display on the scan tool while moving connectors and wiring harnesses related to the EVAP canister purge valve. A sudden change in the display will indicate the location of the fault.
- Incorrect vacuum line routing. Verify that the source vacuum line routing to the EVAP canister purge valve is correct and that the EVAP purge and source vacuum lines to the EVAP canister purge valve are not switched.
- Loose Carbon in the purge solenoid. Blow out the lines and replace the purge canister.

Test Description

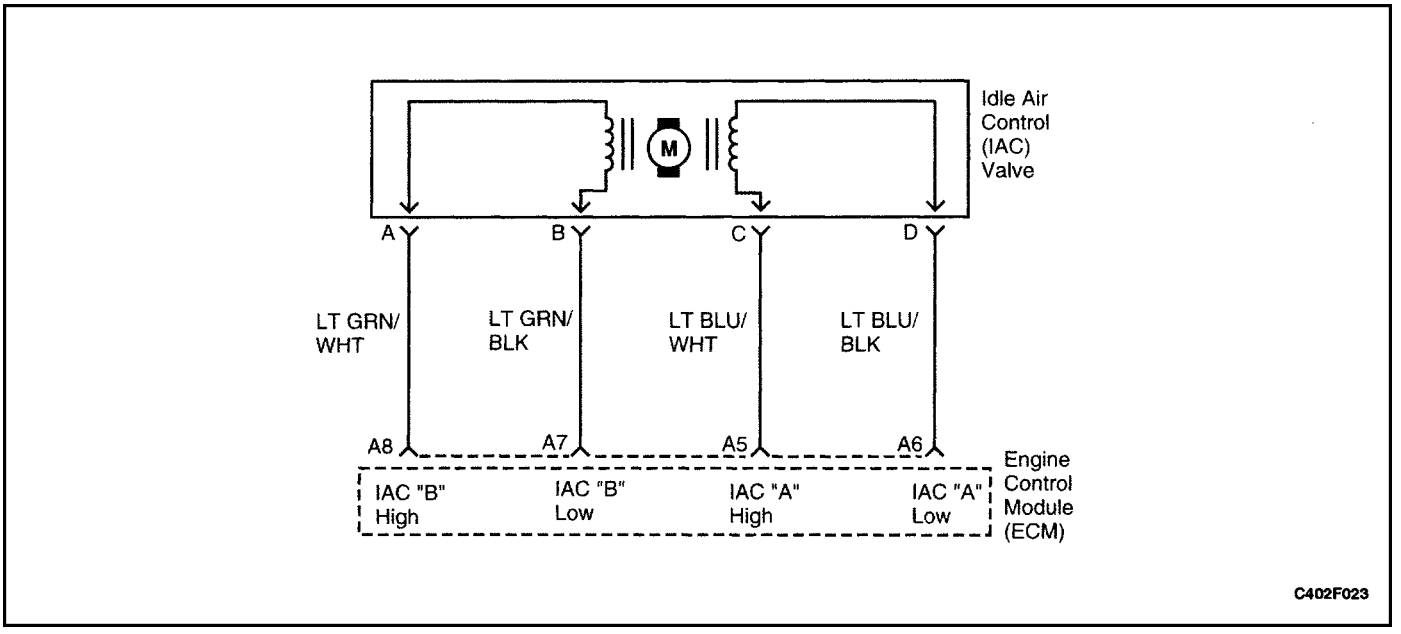
Number(s) below refer to the step number(s) on the Diagnostic Table.

1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
2. If an EVAP canister purge valve electrical malfunction is present, the purge system will not operate correctly. Repairing the electrical malfunction will very likely correct the condition that set DTC P1441.
3. Checks the fuel tank pressure sensor at ambient pressure.
5. Forces fuel tank pressure sensor to re–zero.
7. Verifies that the fuel tank pressure sensor accurately reacts to EVAP system pressure changes.
9. If the EVAP purge and engine vacuum lines are switched at the EVAP canister purge valve, the solenoid valve will leak vacuum.
12. Duplicates the On–Board diagnostic test.

DTC P1441 Evaporative Emission Continuous Purge Flow

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. Install scan tool. 2. Command the Evaporative Emission (EVAP) canister purge valve and vent solenoid on and off with the scan tool. Does the purge valve and vent solenoid click on and off?		Go to *Step 3*	Go to ”ECM Output Diagnosis”
3	1. Turn the ignition switch OFF. 2. Remove the fuel cap. 3. Turn the ignition switch ON. Is the Fuel Tank Pressure at the specified value?	0 in. H2O (±1 in. H2O)	Go to *Step 6*	Go to *Step 4*
4	Check the battery. Has the battery been disconnected?		Go to ”EVAP Control System Diagnosis”	Go to *Step 5*
5	Disconnect the battery. Is the action complete?		Go to *Step 3*	

Step	Action	Value(s)	Yes	No
6	**Important :** Before continuing with this diagnosis, zero the EVAP Pressure and Vacuum gauges on the EVAP pressure/purge cart J–41413. Also read the temperature variation instruction card. 1. Reinstall the fuel cap. 2. Connect the EVAP pressure/purge cart J–41413 to EVAP service port. 3. Using the scan tool, command the EVAP vent solenoid ON (closed). 4. Attempt to pressurize the EVAP system to the specified value using the EVAP pressure/purge cart J–41413 (monitor the pressure using the gauge an the cart with the switch in the HOLD position). Can the specified value be achieved?	5 in. H20	Go to *Step 7*	Go to *Step 8*
7	1. Maintain tank pressure at 5 inches of H2O. 2. Observe the Fuel Tank Pressure on the scan tool. Is the Fuel Tank Pressure at the specified value?	5 in. H2O	Go to *Step 8*	Go to ”EVAP Control System Diagnosis”
8	1. Remove the engine vacuum source line from the EVAP canister purge valve. 2. Connect a vacuum hand pump to the engine vacuum side of the EVAP canister purge valve and apply specified vacuum to the solenoid. Does the EVAP canister purge valve maintain vacuum at the specified value?	15 in. Hg	Go to *Step 9*	Go to *Step 10*
9	Check the EVAP purge and source vacuum line routing and connections at the EVAP canister purge valve. Are the EVAP purge and source vacuum lines connected correctly at the EVAP canister purge valve?		Go to”Diagnostic Aids”	Go to *Step 11*
10	Replace the EVAP canister purge valve. Is the action complete?		Go to *Step 12*	
11	Connect the EVAP purge and source vacuum line routing and connections. Is the action complete?		Go to *Step 12*	
12	1. Start the engine. 2. Remove the fuel cap. 3. Using the scan tool, command the EVAP vent solenoid on (closed) and the EVAP canister purge valve off (0%). 4. Replace the fuel cap. 5. Run the engine at the specified rpm while monitoring the Fuel Tank Pressure on the scan tool. Does the Fuel Tank Pressure remain at or above the specified value while the EVAP vent solenoid is command on (closed) and the EVAP canister purge valve is command off (0%).		System OK	Go to *Step 2*



DIAGNOSTIC TROUBLE CODE (DTC) P1508
IDLE AIR CONTROL COUNTS TOO LOW

Circuit Description

The engine control module (ECM) controls engine idle speed by adjusting the position of the idle air control (IAC) motor pintle. The IAC is a bi–directional stepper motor driven by two coils. The ECM applies current to the IAC coils in steps (counts) to extend the IAC pintle into a passage in the throttle body to decrease air flow. The ECM reverses the current to retract the pintle, increasing air flow. This method allows highly accurate control of idle speed and quick response to changes in engine load. If the ECM detects a condition where too low of an idle speed is present and the ECM is unable to adjust idle speed by decreasing the IAC counts, Diagnostic Trouble Code (DTC) P1508 will set, indicating a problem with the idle control system.

Conditions for Setting the DTC

- No scan tool test is being run.
- None of these DTCs are set: Throttle Position (TP) sensor, Vehicle Speed Sensor (VSS), Engine Coolant Temperature (ECT), Exhaust Gas Recirculation EGR), Fuel System, Manifold Absolute Pressure MAP), Intake Air Temperature (IAT), Canister Purge, Injector Control or Ignition Control.
- Barometric pressure (BARO) is above 75 kPa.
- ECT is above 50˚C (120˚F).
- Engine speed is more than 100–200 rpm lower than desired idle, based upon coolant temperature.
- The engine has been running for at least 125 seconds.
- Vehicle speed is greater than 1 mph.
- Canister purge duty cycle is above 10%.
- Ignition voltage is between 9.5 and 16.7 volts.
- The throttle is closed.
- Engine speed is lower than desired idle.
- All of the above conditions are met for 10 seconds.

Action Taken When the DTC Sets

- The ECM will not illuminate the Malfunction Indicator Lamp (MIL).
- 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

- A history DTC P1508 will clear after 40 consecutive warm–up cycles have occurred without a fault.
- DTC P1508 can be cleared by using the scan tool CLEAR INFO function or by disconnecting the battery.

Diagnostic Aids

Check for the following conditions:

- Poor connection at the ECM or IAC motor – 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.
- Restricted air intake system – Check for a possible collapsed air intake duct, restricted air filter element, or foreign objects blocking the air intake system.
- Throttle body – Check for objects blocking the IAC passage or throttle bore, excessive deposits in the IAC passage and on the IAC pintle, and excessive deposits in the throttle bore and on the pintle plate.
- Large vacuum leak – Check for a condition that causes a large vacuum leak, such as a disconnected brake booster hose.

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

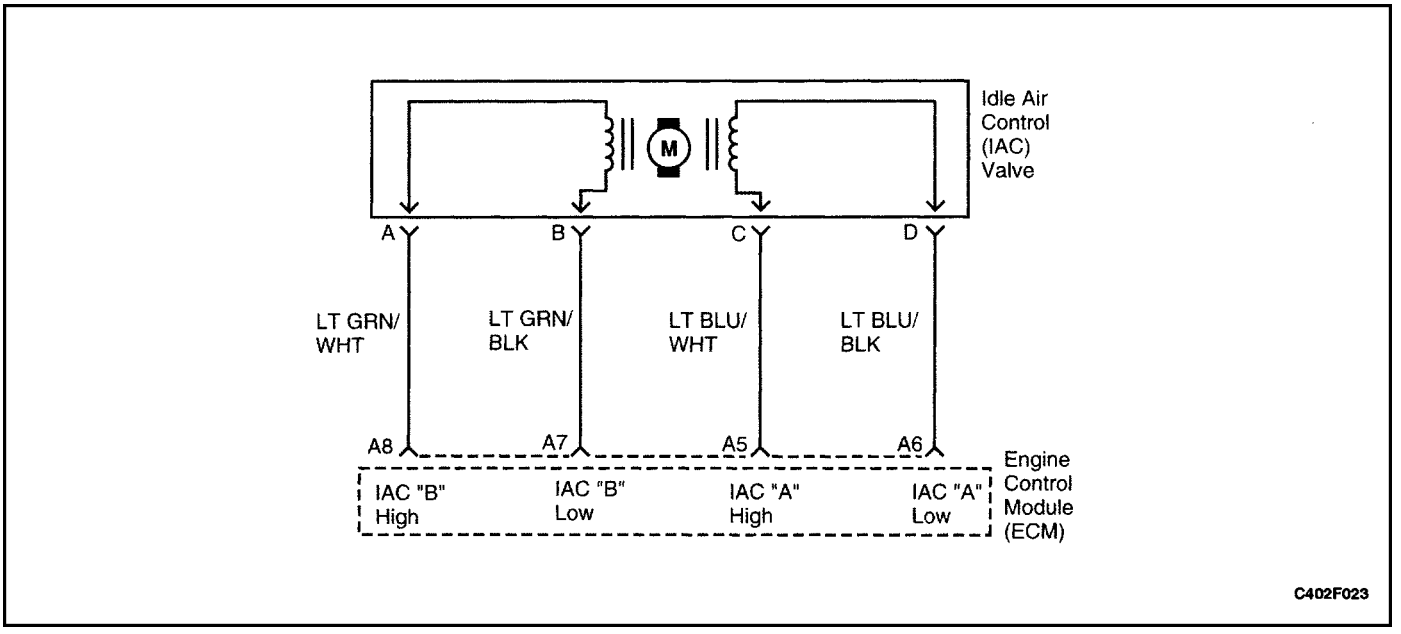
Number(s) below refer to the step number(s) on the Diagnostic Table.

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.
8. The replacement ECM must be reprogrammed. Refer to the latest Techline procedure for ECM reprogramming.

DTC P1508 Idle Air Control Counts Too Low

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. Start the engine. 2. Turn all accessories off. 3. Using a scan tool, command rpm up to 1500, down to 500, and than up to 1500 while monitoring the Engine Speed on the scan tool. **Important :** This scan tool command may cause the engine to ”cut out” when the rpm goes above 1500. If this occurs, the ”cutting out” will stop when the scan tool command for the test is discontinued, or if the scan tool command is changed to less than 1500 rpm. Does ”Engine Speed” remain within the specified value of ”Desired Idle” for each rpm command?	± 50 rpm	Go to ”Diagnostic Aids”	Go to *Step 3*
3	1. Disconnect the Idle Air Control (IAC). 2. Install IAC Node Light J–37027 or equivalent. 3. With the engine running, command rpm up to 1500, down to 500, and then up to 1500 while observing the node light. **Important :** This scan tool command may cause the engine to ”cut out” when the rpm goes above 1500. If this occurs, the ”cutting out” will stop when the scan tool command for the test is discontinued, or if the scan tool command is changed to less than 1500 rpm. Does each node light cycle red and green (never ”OFF”)?		Go to *Step 5*	Go to *Step 4*
4	1. Check the following circuits for an open, short to ground, short to voltage, or poor connections at the engine control module (ECM): • IAC ”A” Low, terminal A6. • IAC ”A” High, terminal A5. • IAC ”B” Low, terminal A7. • IAC ”B” High, terminal A8. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 9*	Go to *Step 8*

Step	Action	Value(s)	Yes	No
5	Visually/physically inspect for the following conditions: • Restricted air intake system. Check for a possible collapsed air intake duct, restricted air filter element, or foreign objects blocking the air intake system. • Throttle body. Check for objects blocking the IAC passage and on the IAC pintle, and excessive deposits in the throttle bore and on the throttle plate. Do any of the above require a repair?		Go to "Appropriate On–Vehicle Service"	Go to *Step 6*
6	1. Check for a poor connection at the IAC harness connector. 2. Replace faulty terminals as necessary. Is a problem found?		Go to *Step 9*	Go to *Step 7*
7	Replace the IAC valve. Is the action complete?		Go to *Step 9*	
8	Replace the ECM. Is the action complete?		Go to *Step 9*	
9	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 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) P1509
IDLE AIR CONTROL COUNTS TOO HIGH

Circuit Description

The engine control module (ECM) controls engine idle speed by adjusting the position of the idle air control (IAC) motor pintle. The IAC is a bi–directional stepper motor driven by two coils. The ECM applies current to the IAC coils in steps (counts) to extend the IAC pintle into a passage in the throttle body to decrease air flow. The ECM reverses the current to retract the pintle, increasing air flow. This method allows highly accurate control of idle speed and quick response to changes in engine load. If the ECM detects a condition where too low of an idle speed is present and the ECM is unable to adjust idle speed by decreasing the IAC counts, Diagnostic Trouble Code (DTC) P1508 will set, indicating a problem with the idle control system.

Conditions for Setting the DTC

- No scan tool test is being run.
- None of these DTCs are set: Throttle Position (TP) sensor, Vehicle Speed Sensor (VSS), Engine Coolant Temperature (ECT), Exhaust Gas Recirculation (EGR), Fuel System, Manifold Absolute Pressure (MAP), Intake Air Temperature (IAT), Canister Purge, Injector Control or Ignition Control.
- Barometric pressure (BARO) is above 75 kPa.
- ECT is above 50˚C (120˚F).
- Engine speed is more than 100–200 rpm lower than desired idle, based upon coolant temperature.
- The engine has been running for at least 125 seconds.
- Vehicle speed is greater than 1 mph.
- Canister purge duty cycle is above 10%.
- Ignition voltage is between 9.5 and 16.7 volts.
- The throttle is closed.
- Engine speed is lower than desired idle.
- All of the above conditions are met for 10 seconds.

Action Taken When the DTC Sets

- The ECM will not illuminate the Malfunction Indicator Lamp (MIL).
- 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

- A history DTC P1509 will clear after 40 consecutive warm–up cycles have occurred without a fault.
- DTC P1509 can be cleared by using the scan tool CLEAR INFO function or by disconnecting the battery.

Diagnostic Aids

Check for the following conditions:

- Poor connection at the ECM or IAC motor – 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.
- Restricted air intake system – Check for a possible collapsed air intake duct, restricted air filter element, or foreign objects blocking the air intake system.
- Throttle body – Check for objects blocking the IAC passage or throttle bore, excessive deposits in the IAC passage and on the IAC pintle, and excessive deposits in the throttle bore and on the pintle plate.
- Large vacuum leak – Check for a condition that causes a large vacuum leak, such as a disconnected brake booster hose.

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

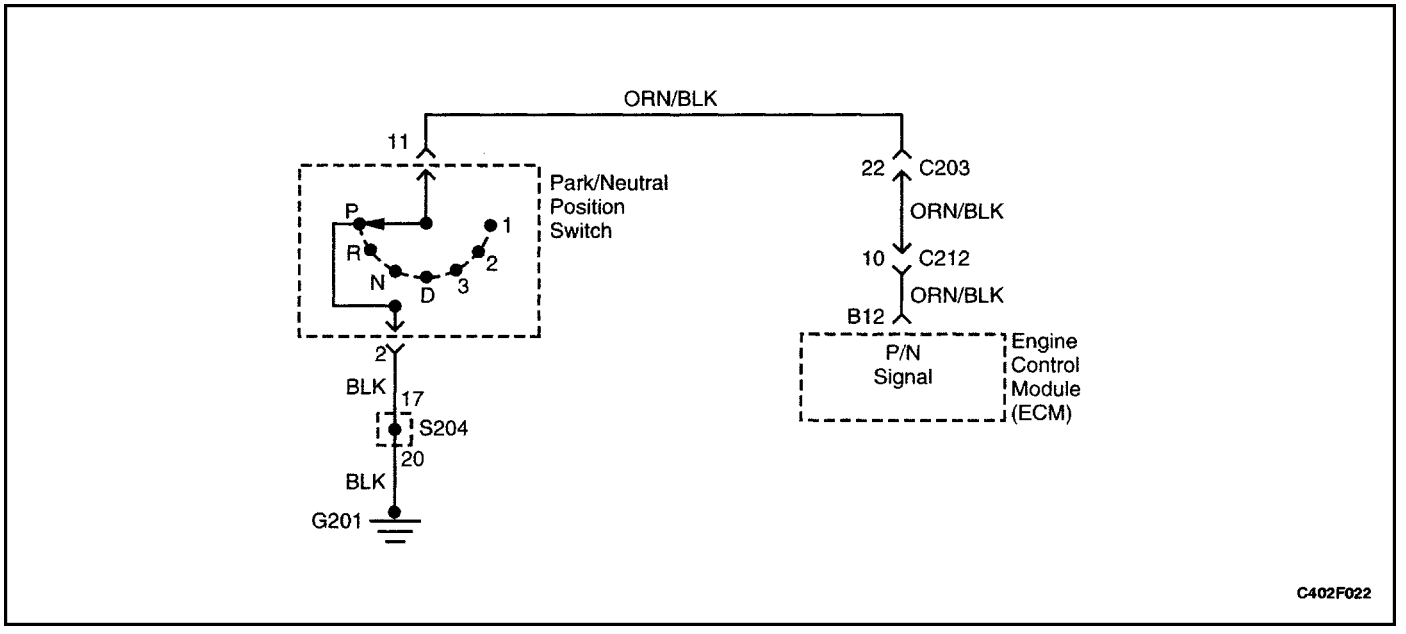
Number(s) below refer to the step number(s) on the Diagnostic Table.

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.
8. The replacement ECM must be reprogrammed. Refer to the latest Techline procedure for ECM reprogramming.

DTC P1509 Idle Air Control Counts Too High

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. Start the engine. 2. Turn all accessories off. 3. Using a scan tool, command the rpm up to 1500, down to 500, and than up to 1500 while monitoring the ENGINE SPEED on the scan tool. **Important :** This scan tool command may cause the engine to "cut out" when the rpm goes above 1500. If this occurs, the "cutting out" will stop when the scan tool command for the test is discontinued, or if the scan tool command is changed to less than 1500 rpm. Does ENGINE SPEED remain within the specified value of "Desired Idle" for each rpm command?	± 50 rpm	Go to "Diagnostic Aids"	Go to *Step 3*
3	1. Disconnect the Idle Air Control (IAC). 2. Install IAC Node Light J–37027 or equivalent. 3. With the engine running, command the rpm up to 1500, down to 500, and then up to 1500 while observing the node light. **Important :** This scan tool command may cause the engine to "cut out" when the rpm goes above 1500. If this occurs, the "cutting out" will stop when the scan tool command for the test is discontinued, or if the scan tool command is changed to less than 1500 rpm. Does each node light cycle red and green (never OFF)?		Go to *Step 5*	Go to *Step 4*
4	1. Check the following circuits for an open, short to ground, short to voltage, or poor connections at the engine control module (ECM): • IAC "A" Low, terminal A6. • IAC "A" High, terminal A5. • IAC "B" Low, terminal A7. • IAC "B" High, terminal A8. 2. If a problem is found, repair as necessary. Is a problem found?		Go to *Step 9*	Go to *Step 8*

Step	Action	Value(s)	Yes	No
5	Visually/physically inspect for the following conditions: • Restricted air intake system. Check for a possible collapsed air intake duct, restricted air filter element, or foreign objects blocking the air intake system. • Throttle body. Check for objects blocking the IAC passage and on the IAC pintle, and excessive deposits in the throttle bore and on the throttle plate. Do any of the above require a repair?		Go to ”Appropriate On–Vehicle Service”	Go to *Step 6*
6	1. Check for a poor connection at the IAC harness connector. 2. If a problem is found, replace faulty terminals as necessary. Is a problem found?		Go to *Step 9*	Go to *Step 7*
7	Replace the IAC valve. Is the action complete?		Go to *Step 9*	
8	Replace the ECM. Is the action complete?		Go to *Step 9*	
9	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 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) P1520

PARK/NEUTRAL DISCRETE FAULT

Circuit Description

The Park/Neutral Position (PNP) Switch contacts close the input circuit from the engine control module (ECM) to ground when the transmission range switch is in the park or neutral position. The PNP switch is open when a transaxle drive range is selected. The ECM uses the P/N position switch information to perform the following functions:

- Control idle speed using the Idle Air Control (IAC).
- Vehicle speed sensor (VSS) output.
- Speed sensor diagnostics.
- Ignition coil spark advance.

The ECM supplies 12 volts to the PNP switch signal circuit. The ECM senses a closed switch (PARK or NEUTRAL selected) when the voltage on the PNP signal switch drops below 1 volt.

Conditions for Setting the DTC

- DTCs P0106, P0107, P0108, P0121, P0122, P0123, P0336, P0337, P0502, P1106, P1121, P1122, P1336 not set.

In park (PNP Switch is on)

- Vehicle speed is greater than 48 km/h (30 mph).
- Engine speed is greater than 2000 rpm.
- Throttle position sensor is greater than 10%.
- Manifold Absolute Pressure (MAP) is greater than 45 kPa.

In gear (PNP Switch is OFF)

- Vehicle speed is greater than 3 km/h (2 mph).
- Engine speed is greater than 1100 rpm.
- Throttle position sensor is greater than 0.4%.
- MAP is greater than 40 kPa.

Action Taken When the DTC Sets

The ECM will not illuminate the Malfunction Indicator Lamp (MIL).

The ECM will store conditions which were present when the DTC set as Fail Records data only. This information will be not stored as Freeze Frame data.

Conditions for Clearing the MIL/DTC

- A history DTC P1520 will clear after 40 consecutive warm–up cycles have occurred without a fault.
- DTC P1520 can be cleared by using the scan tool or disconnecting the ECM.

Diagnostic Aids

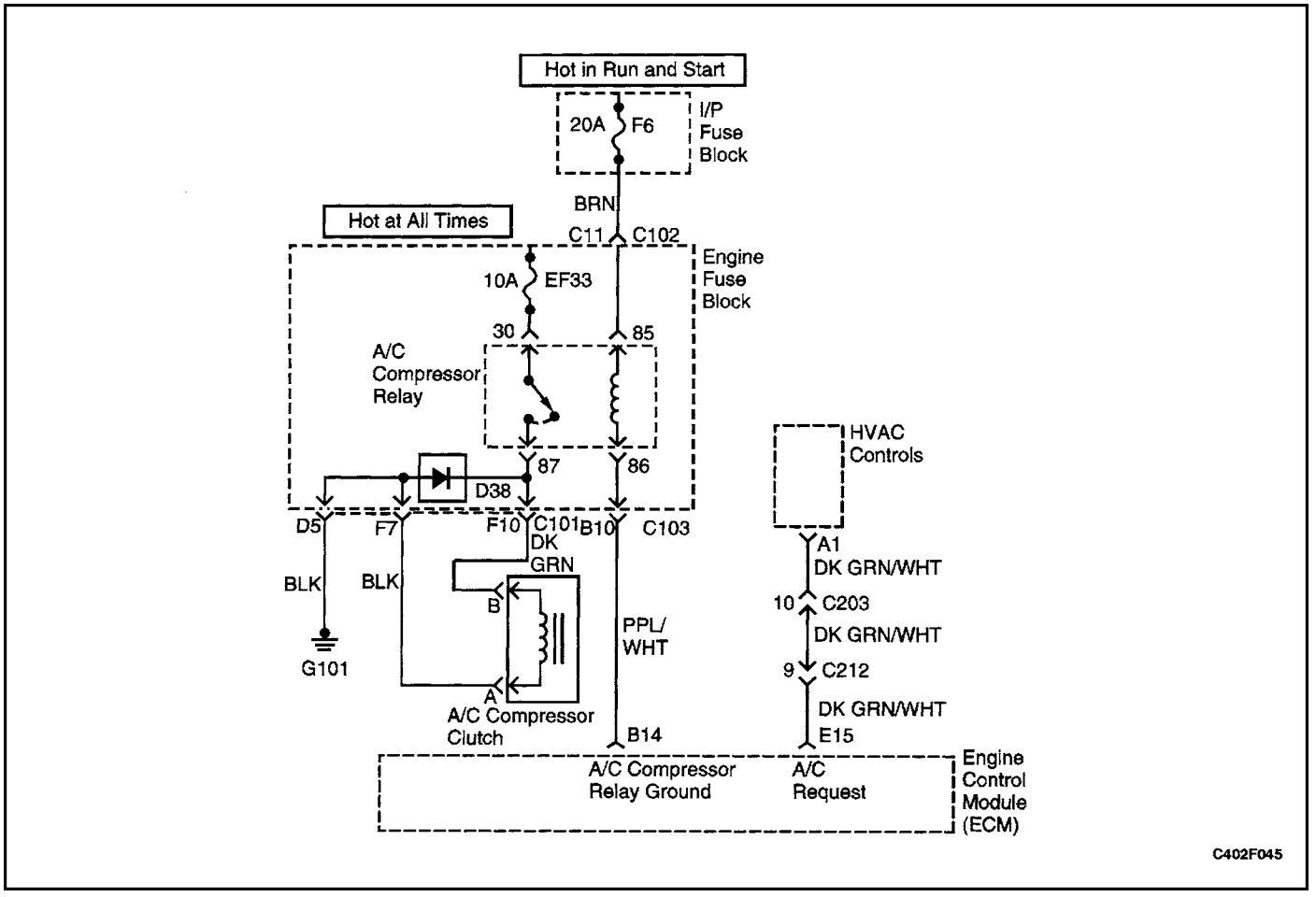
An intermittent may be caused by a poor wire connection, rubbed through wire insulation or a wire broken inside the insulation. Check for the following conditions:

- Misadjusted PNP switch.
- Poor connection with the ECM harness and connectors for improper mating, broken locks, improperly formed or damaged terminals, and poor terminal to wire connection.
- Damaged wiring harnesses.

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 P1520 Park/Neutral Discrete Fault

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. Place the transmission range switch in PARK 2. Disconnect connector 1 from the engine control module (ECM). 3. Turn the ignition ON. 4. Connect a digital voltmeter (DVM) from terminal B12 to ground and measure the resistance of the Park/Neutral position (PNP) signal circuit. Is the resistance near the specified value?	0 Ω	Go to *Step 5*	Go to *Step 3*
3	1. Turn the ignition OFF. 2. Disconnect the PNP switch connector. 3. Measure the resistance across the PNP switch at terminals 11 and 2. Is the resistance near the specified value?	0 Ω	Go to *Step 4*	Go to *Step 6*
4	Measure the resistance of the PNP signal circuit between terminal 11 at the PNP switch connector and terminal B12 on the ECM connector. Is the resistance near the specified value?	0 Ω	Go to *Step 8*	Go to *Step 7*
5	Replace the engine control module (ECM). Is the repair complete?		Go to *Step 9*	
6	Replace the PNP switch. Is the repair complete?		Go to *Step 9*	
7	Repair the open or short to ground in the PNP signal circuit between terminal 11 at the PNP switch connector and terminal B12 on the ECM connector. Is the repair complete?		Go to *Step 9*	
8	Repair the open in the PNP signal circuit between terminal 2 at the PNP switch connector and ground. Is the repair complete?		Go to *Step 9*	
9	1. Using the scan tool, clear the Diagnostic Trouble Codes (DTCs). 2. 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) P1546
A/C CLUTCH OUTPUT CIRCUIT FAULT

Circuit Description

When the engine control module (ECM) detects that A/C has been requested, the ECM will activate the A/C clutch relay. When the relay has been activated, voltage should be present at both the A/C compressor clutch and the A/C clutch status circuit at the ECM.

Conditions for Setting the DTC

- Ignition ON and voltage is greater than 10 volts.
- The ECM has commanded the A/C ON and no voltage is detected on the A/C clutch status line for more than 5 seconds.
- Engine run time is greater than 5 seconds.

Action Taken When the DTC Sets

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

Conditions for Clearing the MIL/DTC

- The MIL will turn off after three consecutive ignition cycles in which the diagnostic runs without a fault.
- A history DTC will clear after 40 consecutive warm–up cycles without a fault.
- DTC(s) can be cleared by using the scan tool.

Diagnostic Aids

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 Throttle Position (TP) sensor. A change in the display will indicate the location of the fault.

Test Description

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

1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure re-

cords 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. A problem that may prevent the compressor from engaging may or may not cause DTC P1546 to set.
3. If the scan tool indicates that the A/C status is on, then the status circuit is OK.
4. Using Freeze Frame and/or Failure Records data may aid in locating an intermittent condition. If the DTC cannot be duplicated, the information included in the Freeze Frame and/or Failure Records data can be useful in determining how many miles since the DTC set. The Fail Counter and Pass Counter can also be used to determine how many ignition cycles the diagnostic reported a pass and/or a fail. Operate vehicle within the same freeze frame conditions (rpm, load, vehicle speed, temperature, etc.) that were noted. This will isolate when the DTC failed.
5. Checks whether ignition voltage is available at the relay.
6. Determines if the A/C relay is at fault or the A/C status circuit is at fault. If the A/C clutch engages, this indicates that the A/C status circuit is OK.
11. The replacement ECM must be reprogrammed. Refer to the latest Techline procedure for ECM reprogramming.

DTC P1546 A/C Clutch Output Circuit Fault

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to *Step 2*	Go to ”On–Board Diagnostic System Check”
2	1. Install the scan tool. 2. Start the engine and idle with the A/C ON. Does the A/C clutch operate properly?		Go to *Step 3*	Go to *Step 5*
3	Using the scan tool, monitor the A/C Status display on the scan tool. Does the scan tool indicate A/C Status as on?		Go to *Step 4*	Go to *Step 8*
4	1. Turn the engine OFF, ignition ON. 2. Review the Freeze Frame and /or Failure Records data for this DTC and note parameters. 3. Turn the ignition OFF for 15 seconds. 4. Start the engine and operate the vehicle within the conditions required for this diagnostic to run, and as close to the conditions recorded in Freeze Frame/Failure Records as possible. Does the scan tool indicate that this diagnostic failed this ignition?		Go to *Step 5*	Go to ”Diagnostic Aids”
5	1. Turn the ignition OFF. 2. Disconnect the A/C clutch relay. 3. Turn the ignition ON, engine OFF. 4. Probe the ignition feed circuit at the A/C relay terminal 85 with a test light to ground. Does the test light illuminate?		Go to *Step 6*	Go to *Step 9*
6	Using a digital voltmeter (DVM) probe the resistance between the terminals 85 and 86 on the compressor relay. Is the resistance around the specified value?	98 Ω	Go to *Step 7*	Go to *Step 8*
7	1. Ignition OFF. 2. Disconnect the engine control module (ECM) connector 1 from the ECM. 3. Using a digital voltmeter (DVM) probe the resistance between terminal connector B14 and 86. Is the resistance around the specified value?	0 Ω	Go to *Step 10*	Go to *Step 11*

Step	Action	Value(s)	Yes	No
8	Replace the A/C compressor relay. Is the repair complete?		Go to *Step 12*	
9	Repair the open or short to ground in the ignition feed circuit. Is the repair complete?		Go to *Step 12*	
10	Replace the ECM. Is the repair complete?		Go to *Step 12*	
11	1. Using the scan tool, clear the Diagnostic Trouble Codes (DTCs). 2. Start the engine and idle at normal operating temperature. 3. Operate the vehicle within the conditions for setting this DTC as specified in the supporting text. Does the scan tool indicate that this diagnostic ran and passed?		Go to *Step 13*	Go to *Step 2*
12	Repair the open or short to voltage in the A/C output circuit. Is the repair complete?		Go to *Step 13*	
13	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to ”Applicable DTC table”	System OK