

DIAGNOSTIC TROUBLE CODE (DTC) P0171

BANK 1 SYSTEM TOO LEAN

System Description

To provide the best possible combination of driveability, fuel economy, and emission control, a Closed Loop air/fuel metering system is used. While in Closed Loop, the powertrain control module (PCM)/engine control module (ECM) monitors the oxygen sensor (O₂S 1) signal voltage and adjusts fuel delivery based on signal voltage. A change made to fuel delivery will be indicated by the long and short term fuel trim values which can be monitored with the scan tool. Ideal fuel trim values are around 128 (0%). If the oxygen sensor signal is indicating a lean condition, the PCM/ECM will add fuel resulting in fuel trim values above 128 (0% to 100%). If a rich condition is detected, the fuel trim values will be below 128 (0% to -100%), indicating that the PCM/ECM is reducing the amount of fuel delivered. If exhaust emissions reach an excessive level due to a lean or rich condition, a fuel trim Diagnostic Trouble Code (DTC) is set.

Conditions for Setting the DTC

- No intrusive tests active.
- DTC(s) P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0121, P0122, P0123, P0131, P0132, P0133, P0134, P0135, P0137, P0138, P0140, P0141, P0201, P0202, P0203, P0204, P0336, P0337, P0341, P0342, P0351, P0352, P0402, P0404, P0406, P0443, P0506, P0507, P1404, P1130, P1133, P1134, P1404, P1441, and P1627 not set.
- Throttle position (TP) is less than 95%.
- Engine speed is greater than 400 rpm but less than 6000 rpm.
- Barometric Pressure (BARO) is greater than 72.3 kPa.
- Coolant temperature is between 45°C (113°F) and 105°C (221°F).
- Manifold Absolute Pressure (MAP) is between 24 and 100 kPa.
- Airflow is between 0.008 and 200 g/sec.
- Vehicle speed is less than 80 mph (128 km/h).
- System is in closed loop.
- Adaptive index is ready.
- Canister purge enabled.
- System voltage is greater than 11 volts.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will illuminate after two consecutive ignitions in which the diagnostic runs with the fault active.
- The PCM/ECM will record operating conditions at the time the diagnostic fails. This information will be stored in the Freeze Frame and Failure Records buffers.

- A history 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 within the freeze frame conditions that the DTC failed.
- A history DTC will clear after 80 consecutive warm-up cycles without a fault.
- DTC(s) can be cleared by using the scan tool.

Diagnostic Aids

Important : After repairs use the scan tool Fuel Trim Reset function to reset long term fuel trim to 128 (0%).

Fuel pressure – System will be lean if pressure is too low. It may be necessary to monitor fuel pressure while driving the vehicle at various road speeds and/or loads to confirm.

Map sensor – An output that causes the PCM/ECM to sense a lower than normal manifold pressure (high vacuum) can cause the system to go lean. Disconnecting the MAP sensor will allow the PCM/ECM to substitute a fixed (default) value for the MAP sensor. If the lean condition is gone when the sensor is disconnected, substitute a known good sensor and recheck.

Fuel contamination – Water, in even small amounts, near the in-tank fuel pump inlet, can be delivered to the injector. The water causes a lean exhaust and can set DTC P0171.

Check for a poor O₂S 1 or MAP sensor connection at the PCM/ECM. Inspect the harness connectors for the following conditions:

- Backed-out terminals
- Improper mating
- Broken locks
- Improperly formed
- Damaged terminals
- Poor terminal-to-wire connection

Check for a damaged harness. Inspect wiring harness for damage. If the harness appears to be OK, observe the O₂S 1 display on the scan tool while moving connectors and wiring harness related to the engine harness. A change in the display will indicate the location of the fault.

Check the brake power booster check valve for possible leaks.

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.
5. Visually/physically checking items which may cause a lean condition may determine the cause of the DTC being set and save diagnosis time.
 9. A vacuum leak can change the Fuel Trim Index and set DTC P0171. This step checks the intake manifold for vacuum leaks.
 11. Contaminants in fuel, such as alcohol or water, can create a lean condition setting DTC P0171. Checking for these contaminants could identify the malfunction.
 17. If no faults have been found at this point and no additional DTCs were set, refer to "Diagnostic Aids" for additional checks and information.

DTC P0171 Bank 1 System Too Lean

Step	Action	Value(s)	Yes	No
1	Perform an On-Board Diagnostic (OBD II) System Check. Is the system check complete?		Go to <i>Step 2</i>	Go to "On-Board Diagnostic System Check"
2	Install the scan tool. Are any component related Diagnostic Trouble Codes (DTCs) set?		Go to applicable DTC table	Go to <i>Step 3</i>
3	With the engine running, operate the vehicle until the LOOP STATUS indicates closed. Is the Fuel Trim Index below the specified value?	160	Go to <i>Step 4</i>	Go to <i>Step 5</i>
4	1. Turn the ignition switch ON with the engine OFF. 2. Review the Freeze Frame data and note the parameters. 3. Operate the vehicle within the Freeze Frame conditions and Conditions for Setting The DTC as noted. Does the Fuel Trim Index go below the specified value while operating under the specified conditions?	160	Go to <i>Step 16</i>	Go to <i>Step 5</i>
5	Visually/physically check the following items: <ul style="list-style-type: none"> • Vacuum hoses for splits, kinks and improper connections. • Crankcase ventilation oil/air separator for proper installation. • Exhaust system for corrosion, leaks, or loose or missing hardware. • Exhaust system for corrosion, leaks, loose or missing hardware. • O2S 1 is installed securely and the pigtail harness is not contacting exhaust manifold or engine. • Fuel for excessive water, alcohol, or other contaminants. • Powertrain control module (PCM)/engine control module (ECM) and sensor grounds are clean, tight, and in their proper locations. Do any of the above checks isolate a condition requiring repair?		Go to <i>Step 7</i>	Go to <i>Step 6</i>
6	1. Disconnect the Manifold Absolute Pressure (MAP) sensor electrical connector. 2. Operate the vehicle in Closed Loop while monitoring the Fuel Trim Index. Is the Fuel Trim Index below the specified value?	160	Go to <i>Step 16</i>	Go to <i>Step 9</i>

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Step	Action	Value(s)	Yes	No
7	<p>1. Repair the malfunction found in Step 5.</p> <p>2. Check the Fuel Trim Index while operating the engine.</p> <p>Is the Fuel Trim Index below the specified value?</p>	160	Go to <i>Step 8</i>	Go to <i>Step 9</i>
8	<p>Lean condition is not present.</p> <p>Does a driveability problem exist?</p>		Go to "Symptom Diagnosis"	Go to <i>Step 16</i>
9	<p>Visually and physically inspect the following items for vacuum leaks:</p> <ul style="list-style-type: none"> • Intake manifold. • Throttle body • Injector O-rings. • Repair any leaks found. <p>Do any of the above checks isolate a condition requiring a repair?</p>		Go to <i>Step 16</i>	Go to <i>Step 10</i>
10	<p>Turn the ignition ON and allow the engine to idle.</p> <p>Are the Idle Air Control (IAC) counts above the specified value?</p>	50	Go to <i>Step 11</i>	Go to <i>Step 12</i>
11	<p>Check the fuel for excessive water, alcohol, or other contaminants and correct the contaminated fuel condition if present.</p> <p>Is the fuel contaminated?</p>		Go to <i>Step 16</i>	Go to <i>Step 13</i>
12	<p>1. Check the IAC valve performance. Refer to "DTC P0506 Idle Speed RPM Lower Than Desired Idle Speed" or "DTC P0507 Idle Speed RPM Higher Than Desired Idle Speed"</p> <p>2. Repair as necessary.</p> <p>Is a repair necessary?</p>		Go to <i>Step 16</i>	Go to <i>Step 13</i>
13	<p>1. Connect a fuel pressure gauge to the fuel system.</p> <p>2. Turn the ignition switch OFF for at least 10 seconds.</p> <p>3. Turn the ignition switch ON. The fuel pump will run for approximately 2–3 seconds. It may be necessary to cycle the ignition switch ON more than once to obtain maximum fuel pressure.</p> <p>4. Note the fuel pressure with the fuel pump running. The pressure should be within the specified value. When the fuel pump stops, the pressure may vary slightly then hold steady.</p> <p>Is the fuel pressure steady and does the fuel pressure hold?</p>	241–276 kPa (35–40 psi)	Go to <i>Step 14</i>	Go to "Fuel System Diagnosis"
14	<p>1. Start and idle the engine at normal operating temperature.</p> <p>2. The fuel pressure noted in the above step should drop by the indicated value.</p> <p>Does the fuel pressure drop by the indicated value?</p>	21–69 kPa (3–10 psi)	Go to "Fuel Injector Balance Test"	Go to "Fuel System Diagnosis"
15	<p>Replace the MAP sensor.</p> <p>Is the action complete?</p>		Go to <i>Step 16</i>	

Step	Action	Value(s)	Yes	No
16	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 <i>Step 17</i>	Go to <i>Step 2</i>
17	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) P0172

BANK 1 SYSTEM TOO RICH

System Description

To provide the best possible combination of driveability, fuel economy, and emission control, a Closed Loop air/fuel metering system is used. While in Closed Loop, the powertrain control module (PCM)/engine control module (ECM) monitors the oxygen sensor (O2S 1) signal voltage and adjusts fuel delivery based on signal voltage. A change made to fuel delivery will be indicated by the long and short term fuel trim values which can be monitored with the scan tool. Ideal fuel trim values are around 128 (0%). If the O2S 1 signal is indicating a lean condition, the PCM/ECM will add fuel resulting in fuel trim values above 128 (0% to 100%). If a rich condition is detected, the fuel trim values will be below 128 (0% to -100%), indicating that the PCM/ECM is reducing the amount of fuel delivered. If exhaust emissions reach an excessive level due to a lean or rich condition, a fuel trim Diagnostic Trouble Code (DTC) is set.

Conditions for Setting the DTC

- No intrusive tests are active, except fuel trim intrusive.
- DTC(s) P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0121, P0122, P0123, P0131, P0132, P0133, P0134, P0135, P0137, P0138, P0140, P0141, P0201, P0202, P0203, P0204, P0336, P0337, P0341, P0342, P0351, P0352, P0404, P0406, P0443, P0506, P0507, P1404, P1130, P1133, P1134, P01404, P1441, and P1627 not set.
- Throttle position (TP) is less than 95%.
- Engine speed is greater than 400 rpm but less than 6000 rpm.
- Barometric Pressure (BARO) is greater than 72.3 kPa.
- Coolant temperature is between 45°C(113°F) and 105°C(221°F).
- MAP is between 24 and 100 kPa.
- Intake Air Temperature (IAT) is between -40°C(-40°F) and 120°C(248°F).
- Airflow is between 0.008 and 200 g/sec.
- Vehicle speed is less than 80 mph (128 km/h).
- System is in closed loop.
- Adaptive index is ready.
- Canister purge enabled.

Action Taken When the DTC Sets

- The Malfunction Indicator Lamp (MIL) will illuminate after two consecutive ignitions in which the diagnostic runs with the fault active.
- The PCM/ECM will record operating conditions at the time the diagnostic fails. This information will be stored in the Freeze Frame and Failure Records buffers.
- A history 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 within the freeze frame conditions that the DTC failed.
- A history DTC will clear after 80 consecutive warm-up cycles without a fault.
- DTC(s) can be cleared by using the scan tool.

Diagnostic Aids

Important : After repairs use the scan tool Fuel Trim Reset function to reset long term fuel trim to 128 (0%).

Check for a poor connection at the PCM/ECM. Inspect the harness connectors for the following conditions:

- Backed-out terminals.
- Improper mating.
- Broken locks.
- Improperly formed.
- Damaged terminals.
- Poor terminal-to-wire connection.

Check for a damaged harness. Inspect wiring harness for damage. If the harness appears to be OK, observe the O2S 1 display on the scan tool while moving the connectors and the wiring harness related to the engine harness. A change in the display will indicate the location of the fault.

If a DTC P1404 is also set, check the 5 volt reference circuits for a short to voltage.

Check for a restricted exhaust system.

A shorted 5 volt reference circuit may cause a DTC P0172 to set. Check the 5 volt reference sensors for abnormal readings.

Test Description

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

1. The On-Board Diagnostic (OBD) 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.
5. A clogged air cleaner filter element restricts the airflow coming into the engine. This step checks the condition of the air cleaner filter.
17. A leaky injector can cause a rich condition and set DTC P0172. Refer to "Fuel injector Balance Test" in this section.
19. A loose TP sensor may not set a TP sensor related DTC, but may cause the system to become rich by a higher-than-actual TP reading.

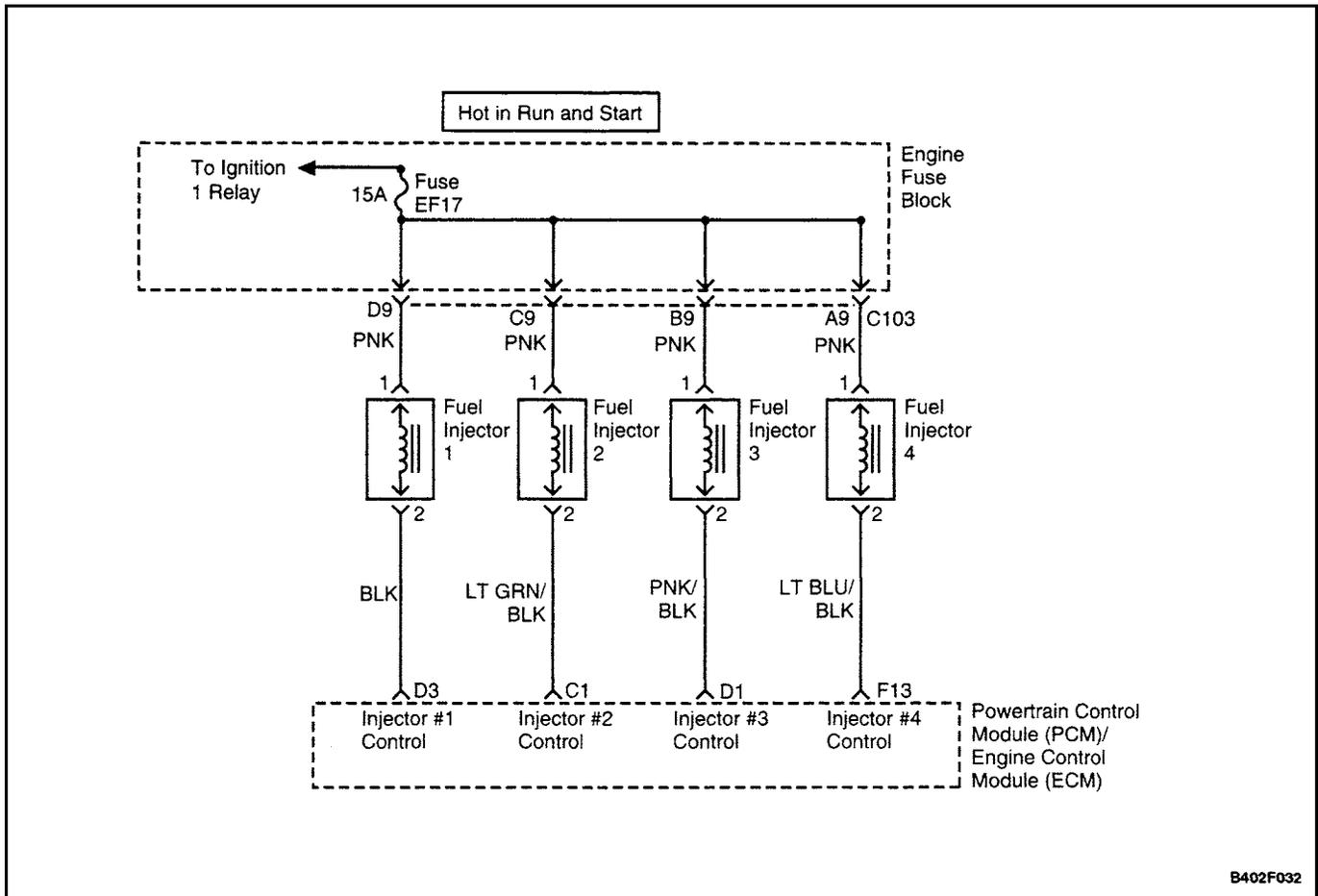
DTC P0172 Bank 1 System Too Rich

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the check completed?		Go to <i>Step 2</i>	Go to "On–Board Diagnostic System Check"
2	Install the scan tool. Are any component related Diagnostic Trouble Codes (DTCs) set?		Go to applicable DTC table	Go to <i>Step 3</i>
3	With the engine running, operate the vehicle while in Closed Loop Is the Fuel Trim Index above the specified value?	75	Go to <i>Step 4</i>	Go to <i>Step 5</i>
4	1. Turn the ignition switch ON with the engine OFF. 2. Review the Freeze Frame data and note the parameters. 3. Operate the vehicle within the Freeze Frame conditions and Conditions for Setting The DTC as noted. Is the Fuel Trim Index above the specified value while operating under the specified conditions?	75	Go to <i>Step 21</i>	Go to <i>Step 5</i>
5	1. Visually and physically check the air cleaner filter for excessive dirt or being plugged. 2. Repair as necessary. Does the air cleaner filter require replacement?		Go to <i>Step 21</i>	Go to <i>Step 6</i>
6	1. Visually and physically check the air intake system for being collapsed or restricted. 2. Repair as necessary. Does the air intake system require repair?		Go to <i>Step 21</i>	Go to <i>Step 7</i>
7	Inspect the throttle body inlet for damage or foreign objects which may partially block the airflow and correct any problem found. Does the inspection of the throttle body reveal a condition requiring a repair or replacement?		Go to <i>Step 21</i>	Go to <i>Step 8</i>
8	1. Turn the ignition switch OFF and inspect the throttle bore, throttle plate and Idle Air Control (IAC) passages for choking and foreign objects. 2. Repair as necessary. Does the inspection reveal a condition requiring a repair?		Go to <i>Step 21</i>	Go to <i>Step 9</i>
9	Start the engine with the vehicle in park or neutral and the A/C OFF and note the idle quality. Is a low or unsteady idle being experienced?		Go to <i>Step 10</i>	Go to <i>Step 12</i>
10	With the engine idling. Are the IAC counts below the specified value?	100	Go to <i>Step 12</i>	Go to <i>Step 11</i>
11	1. Disconnect the Manifold Absolute Pressure (MAP) sensor. 2. Operate the vehicle while in Closed Loop. Does the Fuel Trim Index increase above the specified value?	60	Go to <i>Step 20</i>	Go to <i>Step 12</i>

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Step	Action	Value(s)	Yes	No
12	<p>1. Check the IAC valve performance. Refer to "DTC P0506 Idle Speed RPM Lower Than Desired Idle Speed" or "DTC P0507 Idle Speed RPM Higher Than Desired Idle Speed"</p> <p>2. Repair as necessary.</p> <p>Does the inspection reveal a condition requiring a repair?</p>		Go to <i>Step 21</i>	Go to <i>Step 13</i>
13	<p>1. Disconnect the vacuum hose from the fuel pressure regulator and inspect the hose for the presence of fuel.</p> <p>2. If fuel is present in the vacuum hose, replace the fuel pressure regulator.</p> <p>Does the fuel pressure regulator require replacement?</p>		Go to <i>Step 21</i>	Go to <i>Step 14</i>
14	<p>1. Turn the ignition switch ON with the engine OFF.</p> <p>2. Slowly press the accelerator pedal.</p> <p>Does the throttle position (TP) display increase steadily and evenly from its minimum voltage at closed throttle to its maximum voltage at wide-open throttle?</p>		Go to <i>Step 15</i>	Go to <i>Step 19</i>
15	<p>1. Perform the Fuel System Diagnosis.</p> <p>2. If the table isolates a problem, repair as necessary.</p> <p>Does the table isolate a problem requiring a repair?</p>		Go to <i>Step 21</i>	Go to <i>Step 16</i>
16	<p>1. Perform the EVAP Control System Diagnosis.</p> <p>2. If the table isolates a problem, repair as necessary.</p> <p>Is a problem isolated that required a repair?</p>		Go to <i>Step 21</i>	Go to <i>Step 17</i>
17	<p>1. Perform the Fuel Injector Balance Test.</p> <p>2. If the table isolates a problem, repair as necessary.</p> <p>Does the table isolate a problem requiring a repair?</p>		Go to <i>Step 21</i>	Go to <i>Step 18</i>
18	<p>1. Remove and visually/physically inspect the oxygen sensor (O2S) for silicone contamination. This will be indicated by a powdery white deposit on the portion of the O2S sensor exposed to the exhaust stream.</p> <p>2. If contamination is present on the O2S sensor, find the source of the contamination and repair and also replace the contaminated O2S sensor.</p> <p>Is the problem found and corrected?</p>		Go to <i>Step 21</i>	Go to "Diagnostic Aids"
19	<p>1. Check the TP sensor mounting screws</p> <p>2. If they are loose or missing, tighten or replace them as necessary.</p> <p>3. If the screws are OK, replace the TP sensor.</p> <p>Is the action complete?</p>		Go to <i>Step 21</i>	
20	<p>Replace the Manifold Absolute Pressure (MAP) sensor.</p> <p>Is the action complete?</p>		Go to <i>Step 21</i>	

Step	Action	Value(s)	Yes	No
21	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 has run and passed?		Go to <i>Step 22</i>	Go to <i>Step 2</i>
22	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) P0201

INJECTOR 1 CIRCUIT FAULT

Circuit Description

The powertrain control module (PCM)/engine control module (ECM) has four individual injector driver circuits, each of which controls an injector. When a driver circuit is grounded by the PCM/ECM, the injector is activated. The PCM/ECM monitors the current in each driver circuit. The PCM/ECM measures a voltage drop through a fixed resistor and controls it. The voltage on each driver is monitored to detect a fault. If the voltage is not what the PCM/ECM expects to monitor on the circuit, a Diagnostic Trouble Code (DTC) is set. This DTC detects short to ground and/or an open circuit and short to battery conditions for low side drive injector outputs.

Conditions for Setting the DTC

- The injector voltage does not equal the ignition voltage when the injector is commanded OFF or the injector voltage does not equal 0 volts when the injector is commanded ON.
- Battery voltage is more than 9 volts.
- Above conditions are met for 5 seconds.

Action Taken When the DTC Sets

- The PCM/ECM will illuminate Malfunction Indicator Lamp (MIL) the first time the fault is Detected.
- The PCM/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 PCM/ECM will turn the MIL off on the third consecutive trip cycle in which the diagnostic has been run and the fault is no longer present.
- A history DTC P0201 will clear after 40 consecutive warm-up cycles without a fault.
- DTC P0201 can be cleared by using the scan tool CLEAR INFO function or by disconnecting the PCM/ECM battery feed.

Diagnostic Aids

An injector driver circuit that is open or shorted to voltage will cause a DTC P0201 to set. It will also cause a misfire due to an inoperative injector. A misfire DTC should also be set indicating which injector is inoperative.

Long-term and short-term fuel trims that are excessively high or low are a good indication that an injector is malfunctioning. Use Fuel Injector Balance Test to check for malfunctioning injectors.

Injector resistance tested at the PCM/ECM connection is slightly more than if tested directly at the injector because it includes resistance of the harness wires. The normal value is about 13.5 Ω .

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.

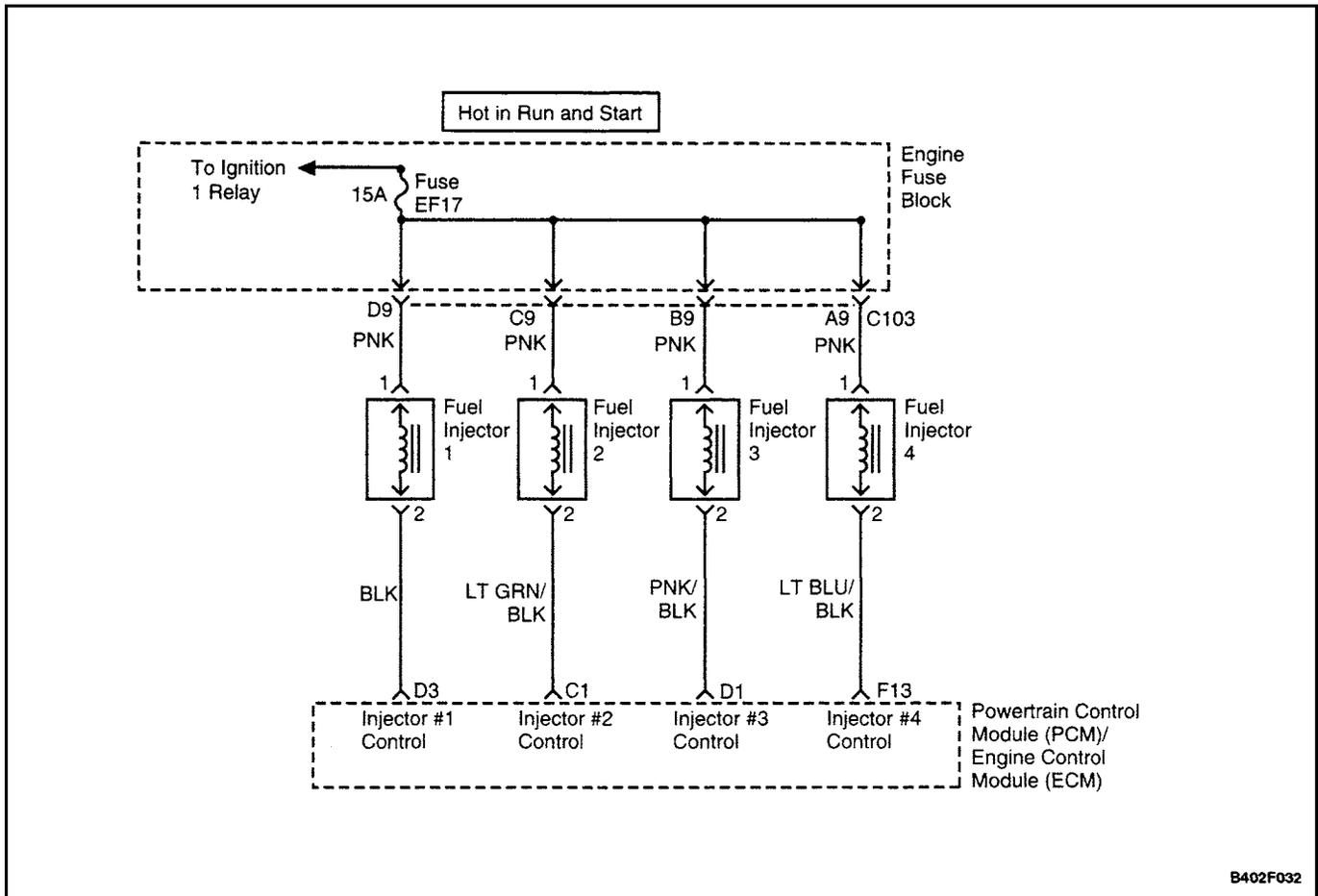
3. This step determines if DTC P0201 is the result of a hard failure or an intermittent condition.
5. This step tests the wiring harness and the PCM/ECM control of the injectors using a test light.
7. This step determines if the circuitry is shorted to voltage or the PCM/ECM is faulty.
9. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.

DTC P0201 Injector 1 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 <i>Step 2</i>	Go to "On–Board Diagnostic System Check"
2	Turn the ignition ON. Will engine start?		Go to <i>Step 3</i>	Go to "Engine Cranks But Will Not Run"
3	1. Install a scan tool and clear the Diagnostic Trouble Codes (DTCs). 2. Idle the engine for one minute. Does DTC P0201 reset?		Go to <i>Step 5</i>	Go to <i>Step 4</i>
4	1. Review the Freeze Frame data with the ignition ON and the engine OFF and note the parameters. 2. Operate the vehicle within the Freeze Frame conditions as noted. Does DTC P0201 reset?		Go to <i>Step 5</i>	Go to "Diagnostic Aids"
5	1. Disconnect the powertrain control module (PCM)/engine control module (ECM) connector for injector 1. 2. With a test light connected to ground, probe the driver circuit, terminal D3. Does the test light illuminate?		Go to <i>Step 7</i>	Go to <i>Step 6</i>
6	Repair the short to ground or open in the injector driver circuit. Is the action complete?		Go to <i>Step 10</i>	
7	1. Disconnect the injector 1 wiring connection. 2. With a test light connected to ground, probe the driver circuit, terminal 2. Does the test light illuminate?		Go to <i>Step 8</i>	Go to <i>Step 9</i>
8	Repair the short to voltage in the injector driver circuit. Is the repair complete?		Go to <i>Step 10</i>	
9	Replace the PCM/ECM. Is the action complete?		Go to <i>Step 10</i>	

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Step	Action	Value(s)	Yes	No
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 <i>Step 11</i>	Go to <i>Step 3</i>
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) P0202

INJECTOR 2 CIRCUIT FAULT

Circuit Description

The powertrain control module (PCM)/engine control module (ECM) has four individual injector driver circuits, each of which controls an injector. When a driver circuit is grounded by the PCM/ECM, the injector is activated. The PCM/ECM monitors the current in each driver circuit. The PCM/ECM measures a voltage drop through a fixed resistor and controls it. The voltage on each driver is monitored to detect a fault. If the voltage is not what the PCM/ECM expects to monitor on the circuit, a Diagnostic Trouble Code (DTC) is set. This DTC detects short to ground and/or an open circuit and short to battery conditions for low side drive injector outputs.

Conditions for Setting the DTC

- The injector voltage does not equal the ignition voltage when the injector is commanded OFF or the injector voltage does not equal 0 volts when the injector is commanded ON.
- Battery voltage is more than 9 volts.
- Above conditions are met for 5 seconds.

Action Taken When the DTC Sets

- The PCM/ECM will illuminate Malfunction Indicator Lamp (MIL) the first time the fault is Detected.
- The PCM/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 PCM/ECM will turn the MIL off on the third consecutive trip cycle in which the diagnostic has been run and the fault is no longer present.
- A history DTC P0202 will clear after 40 consecutive warm-up cycles without a fault.
- DTC P0202 can be cleared by using the scan tool CLEAR INFO function or by disconnecting the PCM/ECM battery feed.

Diagnostic Aids

An injector driver circuit that is open or shorted to voltage will cause a DTC P0202 to set. It will also cause a misfire due to an inoperative injector. A misfire DTC should also be set indicating which injector is inoperative.

Long-term and short-term fuel trims that are excessively high or low are a good indication that an injector is malfunctioning. Use Fuel Injector Balance Test to check for malfunctioning injectors.

Injector resistance tested at the PCM/ECM connection is slightly more than if tested directly at the injector because it includes resistance of the harness wires. The normal value is about 13.5 Ω.

Test Description

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

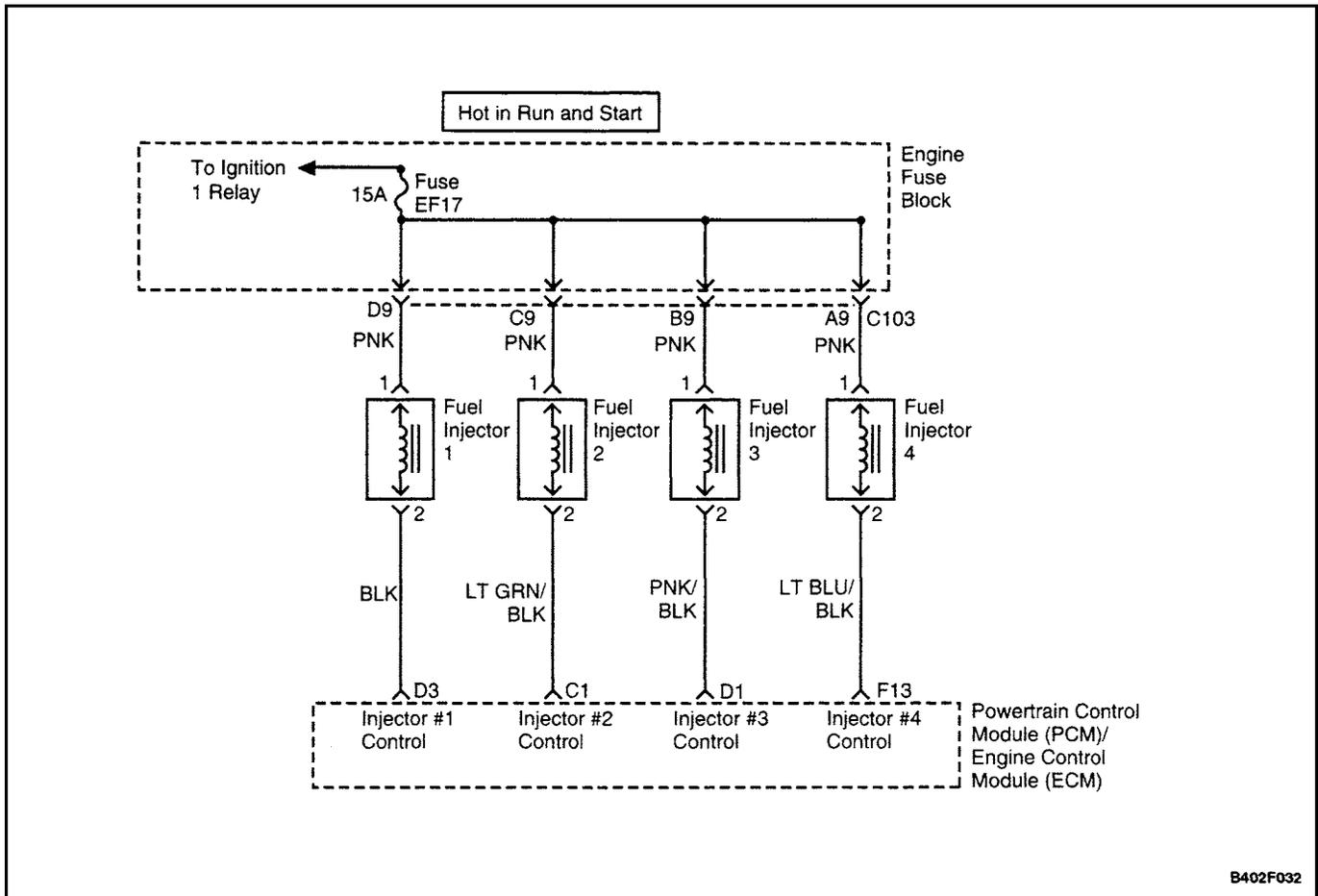
1. The On–Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This

- creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
3. This step determines if DTC P0201 is the result of a hard failure or an intermittent condition.
 5. This step tests the wiring harness and the PCM/ECM control of the injectors using a test light.
 7. This step determines if the circuitry is shorted to voltage or the PCM/ECM is faulty.
 9. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.

DTC P0202 Injector 2 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 <i>Step 2</i>	Go to "On–Board Diagnostic System Check"
2	Turn the ignition ON. Will engine start?		Go to <i>Step 3</i>	Go to "Engine Cranks But Will Not Run"
3	1. Install a scan tool and clear the Diagnostic Trouble Codes (DTCs). 2. Idle the engine for one minute. Does DTC P0202 reset?		Go to <i>Step 5</i>	Go to <i>Step 4</i>
4	1. Review the Freeze Frame data with the ignition ON and the engine OFF and note the 2. Operate the vehicle within the Freeze Frame conditions as noted. Does DTC P0201 reset?		Go to <i>Step 5</i>	Go to "Diagnostic Aids"
5	1. Disconnect the powertrain control module (PCM)/engine control module (ECM) connector for injector 2. 2. With a test light connected to ground, probe the driver circuit, terminal C1. Does the test light illuminate?		Go to <i>Step 7</i>	Go to <i>Step 6</i>
6	Repair the short to ground or open in the injector driver circuit. Is the action complete?		Go to <i>Step 10</i>	
7	1. Disconnect the injector 2 wiring connection. 2. With a test light connected to ground, probe the driver circuit, terminal 2. Does the test light illuminate?		Go to <i>Step 8</i>	Go to <i>Step 9</i>
8	Repair the short to voltage in the injector driver circuit. Is the repair complete?		Go to <i>Step 10</i>	
9	Replace the PCM/ECM. Is the action complete?		Go to <i>Step 10</i>	

Step	Action	Value(s)	Yes	No
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 <i>Step 11</i>	Go to <i>Step 3</i>
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) P0203

INJECTOR 3 CIRCUIT FAULT

Circuit Description

The powertrain control module (PCM)/engine control module (ECM) has four individual injector driver circuits, each of which controls an injector. When a driver circuit is grounded by the PCM/ECM, the injector is activated. The PCM/ECM monitors the current in each driver circuit. The PCM measures a voltage drop through a fixed resistor and controls it. The voltage on each driver is monitored to detect a fault. If the voltage is not what the PCM/ECM expects to monitor on the circuit, a Diagnostic Trouble Code (DTC) is set. This DTC detects short to ground and/or an open circuit and short to battery conditions for low side drive injector outputs.

Conditions for Setting the DTC

- The injector voltage does not equal the ignition voltage when the injector is commanded OFF or the injector voltage does not equal 0 volts when the injector is commanded ON.
- Battery voltage is more than 9 volts.
- Above conditions are met for 5 seconds.

Action Taken When the DTC Sets

- The PCM/ECM will illuminate Malfunction Indicator Lamp (MIL) the first time the fault is detected.
- The PCM/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 PCM/ECM will turn the MIL off on the third consecutive trip cycle in which the diagnostic has been run and the fault is no longer present.
- A history DTC P0203 will clear after 40 consecutive warm-up cycles without a fault.
- DTC P0203 can be cleared by using the scan tool CLEAR INFO function or by disconnecting the PCM/ECM battery feed.

Diagnostic Aids

An injector driver circuit that is open or shorted to voltage will cause a DTC P0203 to set. It will also cause a misfire due to an inoperative injector. A misfire DTC should also be set indicating which injector is inoperative.

Long-term and short-term fuel trims that are excessively high or low are a good indication that an injector is malfunctioning. Use Fuel Injector Balance Test to check for malfunctioning injectors.

Injector resistance tested at the PCM/ECM connection is slightly more than if tested directly at the injector because it includes resistance of the harness wires. The normal value is about 13.5 Ω .

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.

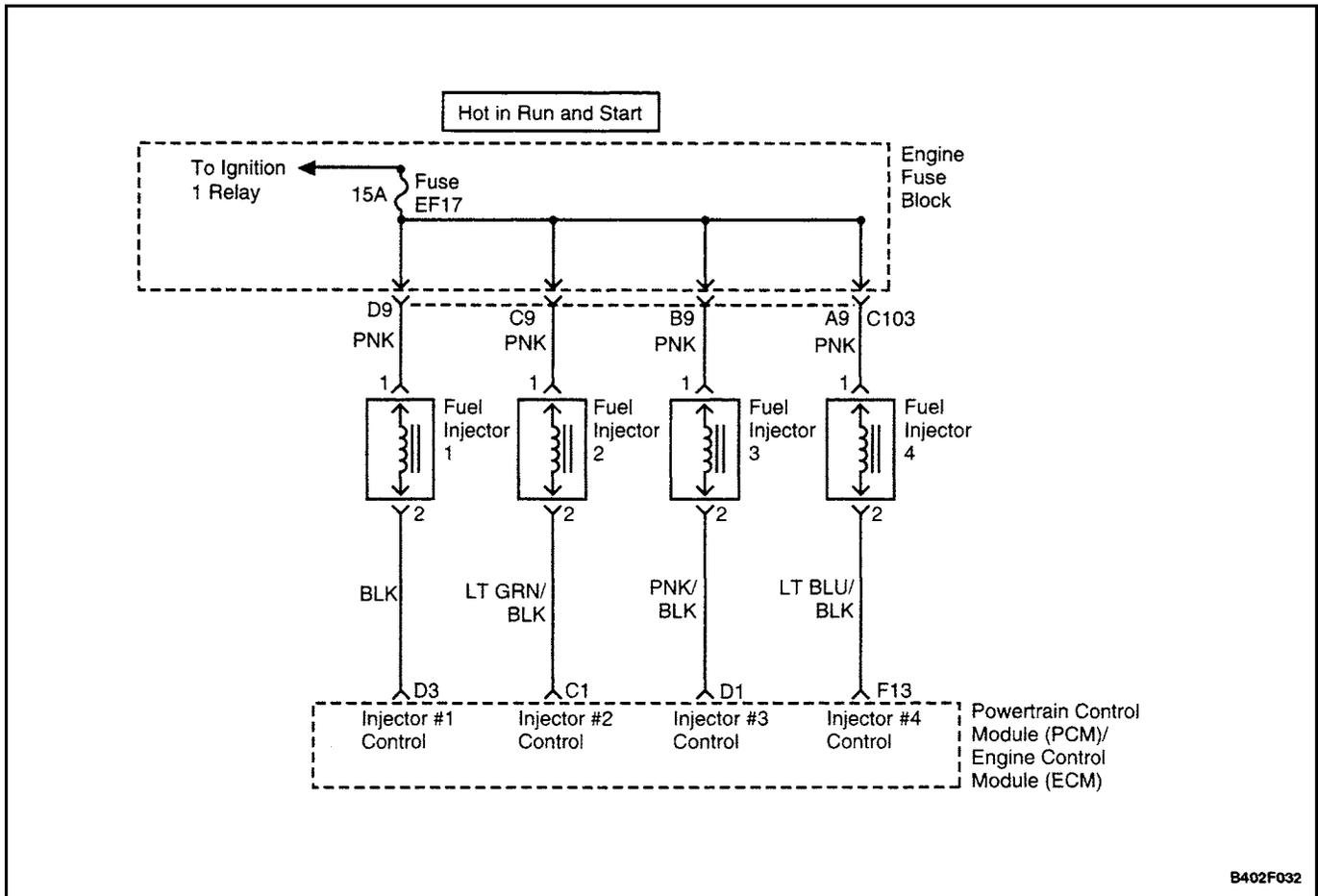
3. This step determines if DTC P0203 is the result of a hard failure or an intermittent condition.
5. This step tests the wiring harness and PCM/ECM control of the injectors using a test light.
7. This step determines if the circuitry is shorted to voltage or the PCM/ECM is faulty.
9. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.

DTC P0203 Injector 3 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 <i>Step 2</i>	Go to "On–Board Diagnostic System Check"
2	Turn the ignition ON. Will engine start?		Go to <i>Step 3</i>	Go to "Engine Cranks But Will Not Run"
3	1. Install a scan tool and clear the Diagnostic Trouble Codes (DTCs). 2. Idle the engine for one minute. Does DTC P0201 reset?		Go to <i>Step 5</i>	Go to <i>Step 4</i>
4	1. Review the Freeze Frame data with the ignition ON and the engine OFF and note the parameters. 2. Operate the vehicle within the Freeze Frame conditions as noted. Does DTC P0201 reset?		Go to <i>Step 5</i>	Go to "Diagnostic Aids"
5	1. Disconnect the powertrain control module (PCM)/engine control module (ECM) connector for injector 3. 2. With a test light connected to ground, probe the driver circuit, terminal D1. Does the test light illuminate?		Go to <i>Step 7</i>	Go to <i>Step 6</i>
6	Repair the short to ground or open in the injector driver circuit. Is the action complete?		Go to <i>Step 10</i>	
7	1. Disconnect the injector 3 wiring connection. 2. With a test light connected to ground, probe the driver circuit, terminal 2. Does the test light illuminate?		Go to <i>Step 8</i>	Go to <i>Step 9</i>
8	Repair the short to voltage in the injector driver circuit. Is the repair complete?		Go to <i>Step 10</i>	
9	Replace the PCM/ECM. Is the action complete?		Go to <i>Step 10</i>	

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Step	Action	Value(s)	Yes	No
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 <i>Step 11</i>	Go to <i>Step 3</i>
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) P0204

INJECTOR 4 CIRCUIT FAULT

Circuit Description

The powertrain control module (PCM)/engine control module (ECM) has four individual injector driver circuits, each of which controls an injector. When a driver circuit is grounded by the PCM/ECM, the injector is activated. The PCM/ECM monitors the current in each driver circuit. The PCM/ECM measures a voltage drop through a fixed resistor and controls it. The voltage on each driver is monitored to detect a fault. If the voltage is not what the PCM/ECM expects to monitor on the circuit, a Diagnostic Trouble Code (DTC) is set. This DTC detects a short to ground and/or an open circuit and short to battery conditions for low side drive injector outputs.

Conditions for Setting the DTC

- The injector voltage does not equal the ignition voltage when the injector is commanded OFF or the injector voltage does not equal 0 volts when the injector is commanded ON.
- Battery voltage is more than 9 volts.
- Above conditions are met for 5 seconds.

Action Taken When the DTC Sets

- The PCM/ECM will illuminate Malfunction Indicator Lamp (MIL) the first time the fault is Detected.
- The PCM/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 PCM/ECM will turn the MIL off on the third consecutive trip cycle in which the diagnostic has been run and the fault is no longer present.
- A history DTC P0204 will clear after 40 consecutive warm-up cycles without a fault.
- DTC P0204 can be cleared by using the scan tool CLEAR INFO function or by disconnecting the PCM/ECM battery feed.

Diagnostic Aids

An injector driver circuit that is open or shorted to voltage will cause a DTC P0204 to set. It will also cause a misfire due to an inoperative injector. A misfire DTC should also be set indicating which injector is inoperative.

Long-term and short-term fuel trims that are excessively high or low are a good indication that an injector is malfunctioning. Use Fuel Injector Balance Test to check for malfunctioning injectors.

Injector resistance tested at the PCM/ECM connection is slightly more than if tested directly at the injector because it includes resistance of the harness wires. The normal value is about 13.5 Ω .

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

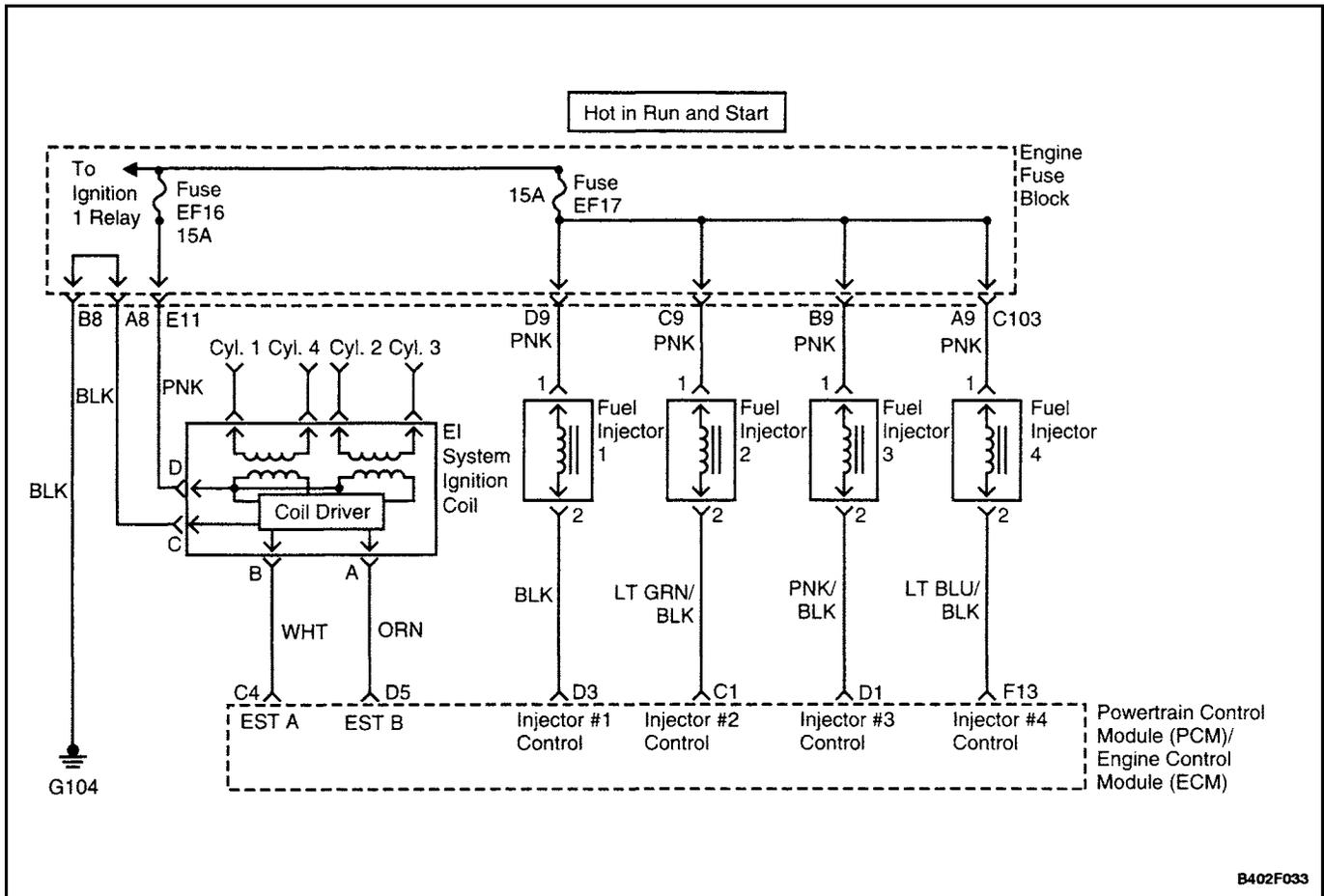
creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.

3. This step determines if DTC P0204 is the result of a hard failure or an intermittent condition.
5. This step tests the wiring harness and PCM/ECM control of the injectors using a test light.
7. This step determines if the circuitry is shorted to voltage or the PCM/ECM is faulty.
9. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.

DTC P0204 Injector 4 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 <i>Step 2</i>	Go to "On–Board Diagnostic System Check"
2	Turn the ignition ON. Will engine start?		Go to <i>Step 3</i>	Go to "Engine Cranks But Will Not Run"
3	1. Install a scan tool and clear the Diagnostic Trouble Codes (DTCs). 2. Idle the engine for one minute. Does DTC P0201 reset?		Go to <i>Step 5</i>	Go to <i>Step 4</i>
4	1. Review the Freeze Frame data with the ignition ON and the engine OFF and note the parameters. 2. Operate the vehicle within the Freeze Frame conditions as noted. Does DTC P0201 reset?		Go to <i>Step 5</i>	Go to "Diagnostic Aids"
5	1. Disconnect the powertrain control module (PCM)/engine control module (ECM) connector for injector 4. 2. With a test light connected to ground, probe the driver circuit, terminal F13. Does the test light illuminate?		Go to <i>Step 7</i>	Go to <i>Step 6</i>
6	Repair the short to ground or open in the injector driver circuit. Is the action complete?		Go to <i>Step 10</i>	
7	1. Disconnect the injector 4 wiring connection. 2. With a test light connected to ground, probe the driver circuit, terminal 2. Does the test light illuminate?		Go to <i>Step 8</i>	Go to <i>Step 9</i>
8	Repair the short to voltage in the injector driver circuit. Is the repair complete?		Go to <i>Step 10</i>	
9	Replace the PCM/ECM. Is the action complete?		Go to <i>Step 10</i>	

Step	Action	Value(s)	Yes	No
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 <i>Step 11</i>	Go to <i>Step 3</i>
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) P0300 MULTIPLE CYLINDER MISFIRE DETECTED

System Description

The powertrain control module (PCM)/engine control module (ECM) monitors the crankshaft and camshaft position to detect if the engine is misfiring. The PCM/ECM looks for a quick drop in crankshaft speed. This test is executed in blocks of 100 camshaft revolution tests. It may take between one to several tests to store a Diagnostic Trouble Code (DTC) and illuminate the Malfunction Indicator Lamp (MIL). Under light misfire conditions, it may also take more than one trip to set a DTC. Severe misfire will flash the MIL indication that catalyst damage is possible. The Torque Converter Clutch (TCC) is disabled momentarily to determine if the misfire was due to a rough road condition (automatic trans. only).

Conditions for Setting the DTC

- DTCs P0106, P0107, P0108, P0117, P0118, P0121, P0122, P0123, P0336, P0337, P0341, P0342, and P0502, not set.
- Engine run time is greater than or equal to 30 seconds.
- A/C compressor clutch has not just engaged or disengaged.
- Air injection reaction intrusive diagnostic is not progress.
- Engine load and engine speed are in a detectable region and are at or above zero torque.
- Camshaft position (CMP) sensor is in synchronization.
- Exhaust Gas Recirculation (EGR) flow diagnostic is not in progress.
- Deceleration fuel cutoff not active.
- Fuel is not shut off from high engine speed of 6300 rpm in drive and 4100 rpm in park (automatic trans-axles).
- Fuel is not shut off at 255 mph.
- No automatic transaxle shifting.
- Pulse throttle position change is less than 1.56% per 100 ms.
- Minus throttle position change is less than 1.56% per 100 ms.
- Throttle position is greater than 3.125% or vehicle speed is less than 20 mph.
- 20 engine cycles have occurred since cranking has started.
- Engine speed is between 750 and 5600 rpm.
- Vehicle voltage is between 10 and 16 volts.

- Coolant temperature is between -6.25°C (20.8°F) and 119.8°C (247.6°F).
- The TCC is not forced on because the transaxle is overheating while the misfire diagnosis is requesting to disable the TCC.
- The engine speed is less than or equal to 3000 rpm or the crank angle sensing error has been learned.
- Crankshaft speed patterns are normal.
- There is the correct ratio between crankshaft position (CKP) sensor pulses and CMP sensor pulses.

Action Taken When the DTC Sets

- The MIL will illuminate after two consecutive ignition cycles in which the diagnostic runs with the fault active.

Or

- The MIL will illuminate immediately and flash if misfire is present (automatic only).
- The PCM/ECM will record operating conditions at the time the diagnostic fails. This information will be stored in the Freeze Frame and Failure Records buffers.
- A history 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 within the freeze frame conditions that the DTC failed.
- A history DTC will clear after 80 consecutive warm-up cycles without a fault.
- DTC(s) can be cleared by using the scan tool.

Diagnostic Aids

An intermittent can also be the result of a defective reluctor wheel. Remove the CKP sensor and inspect the reluctor wheel through the sensor mount hole. Check for porosity and condition of the wheel. If the DTC is intermittent, refer to "Symptoms Diagnosis" in this section.

Test Description

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

1. The On-Board Diagnostic (OBD II) System Check prompts the technician to complete some basic checks and store the freeze frame and failure records data on the scan tool if applicable. This creates an electronic copy of the data taken when the malfunction occurred. The information is then stored on the scan tool for later reference.
3. A visual/physical inspection should include checking the following components:
 - The wiring for proper connections, pinches or cuts.
 - The PCM/ECM grounds for being clean and tight.
 - The vacuum hoses for splits, kinks, and proper connections as shown on the Vehicle Emission Information label. Check thoroughly for any type of leak or restriction.
 - For air leaks at the throttle body mounting area and intake manifold sealing surfaces.
5. When all the accumulators are relatively equal, then the misfire is being caused by something that affects the entire engine. When they are not then the misfire is being caused by something that is specific to two or more cylinders.
6. Whenever the misfire is not present operating the vehicle may be necessary to duplicate the conditions in the Freeze Frame Data in order to detect misfire. Depending on the engine load, the conditions may have to be maintained for up to 20 seconds. Whenever the misfire accumulators start to increment, then misfire is present. A history misfire counter will store the number of misfires that have occurred until the DTC is cleared.
8. Check fuel for water, alcohol, etc.
9. A basic engine problem that affects all cylinders is the only possibility at this point. (Cam timing, throttle body leak, restricted air flow, etc.)
11. Tests the ignition system voltage output using a spark tester.
12. Replace any spark plugs that are worn, cracked or fouled.
13. Checks for voltage at the ignition feed circuit.
18. Whenever the driver circuit is shorted to ground, the light will be on steady. When the driver circuit is shorted to voltage or open, the light will be off.
19. Since voltage is supplied to the fuel injector on a single circuit, the malfunction could only be a poor connection or open in the fuel injector harness. An open before the harness would result in an "Engine Cranks But Will Not Run" complaint.
28. Before replacing the PCM/ECM, check terminals for improper mating, broken locks, or physical damage to the wiring harness. The replacement PCM/ECM must be reprogrammed. Refer to the latest Techline procedure for PCM/ECM reprogramming.

DTC P0300 Multiple Cylinder Misfire Detected

Step	Action	Value(s)	Yes	No
1	Perform an On–Board Diagnostic (OBD II) System Check. Is the check complete?		Go to <i>Step 2</i>	Go to "On–Board Diagnostic System Check"
2	Install a scan tool. Are Diagnostic Trouble Codes (DTCs) P0201, P0202, P0203, P0204 set?		Go to applicable DTC	Go to <i>Step 3</i>
3	1. Perform a visual/physical inspection. 2. Make any repairs that are necessary. Are any repairs necessary?		Go to <i>Step 26</i>	Go to <i>Step 4</i>
4	Start the engine and allow it to idle. Are any Misfire Current counters incrementing?		Go to <i>Step 5</i>	Go to <i>Step 6</i>
5	Are all counters equal (within a percentage of each other)?		Go to <i>Step 7</i>	Go to <i>Step 11</i>
6	1. Turn the ignition ON with the engine OFF. 2. Review the Freeze Frame data and note the parameters. 3. Operate the vehicle within the Freeze Frame conditions and conditions for setting this DTC as noted. Are any Misfire Current counters incrementing?		Go to <i>Step 5</i>	Go to "Diagnostic Aids"
7	1. Turn the engine OFF. 2. Install a fuel pressure gauge. 3. Observe the fuel pressure with the engine running. Is the fuel pressure within the specified value?	284–325 kPa (41–47 psi)	Go to <i>Step 8</i>	Go to "Fuel System Diagnosis"
8	Check the fuel for contamination. Is the fuel OK?		Go to <i>Step 9</i>	Go to <i>Step 10</i>
9	Check for a basic engine problem. Is the action complete?		Go to <i>Step 27</i>	
10	Replace the contaminated fuel. Is the action complete?		Go to <i>Step 27</i>	
11	1. Turn the engine OFF. 2. Disconnect the fuel injector harness connector. 3. Install a spark tester on cylinder #1 spark plug cable. 4. Crank the engine and check for spark. 5. Repeat the above procedure on cylinders #2, #3, #4. Is spark observed on all four spark plug cables?		Go to <i>Step 12</i>	Go to <i>Step 20</i>
12	Replace all malfunctioning spark plugs. Are any malfunctioning?		Go to <i>Step 27</i>	Go to <i>Step 13</i>

Step	Action	Value(s)	Yes	No
13	<ol style="list-style-type: none"> Turn the engine OFF. Disconnect the four fuel injector connectors from the injectors. Install an injector test light on the injector harness connector for the cylinders that had misfired. Crank the engine and note the test light. Does the injector test light blink?		Go to <i>Step 14</i>	Go to <i>Step 15</i>
14	Perform the Fuel Injector Balance Test. Are the fuel injectors OK?		Go to <i>Step 9</i>	Go to <i>Step 16</i>
15	<ol style="list-style-type: none"> Disconnect the injector test light. With a test light connected to ground, probe the ignition feed terminal 1 of the injector harness connector for each cylinder that had misfire. Crank the engine. Did the test light illuminate?		Go to <i>Step 17</i>	Go to <i>Step 19</i>
16	Replace any malfunctioning fuel injectors. Is the action complete?		Go to <i>Step 27</i>	
17	Check the affected fuel injector driver circuit at terminals D3, C1, D1 and F13 for an open, short or short to voltage. Is a problem found?		Go to <i>Step 18</i>	Go to <i>Step 24</i>
18	Repair the open or the shorted fuel injector driver circuit. Is the action complete?		Go to <i>Step 27</i>	
19	Repair the open ignition feed circuit between the fuel injector harness connector and the fuel injector connector. Is the action complete?		Go to <i>Step 27</i>	
20	Measure the resistance of the spark plug cable that the spark plug tester did not spark. Is the resistance of the spark plug cable less than the specified value?	30,000 Ω	Go to <i>Step 26</i>	Go to <i>Step 25</i>
21	Inspect the powertrain control module (PCM)/engine control module (ECM) connector and connections. Are the connections OK?		Go to <i>Step 27</i>	Go to <i>Step 22</i>
22	Check the affected cylinders ignition control circuit for an open or short and repair as necessary. Is a repair necessary?		Go to <i>Step 27</i>	Go to <i>Step 24</i>
23	Repair the connector or connections. Is the action complete?		Go to <i>Step 27</i>	
24	Replace the PCM/ECM. Is the action complete?		Go to <i>Step 27</i>	
25	Replace the spark plug cable. Is the action complete?		Go to <i>Step 27</i>	
26	Replace the faulty ignition coil. Is the action complete?		Go to <i>Step 27</i>	

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Step	Action	Value(s)	Yes	No
27	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 supported in the text. Does the scan tool indicate that this diagnostic ran and passed?		Go to <i>Step 29</i>	Go to <i>Step 2</i>
28	Check if any additional DTCs are set. Are any DTCs displayed that have not been diagnosed?		Go to applicable DTC table	System OK