

## ELECTRONIC IGNITION (EI) SYSTEM DIAGNOSIS

### CIRCUIT DESCRIPTION

The electronic ignition system uses an individual [ignition coil](#) for each cylinder. The powertrain control module (PCM) controls the ignition operation through eight individual ignition control (IC) circuits. Each bank of four ignition coils is connected to the PCM, power, or ground by the following circuits:

- Low reference
- Chassis ground
- Ignition 1 voltage
- The appropriate IC circuit

The PCM triggers an [ignition coil](#) by grounding the appropriate IC circuit using information from the crankshaft position (CKP) and camshaft position (CMP) sensors.

### DIAGNOSTIC AIDS

**IMPORTANT:** A missing CMP sensor signal may cause a long crank condition.

The CKP signal must be available for the engine to start. The CMP signal is not needed to start and operate the engine. The PCM can determine when a cylinder is on either the firing or exhaust stroke by the 24X signal.

Remove any debris from the PCM connector surfaces before servicing the PCM. Inspect the PCM connector gaskets when diagnosing or replacing the PCM. Ensure that the gaskets are installed correctly. The gaskets prevent water intrusion into the PCM.

For an intermittent condition, refer to Intermittent Conditions. [See: Computers and Control Systems\Testing and Inspection\Initial Inspection and Diagnostic Overview\Diagnostic Strategies\Intermittent Conditions](#)

### TEST DESCRIPTION

Step	Action	Value(s)	Yes	No
1	Did you perform the Diagnostic System Check – Vehicle?	—	Go to Step 2	Go to <a href="#">Diagnostic System Check - Vehicle</a> in Vehicle DTC Information
2	Attempt to start the engine. Does the engine start and run?	—	Go to Step 5	Go to Step 3
3	1. Observe the Engine Speed parameter with a scan tool. 2. Crank the engine. Does the scan tool indicate RPM is present?	—	Go to Step 7	Go to Step 4
4	Is DTC P0335, P0336, or P0351–P0358 also set?	—	Go to <a href="#">Diagnostic Trouble Code (DTC) List - Vehicle</a> in Vehicle DTC Information	Go to Step 16
5	1. Idle the engine. 2. Observe the misfire current counters on the scan tool. Does the scan tool display any misfire current counters incrementing?	—	Go to Step 6	Go to Diagnostic Aids
6	Do the misfire current counters increment for most cylinders on one bank of the engine?	—	Go to Step 12	Go to Step 7
7	1. Inspect the spark plug wire for open circuits, cracks, or improper seating of terminals at the spark plug or coil before proceeding with the test. Refer to <a href="#">Spark Plug Inspection</a> . 2. Inspect for spark at the plug with the J 26792 Spark Tester or equivalent while cranking. A few sparks, then nothing is considered no spark. Is adequate spark present?	—	Go to Step 33	Go to Step 8
8	Measure the spark plug wire resistance. Is the resistance within the specified value?	397–1,484 ohms	Go to Step 32	Go to Step 9
9	1. Turn OFF the ignition. 2. Disconnect the inoperative ignition coil. 3. Turn ON the ignition, with the engine OFF. 4. Probe the ignition 1 voltage circuit of the ignition coil with a test lamp connected to a good ground. Does the test lamp illuminate?	—	Go to Step 10	Go to Step 13
10	Probe the ignition 1 voltage circuit at the ignition coil with a test lamp connected to the ground circuit of the ignition coil. Does the test lamp illuminate?	—	Go to Step 11	Go to Step 14
11	Probe the ignition 1 voltage circuit at the ignition coil with a test lamp connected to the low reference circuit of the ignition coil. Does the test lamp illuminate?	—	Go to Step 20	Go to Step 15
12	Inspect for an open INJ 1 or INJ 2 fuse. Is the fuse open?	—	Go to Step 29	Go to Step 23

**Steps 1-12**

Step	Action	Value(s)	Yes	No
13	1. Disconnect the main ignition coil 8-way connector. 2. Probe the ignition 1 voltage circuit at the ignition coil main 8-way connector using the test lamp connected to battery ground.  Does the test lamp illuminate?	—	Go to Step 24	Go to Step 23
14	1. Disconnect the main ignition coil 8-way connector. 2. Probe the ignition 1 voltage circuit on the harness side with a test lamp connected to the ground circuit of the ignition coil.  Does the test lamp illuminate?	—	Go to Step 18	Go to Step 26
15	1. Disconnect the main ignition coil 8-way connector. 2. Probe the ignition 1 voltage circuit on the harness side with a test lamp connected to the low reference circuit of the ignition coil.  Does the test lamp illuminate?	—	Go to Step 19	Go to Step 28
16	1. Turn ON the ignition, with the engine OFF. 2. Disconnect the crankshaft position (CKP) sensor. 3. Measure the voltage from the CKP sensor 12-volt reference circuit and a good ground with the DMM. 4. Compare the measured voltage with the system voltage.  Is the difference in the voltage more than the specified value?	0.5 V	Go to Step 17	Go to Step 30
17	Test for a short to ground in the CKP 12-volt reference circuit or the camshaft position (CMP) sensor 12-volt reference circuit.  Did you find and correct the condition?	—	Go to Step 35	Go to Step 22
18	Test for an intermittent and for a poor connection at the ignition coil 8-way connector.  Did you find and correct the condition?	—	Go to Step 35	Go to Step 25
19	Test for an intermittent and for a poor connection at the ignition coil 8-way connector.  Did you find and correct the condition?	—	Go to Step 35	Go to Step 27
20	Test for an intermittent and for a poor connection at the ignition coil.  Did you find and correct the condition?	—	Go to Step 35	Go to Step 31
21	Test for an intermittent and for a poor connection at the CKP sensor.  Did you find and correct the condition?	—	Go to Step 35	Go to Step 30
22	Test for an intermittent and for a poor connection at the powertrain control module (PCM).  Did you find and correct the condition?	—	Go to Step 35	Go to Step 34
23	Repair the open or high resistance in the ignition 1 voltage circuit between the fuse block and the splice.  Did you complete the repair?	—	Go to Step 35	—

**Steps 13-23**

Step	Action	Value(s)	Yes	No
24	Repair the open or high resistance in the ignition 1 voltage circuit between the splice and the ignition coil connector. Did you complete the repair?	—	Go to Step 35	—
25	Repair the open in the ground circuit between the main 8-way connector and the ignition coil. Did you complete the repair?	—	Go to Step 35	—
26	Repair the open in the ground circuit. Did you complete the repair?	—	Go to Step 35	—
27	Repair the open in the low reference circuit between the main 8-way connector and the ignition coil. Did you complete the repair?	—	Go to Step 35	—
28	Repair the open in the low reference circuit between the PCM and the splice. Did you complete the repair?	—	Go to Step 35	—
29	1. Repair the ignition 1 voltage for a short to ground. 2. Replace the fuse. Did you complete the repair?	—	Go to Step 35	—
30	Replace the CKP sensor. Did you complete the replacement?	—	Go to Step 35	—
31	Replace the ignition coil. Did you complete the replacement?	—	Go to Step 35	—
32	Replace the spark plug wire. Did you complete the replacement?	—	Go to Step 35	—
33	Replace the spark plug. Did you complete the replacement?	—	Go to Step 35	—
34	Replace the PCM. Did you complete the replacement?	—	Go to Step 35	—
35	Attempt to start the engine. Does the engine start and continue to run?	—	Go to Step 36	Go to Step 3
36	1. Clear the DTCs with a scan tool. 2. Turn OFF the engine for 30 seconds. 3. Start the engine. 4. Allow the engine to reach operating temperature. Are there any DTCs that have not been diagnosed?	—	Go to <a href="#">Diagnostic Trouble Code (DTC) List - Vehicle in Vehicle DTC Information</a>	System OK

#### Steps 24-36

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

5. Monitoring the misfire current counters determines if a fault is present.
12. A good indication that the fuse is open is all of the misfire current counters are incrementing on one side of the engine. Inspect the ignition positive voltage circuit for a grounded circuit. If the fuse is open and the [ignition coil](#) circuits are OK, inspect the injector circuits for being grounded.

