

## **DTC P0201, P0202, P0203, P0204, P0205, P0206, P0207, or P0208**

### **Circuit Description**

The fuel injection control module (FICM) supplies high voltage to each fuel injector on the injector supply voltage circuits. The FICM enables each fuel injector by grounding the command circuit between the FICM and the fuel injector. The FICM monitors the status of the injector supply voltage circuits and the fuel injector command circuits. When a fuel injector circuit condition is detected by the FICM, all of the fuel injectors on the affected injector supply voltage circuit will be disabled. If a circuit condition is detected on a fuel injector circuit for cylinders 1, 4, 6, or 7, DTCs P0201, P0204, P0206, P0207 will set, along with DTC P2146. If a circuit condition is detected on a fuel injector circuit for cylinders 2, 3, 5, or 8, DTCs P0202, P0203, P0205, P0208 will set, along with DTC P2149.

### **Conditions for Running the DTC**

- DTCs U1800, and U2104 are not set.
- The engine is running.
- The charging system voltage is between 6-18 volts.

### **Conditions for Setting the DTC**

- The FICM detects an incorrect current on a fuel injector circuit.
- The condition exists for less than 1 second.

### **Action Taken When the DTC Sets**

- The control module illuminates the malfunction indicator lamp (MIL) when the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The control module stores this information in the Freeze Frame/Failure Records.
- The control module disables the set of fuel injectors that have a concern.

### **Conditions for Clearing the MIL/DTC**

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

### **Test Description**

© 2010 General Motors. All rights reserved.

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

2. This step verifies that the condition is not intermittent.
4. This step determines which set of fuel injectors the circuit condition is affecting. If DTC P2146 is set, then a condition exists on cylinders 1, 4, 6, or 7. If DTC P2149 is set, then a condition exists on cylinders 2, 3, 5, or 8.
5. This step tests if a ground is constantly being applied to the fuel injectors.
6. This step isolates which circuit is causing the condition. If the DMM displays OL when a multi-way connector is disconnected, test the affected circuits for a short to ground.
7. This step tests for an open circuit. If the DMM displays OL on all of the fuel injector circuits, the injector supply voltage circuit is open.
8. This step tests for an open circuit. If the DMM displays OL on one of the fuel injector circuits, the fuel injector command circuit is open.
9. This step tests for excessive resistance in a fuel injector circuit.
10. This step is testing for a short between the injector supply voltage circuit and the fuel injector command circuit. If the resistance of the circuits is less than 0.3 ohms, test for a short between the circuits. If a short cannot be found, the fuel injector may be the cause of the condition. The normal fuel injector resistance is between 0.3-0.4 ohms.
11. This step tests for a short to voltage on a fuel injector circuit. If the DMM displays battery voltage a short to voltage is the cause of the condition.
12. This step isolates which circuit is causing the condition. If the DMM display changes to 0 volts when a multi-way connector is disconnected, test the disconnected circuits for a short to voltage.
13. This step tests if a ground is constantly being applied to the fuel injectors.
14. This step isolates which circuit is causing the condition. If the DMM displays OL when a multi-way connector is disconnected, test the affected circuits for a short to ground.
15. This step tests for an open circuit. If the DMM displays OL on all of the fuel injector circuits, the injector supply voltage circuit is open.
16. This step tests for an open circuit. If the DMM displays OL on one of the fuel injector circuits, the fuel injector command circuit is open.
17. This step tests for excessive resistance in a fuel injector circuit.
18. This step is testing for a short between the injector supply circuit and the fuel injector command circuit. If the resistance of the circuits is less than 0.3 ohms, test for a short between the circuits. If a short cannot be found, the fuel injector may be the cause of the condition. The normal fuel injector resistance is between 0.3-0.4 ohms.
19. This step tests for a short to voltage on a fuel injector circuit. If the DMM displays battery voltage a short to voltage is the cause of the condition.

20. This step isolates which circuit is causing the condition. If the DMM display changes to 0 volts when a multi-way connector is disconnected, test the disconnected circuits for a short to voltage.

Step	Action	Values	Yes	No
Schematic Reference: <a href="#">Engine Controls Schematics</a>				
Connector End View Reference: <a href="#">Engine Control Module Connector End Views</a> or <a href="#">Engine Controls Connector End Views</a>				
1	Did you perform the Diagnostic System Check-Engine Controls?	--	Go to <a href="#">Step 2</a>	Go to <a href="#">Diagnostic System Check - Engine Controls</a>
<a href="#">2</a>	Observe the DTC information with a scan tool.  Are DTCs P0201, P0204, P0206, P0207, or P0202, P0203, P0205, P0208 set?	--	Go to <a href="#">Step 4</a>	Go to <a href="#">Step 3</a>
3	<ol style="list-style-type: none"> <li>1. Observe the Freeze Frame/Failure Records for this DTC.</li> <li>2. Turn OFF the ignition for 30 seconds.</li> <li>3. Start the engine.</li> <li>4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records.</li> </ol> Did the DTC fail this ignition?	--	Go to <a href="#">Step 4</a>	Go to <a href="#">Intermittent Conditions</a>
<a href="#">4</a>	Is DTC P2146 also set?	--	Go to <a href="#">Step 13</a>	Go to <a href="#">Step 5</a>
<a href="#">5</a>	<p><b>Caution:</b> Refer to <a href="#">High Voltage Caution</a> in the Preface section.</p> <ol style="list-style-type: none"> <li>1. Turn OFF the ignition.</li> </ol> <p><b>Important:</b> Refer to <a href="#">Engine Controls Component Views</a> for fuel injector locations. Failure to identify the correct cylinder will result in misdiagnosis.</p> <ol style="list-style-type: none"> <li>2. Disconnect the fuel injection control module (FICM).</li> </ol> <p><b>Important:</b> Use the J 35616-94 adapters to probe the FICM connector.</p> <ol style="list-style-type: none"> <li>3. Measure the resistance between the injector supply voltage circuit for cylinders 2, 3, 5, and 8 and a known good ground with a DMM.</li> </ol> Does the DMM display OL?	--	Go to <a href="#">Step 7</a>	Go to <a href="#">Step 6</a>
	Disconnect each multi-way harness connector			

<a href="#">6</a>	of the fuel injectors one at a time, while monitoring the DMM.  Does the DMM display OL when any of the fuel injector harness connectors are disconnected?	--	Go to <a href="#">Step 21</a>	Go to <a href="#">Step 34</a>
<a href="#">7</a>	<p><b>Important:</b></p> <ul style="list-style-type: none"> <li>The DMM and test leads must be calibrated to 0 ohms in order to prevent misdiagnosis. Use the J 39200 DMM to perform this test. Refer to the DMM User Manual for calibration procedure.</li> <li>Use the J 35616-94 adapters to probe the FICM connector.</li> <li>The temperature of the engine and injectors should be the same as when the DTC set.</li> </ul> <p>Measure the resistance between the injector supply voltage circuit and the injector command circuits for cylinders 2, 3, 5, and 8 with a DMM.</p> <p>Does the DMM display OL for all of the circuits?</p>	--	Go to <a href="#">Step 35</a>	Go to <a href="#">Step 8</a>
<a href="#">8</a>	Does the DMM display OL for any of the circuits?	--	Go to <a href="#">Step 23</a>	Go to <a href="#">Step 9</a>
<a href="#">9</a>	Does the DMM display a resistance above the specified value for any fuel injector circuit?	0.8 $\Omega$	Go to <a href="#">Step 26</a>	Go to <a href="#">Step 10</a>
<a href="#">10</a>	Does the DMM display a resistance below the specified value for any fuel injector circuit?	0.3 $\Omega$	Go to <a href="#">Step 28</a>	Go to <a href="#">Step 11</a>
<a href="#">11</a>	<p>1. Turn ON the ignition, with the engine OFF.</p> <p><b>Important:</b> Use the J 35616-94 adapters to probe the FICM connector.</p> <p>2. Probe the injector supply voltage circuit for cylinders 2, 3, 5 and 8, with a DMM connected to ground.</p> <p>Does the DMM display battery voltage?</p>	--	Go to <a href="#">Step 12</a>	Go to <a href="#">Step 29</a>
<a href="#">12</a>	<p>Disconnect each multi-way harness connector of the fuel injectors one at a time, while monitoring the DMM.</p> <p>Does the DMM display the specified voltage when any of the fuel injector harness connectors are disconnected?</p>	0 volts	Go to <a href="#">Step 32</a>	Go to <a href="#">Step 31</a>
	<b>Caution:</b> Refer to <a href="#">High Voltage Caution</a> in the			

	<p>Preface section.</p> <ol style="list-style-type: none"> <li>1. Turn OFF the ignition.</li> </ol> <p><b>Important:</b> Refer to <a href="#">Engine Controls Component Views</a> for fuel injector locations. Failure to identify the correct cylinder will result in misdiagnosis.</p> <ol style="list-style-type: none"> <li>2. Disconnect the FICM.</li> </ol> <p><b>Important:</b> Use the J 35616-94 adapters to probe the FICM connector.</p> <ol style="list-style-type: none"> <li>3. Measure the resistance between the injector supply voltage circuit for cylinders 1, 4, 6, and 7 and a known good ground with a DMM.</li> </ol> <p>Does the DMM display OL?</p>	--	Go to <a href="#">Step 15</a>	Go to <a href="#">Step 14</a>
<a href="#">13</a>	<p>Disconnect each multi-way harness connector of the fuel injectors one at a time, while monitoring the DMM.</p> <p>Does the DMM indicate OL when any of the fuel injector harness connectors are disconnected?</p>	--	Go to <a href="#">Step 21</a>	Go to <a href="#">Step 34</a>
<a href="#">14</a>	<p><b>Important:</b></p> <ul style="list-style-type: none"> <li>• The DMM and test leads must be calibrated to 0 ohms in order to prevent misdiagnosis. Refer to the DMM User Manual for calibration procedure.</li> <li>• Use the J 35616-94 adapters to probe the FICM connector.</li> <li>• The temperature of the engine and injectors should be the same as when the DTC set.</li> </ul> <p>Measure the resistance between the injector supply voltage circuit and the injector command circuits for cylinders 1, 4, 6 and 7 with a DMM.</p> <p>Does the DMM display OL for all of the circuits?</p>	--	Go to <a href="#">Step 35</a>	Go to <a href="#">Step 16</a>
<a href="#">15</a>	<p>Does the DMM display OL for any of the circuits?</p>	--	Go to <a href="#">Step 23</a>	Go to <a href="#">Step 17</a>
<a href="#">16</a>	<p>Does the DMM display a resistance above the specified value for any fuel injector circuit?</p>	0.8 $\Omega$	Go to <a href="#">Step 26</a>	Go to <a href="#">Step 18</a>
<a href="#">17</a>	<p>Does the DMM display a resistance below the specified value for any fuel injector circuit?</p>	0.3 $\Omega$	Go to <a href="#">Step 28</a>	Go to <a href="#">Step 19</a>
<a href="#">18</a>				

19	<p><b>Important:</b> Use the J 35616-94 adapters to probe the FICM connector.</p> <ol style="list-style-type: none"> <li>1. Turn ON the ignition, with the engine OFF.</li> <li>2. Probe the injector supply voltage circuit for cylinders 1, 4, 6 and 7, with a DMM connected to ground.</li> </ol> <p>Does the DMM display battery voltage?</p>	--	Go to <a href="#">Step 20</a>	Go to <a href="#">Step 29</a>
20	<p>Disconnect each multi-way harness connector of the fuel injectors one at a time, while monitoring the DMM.</p> <p>Does the DMM display the specified voltage when any of the fuel injector harness connectors are disconnected?</p>	0 volts	Go to <a href="#">Step 32</a>	Go to <a href="#">Step 31</a>
21	<p>Measure the resistance from the fuel injector command circuit to ground at the FICM connector for the cylinder that caused the DMM to display OL.</p> <p>Does the DMM display continuity?</p>	--	Go to <a href="#">Step 33</a>	Go to <a href="#">Step 22</a>
22	<ol style="list-style-type: none"> <li>1. Disconnect the harness from the fuel injector.</li> <li>2. Test for a short between each electrical connection of the fuel injector and the fuel injector housing with a DMM. Refer to <a href="#">Circuit Testing</a> in Wiring Systems.</li> </ol> <p>Is there continuity between either electrical post of the fuel injector and the fuel injector housing?</p>	--	Go to <a href="#">Step 37</a>	Go to <a href="#">Step 36</a>
23	<ol style="list-style-type: none"> <li>1. Disconnect the multi-way connector of the fuel injector that displayed OL.</li> <li>2. Test the command circuit of the fuel injector between the FICM and the multi-way connector, for the following conditions: <ul style="list-style-type: none"> <li>• An open circuit</li> <li>• A poor connection</li> </ul> </li> </ol> <p>Refer to <a href="#">Connector Repairs</a> or <a href="#">Wiring Repairs</a> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	--	Go to <a href="#">Step 39</a>	Go to <a href="#">Step 24</a>
	<p>Test the injector voltage circuit of the fuel injector, between the multi-way connector and the splice, for the following conditions:</p> <ul style="list-style-type: none"> <li>• An open circuit</li> </ul>			

24	<ul style="list-style-type: none"> <li>• A poor connection</li> </ul> <p>Refer to <a href="#">Connector Repairs</a> or <a href="#">Wiring Repairs</a> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	--	Go to <a href="#">Step 39</a>	Go to <a href="#">Step 25</a>
25	<p>Test both of the fuel injector circuits between the fuel injector and the multi-way connector for an open. Refer to <a href="#">Testing for Continuity</a> and <a href="#">Wiring Repairs</a> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	--	Go to <a href="#">Step 39</a>	Go to <a href="#">Step 30</a>
26	<ol style="list-style-type: none"> <li>1. Disconnect the multi-way connector for the circuit with high resistance.</li> <li>2. Test for the following conditions: <ul style="list-style-type: none"> <li>• Excessive resistance in the fuel injector circuits between the FICM and the multi-way connector</li> <li>• Poor connections at the multi-way connector of the fuel injector</li> </ul> </li> </ol> <p>Refer to <a href="#">Testing for Intermittent Conditions and Poor Connections</a> and <a href="#">Connector Repairs</a> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	--	Go to <a href="#">Step 39</a>	Go to <a href="#">Step 27</a>
27	<p>Test both of the fuel injector circuits between the fuel injector and the multi-way connector for high resistance. Refer to <a href="#">Circuit Testing</a> and <a href="#">Wiring Repairs</a> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	--	Go to <a href="#">Step 39</a>	Go to <a href="#">Step 30</a>
28	<p>Test for a short between the injector supply voltage circuit and the fuel injector command circuit. Refer to <a href="#">Circuit Testing</a> and <a href="#">Wiring Repairs</a> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	--	Go to <a href="#">Step 39</a>	Go to <a href="#">Step 37</a>
29	<p>Test for an intermittent and for a poor connection at the harness connector of the FICM. Refer to <a href="#">Testing for Intermittent Conditions and Poor Connections</a> and <a href="#">Connector Repairs</a> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>	--	Go to <a href="#">Step 39</a>	Go to <a href="#">Step 38</a>
30	<p>Test for an intermittent and for a poor connection at the harness connector of the fuel injector. Refer to <a href="#">Testing for Intermittent Conditions and Poor Connections</a> and <a href="#">Connector Repairs</a> in Wiring Systems.</p>	--		

	Did you find and correct the condition?		Go to <a href="#">Step 39</a>	Go to <a href="#">Step 37</a>
31	Repair the short to voltage in the injector supply voltage circuit. Refer to <a href="#">Wiring Repairs</a> in Wiring Systems.  Did you complete the repair?	--	Go to <a href="#">Step 39</a>	--
32	Repair the short to voltage in the fuel injector command circuit that changed to 0 volts on the DMM. Refer to <a href="#">Wiring Repairs</a> in Wiring Systems.  Did you complete the repair?	--	Go to <a href="#">Step 39</a>	--
33	Repair the short to ground in the fuel injector command circuit. Refer to <a href="#">Wiring Repairs</a> in Wiring Systems.  Did you complete the repair?	--	Go to <a href="#">Step 39</a>	--
34	Repair the short to ground in the injector supply voltage circuit. Refer to <a href="#">Wiring Repairs</a> in Wiring Systems.  Did you complete the repair?	--	Go to <a href="#">Step 39</a>	--
35	Repair the open in the injector supply voltage circuit. Refer to <a href="#">Wiring Repairs</a> in Wiring Systems.  Did you complete the repair?	--	Go to <a href="#">Step 39</a>	--
36	Replace the harness between the fuel injector and the multi-way connector.  Did you complete the replacement?	--	Go to <a href="#">Step 39</a>	--
37	<b>Important:</b> Refer to <a href="#">Engine Controls Component Views</a> for fuel injector locations.  Replace the appropriate fuel injector. Refer to <a href="#">Fuel Injector Replacement</a> .  Did you complete the replacement?	--	Go to <a href="#">Step 39</a>	--
38	Replace the FICM. Refer to <a href="#">Fuel Injector Control Module Replacement</a> .  Did you complete the replacement?	--	Go to <a href="#">Step 39</a>	--
39	<ol style="list-style-type: none"> <li>1. Clear the DTCs with a scan tool.</li> <li>2. Turn OFF the ignition for 30 seconds.</li> <li>3. Start the engine.</li> <li>4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records.</li> </ol>	--		

	Did the DTC fail this ignition?		Go to <a href="#">Step 2</a>	Go to <a href="#">Step 40</a>
40	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	--	Go to <a href="#">Diagnostic Trouble Code (DTC) List</a>	System OK