

P0201-P0206 Injector Control Circuit

Circuit Description

The control module enables the appropriate fuel injector on the intake stroke for each cylinder. Ignition voltage is supplied directly to the fuel injectors. The control module controls each fuel injector by grounding the control circuit with a solid state device called a driver. The control module monitors the status of each driver. Each driver has a feedback voltage circuit which the engine control module (ECM) monitors. The injector control circuits are pulled-up to voltage within the ECM. The ECM can determine if a control circuit is open, shorted to ground, or shorted to a voltage by monitoring the feedback voltage. If the ECM detects the control circuit voltage is between a predetermined range when the circuit is commanded OFF, this DTC sets.

DTC Descriptors

This diagnostic procedure supports the following DTCs.

- DTC P0201 Injector 1 Control Circuit
- DTC P0202 Injector 2 Control Circuit
- DTC P0203 Injector 3 Control Circuit
- DTC P0204 Injector 4 Control Circuit
- DTC P0205 Injector 5 Control Circuit
- DTC P0206 Injector 6 Control Circuit

Conditions for Running the DTC

- The engine speed is more than 80 RPM.
- The ignition 1 voltage is between 10–18 volts.
- DTC P0201–P0206 run continuously once the above conditions are met.

Conditions for Setting the DTC

- The ECM detects an open in the fuel injector circuits.
- The condition exists for more than 1 seconds.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 4 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.

Diagnostic Aids

- Use the J 35616-C Connector Test Adapter Kit for any test that requires probing the ECM harness connector or a component harness connector.
- The lower connector of the ECM is connector C1 and the upper connector of the ECM is connector C2. Refer to Engine Controls Component Views on page 6-1209.
- Performing the fuel injector coil test may help isolate an intermittent condition. Refer to Fuel Injector Coil Test on page 6-1621.
- If the condition is intermittent, move the related harnesses and connectors, with the engine operating, while monitoring the circuit status for the component with a scan tool. The circuit status parameter changes from OK or Indeterminate to Fault if there is a condition with the circuit or a connection. The ODM information is in the output driver module (ODM) data list.
- If the condition is intermittent, refer to Intermittent Conditions

Test Description

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

2. This step verifies that the condition is present.
3. This step determines if there is condition with the ignition 1 voltage supply circuit. The fuel injectors for each bank of the engine are fused separately. If all the fuel injector open DTCs set for one bank of the engine, there is a condition with one of the ignition 1 voltage supply circuits.
5. This step verifies that the ECM is able to control the fuel injector.
6. This step tests if the feedback voltage circuit within the ECM is providing the correct voltage. This feedback voltage is used for determining if the fuel injector control circuit is open, shorted to a ground, or shorted to a voltage.

DTC P0201-P0206

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Engine Control Module (ECM) Connector End Views or Engine Controls Connector End Views				
1	Did you perform the Diagnostic System Check-Engine Controls?	—	Go to Step 2	Go to Diagnostic System Check-Engine Controls
2	1. Turn ON the ignition, with the engine OFF. 2. Clear the DTCs with a scan tool. 3. Start the engine. 4. Observe the DTC Info with a scan tool. Does DTC P0201, P0202, P0203, P0204, P0205, or P0206 set?	—	Go to Step 3	Go to Step 4
3	Are DTCs P0201, P0203, and P0205 set at the same time, or are DTCs P0202, P0204, and P0206 set at the same time?	—	Go to Step 15	Go to Step 5

Step	Action	Values	Yes	No
4	<p>1. Observe the Freeze Frame/Failure Records for this DTC.</p> <p>2. Turn OFF the ignition for 30 seconds.</p> <p>3. Start the engine.</p> <p>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.</p> <p>Did the DTC fail this ignition?</p>	—	Go to Step 4	Go to Diagnostic Aids
5	<p>1. Turn OFF the ignition.</p> <p>2. Disconnect the fuel injector multi-way harness connector.</p> <p>Important: Disconnecting the multi-way harness connector causes P0201–P0206 fuel injector circuit open DTCs to set.</p> <p>3. Probe the appropriate fuel injector control circuit, engine control module (ECM) side of harness, with a test lamp connected to B+.</p> <p>4. Crank the engine.</p> <p>Does the test lamp flash while cranking the engine?</p>	—	Go to Step 6	Go to Step 7
6	<p>1. Turn ON the ignition, with the engine OFF.</p> <p>2. Measure the voltage between the control circuit of the fuel injector, ECM side of harness, and the ECM housing with a DMM.</p> <p>Is the voltage within the specified range?</p>	2.6–4.6 V	Go to Step 8	Go to Step 17

Step	Action	Values	Yes	No
7	Test the control circuit of the fuel injector for an open or for high resistance between the multi-way harness connector and the ECM. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 18	Go to Step 13
8	Probe the ignition 1 voltage supply circuit, ECM side of harness, with a test lamp connected to the ECM housing. Does the test lamp illuminate?	—	Go to Step 9	Go to Step 15
9	Test for continuity between the ignition 1 voltage supply circuit and the appropriate fuel injector control circuit, fuel injector side of harness, at the multi-way harness connector with a DMM. Does the DMM indicate OL?	—	Go to Step 10	Go to Step 14
10	1. Remove the upper intake. Refer to Intake Manifold Replacement -Upper on page 6-108 in Engine Mechanical-3.6L (LY7). 2. Test the control circuit of the fuel injector for an open between the multi-way harness connector and the fuel injector connector. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 18	Go to Step 11
11	Test the ignition 1 voltage supply circuit of the affected fuel injector for an open between the fuel injector and the splice. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 18	Go to Step 12

Step	Action	Values	Yes	No
12	Test for an intermittent and for a poor connection at the fuel injector. Refer to Testing for Intermittent and Poor Connections and Connector Repairs on page 8-1198 in Wiring Systems. Did you find and correct the condition?	—	Go to Step 18	Go to Step 16
13	Test for an intermittent and for a poor connection at the ECM. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 18	Go to Step 17
14	Repair the poor connection at the fuel injector harness multi-way harness connector. Refer to Connector Repairs in Wiring Systems. Did you complete the repair?	—	Go to Step 18	—
15	1. Repair the ignition 1 voltage supply circuit of the fuel injector for an open or for an intermittent short to ground. Refer to Wiring Repairs in Wiring Systems. 2. Replace the fuse if necessary. Did you complete the repair?	—	Go to Step 18	—
16	Replace the fuel injector. Refer to Fuel Injectors and Fuel Rail Replacement. Did you complete the replacement?	—	Go to Step 18	—
17	Replace the ECM. Refer to Engine Control Module (ECM) Replacement. Did you complete the replacement?	—	Go to Step 18	—

Step	Action	Values	Yes	No
18	<ol style="list-style-type: none">1. Clear the DTCs with a scan tool.2. Turn OFF the ignition for 30 seconds.3. Start the engine.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. Did the DTC fail this ignition?	—	Go to Step 2	Go to Step 19
19	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List	System OK

LAUNCH