

## PINPOINT TEST V: CAMSHAFT POSITION (CMP) SENSOR

### INTRODUCTION

#### Circuit Functions

The CMP signal source is a magnetic pickup sensor mounted on the left front side of the engine block. The sensor reacts to a peg on a target wheel that is positioned on the camshaft. The peg passes the sensor once per camshaft revolution and produces a single pulse correspondingly. The camshaft speed is calculated from the frequency of the CMP sensor signal. Diagnostic information on the CMP input signal is obtained by carrying out accuracy checks on signal levels, frequency, and duty cycle with software strategies.

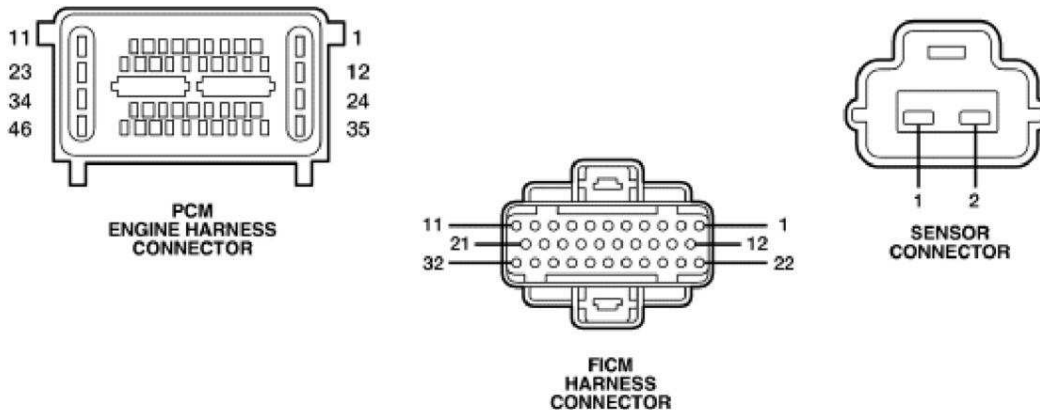
The powertrain control module (PCM) requires a crankshaft position (CKP) sensor and CMP signal to calculate engine speed and piston position. The CMP sensor creates a signal that the PCM uses to indicate the left or right bank. The engine will not operate without a CMP signal.

#### Detection/Management

An inactive CMP signal during cranking is detectable by the PCM. An inactive CMP signal causes a no-start condition. Electrical noise can also be detected by the PCM. If the level is sufficient to affect engine operation, a corresponding DTC is set.

**CAUTION:** The PCM harness connectors must be properly seated and the connector latch properly attached to eliminate possible driveability concerns or a no-start condition. Installing PCM connectors on an angle may cause an improper connection, misdiagnosis, and damaged components. Install the connector until the lever pivots and seats itself. Apply light pressure to get the connector into position on the PCM and then fully seat the connector.

**NOTE:** Visually inspect the harness connectors for corrosion, damage, proper mating, and correct pin tension.



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**Fig. 20: Identifying PCM Engine Harness Connector, FICM Harness Connector And CMP Sensor Connector**

Courtesy of FORD MOTOR CO.

**DTC Descriptions**

- P0340 = CMP Sensor Circuit Malfunction
- P0341 = CMP Sensor Circuit Performance
- P2614 = Camshaft Position Out

**TEST PROCEDURE**

**V1 PRELIMINARY DIAGNOSIS FOR DTCs P0340, P0341, OR P2614**

**NOTE:** Some DTCs require that the engine go through more than one key cycle to set.

**NOTE:** DTCs P2617 and P2614 may set simultaneously after an engine stalling event.

**NOTE:** DTC P2614 is calibrated to an increment counter. To set the DTC requires more than 10 consecutive fault events in the crank or the run mode. Carry out the required number of key cycles from ON to START to ON (cycling to OFF resets the timer) and then carry out the key on engine off (KOEO) or key on engine running (KOER) self-test.

- Carry out a visual inspection.
- Retrieve and record all DTCs.
- Record the freeze frame data.
- Clear all DTCs.
- Carry out the on-demand self-test.

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#### Are any DTCs retrieved?

| Yes   | No  |
|---|---|
| For P0340, P0341, or P2614, GO to <b>V2</b> . | UNABLE to duplicate the condition. CHECK for a loose connection, and damaged or corroded terminals. WIGGLE the harness attempting to recreate the fault. REPAIR as necessary. REFER to <b>SYMPTOM CHARTS - 6.0L DIESEL</b> if a driveability concern exists. REFER to <b>DIAGNOSTIC SUBROUTINES - 6.0L DIESEL</b> to diagnose a no-start condition. |

#### V2 DIAGNOSTIC TROUBLE CODES (DTCs) P0340, P0341, OR P2614

- Possible causes:
  - CMP circuit open
  - CMP circuit short to ground
  - CMP circuit short to power
  - signal circuit open
  - signal circuit shorted
  - PCM
  - CMP sensor

#### Does the engine start?

| Yes               | No   |
|-------------------|--|
| GO to <b>V3</b> . | REFER to <b>DIAGNOSTIC SUBROUTINES - 6.0L DIESEL</b> to diagnose a no-start condition. CLEAR the DTCs. REPEAT the self-test. |

#### V3 ATTEMPT TO RECREATE THE DTCS

- Clear all DTCs.
- Key ON, engine running.
- Increase the engine speed to greater than 1,500 RPM for 10 seconds. Repeat 2 times.
- Key ON, engine OFF.
- Carry out the on-demand self-test.

#### Is DTC P0340, P0341, or P2614 present?

| Yes               | No   |
|-------------------|--|
| GO to <b>V4</b> . | UNABLE to duplicate the condition. CHECK for a loose connection, and damaged or corroded terminals. WIGGLE the harness attempting to recreate the fault. REPAIR as necessary. REFER to <b>SYMPTOM CHARTS - 6.0L DIESEL</b> if a driveability concern exists. |

#### V4 CHECK THE RESISTANCE OF THE CMP SENSOR

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- Key OFF.
- Disconnect the PCM engine connector.
- Measure the resistance between the PCM engine connector pin 31, harness side and the PCM engine connector pin 43, harness side.

**Is the resistance between 800 and 1,000 ohms?**

| Yes               | No                |
|-------------------|-------------------|
| GO to <b>V5</b> . | GO to <b>V7</b> . |

#### **V5 CHECK FOR AN INTERMITTENT SHORT CIRCUIT**

- Connect the PCM engine harness connector.
- Key ON, engine OFF.
- Access the CMP sensor fault PID.
- Monitor the PID while wiggling the harness.

**Is a concern present?**

| Yes   | No   |
|---|--|
| REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test. | For DTCs P0340 or P0341, GO to <b>V6</b> .<br>For DTC P2614, GO to <b>V9</b> . |

#### **V6 CONFIRM A PCM FAULT**

- Key ON, engine OFF.
- Clear all DTCs.
- Carry out the on-demand self-test.

**Are DTCs P0340 and P0341 present?**

| Yes  | No   |
|--|--|
| INSTALL a new PCM.<br>CLEAR the DTCs.<br>REPEAT the self-test. | UNABLE to duplicate the condition. CHECK for a loose connection, and damaged or corroded terminals. WIGGLE the harness attempting to recreate the fault. REPAIR as necessary. REFER to <b>SYMPTOM CHARTS - 6.0L DIESEL</b> if a driveability concern exists. |

#### **V7 CHECK THE CMP SENSOR CIRCUITS FOR A SHORT TO GROUND**

- Key OFF.
- Disconnect the CMP sensor.
- Inspect the CMP sensor connector for damaged or corroded pins.
- Measure the resistance between the PCM engine connector pin 31, harness side and ground; and between

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the PCM engine connector pin 43, harness side and ground.

**Are the resistances greater than 10,000 ohms?**

| Yes               | No  |
|-------------------|---|
| GO to <b>V8</b> . | REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test. |

#### V8 CHECK THE CMP CIRCUITS FOR AN OPEN

- Measure the resistance between the PCM engine connector pin 31, harness side and the CMP sensor pin 1, harness side; and between the PCM engine connector pin 43, harness side and the CMP sensor pin 2, harness side.

**Are the resistance less than 5 ohms?**

| Yes   | No  |
|---|---|
| INSTALL a new CMP sensor. CLEAR the DTCs. REPEAT the self-test. | REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test. |

#### V9 CHECK THE CAMSHAFT POSITION SIGNAL FOR A SHORT TO VOLTAGE

- Key OFF.
- Disconnect the PCM engine harness connector.
- d Disconnect the FICM harness connector C.
- Key ON, engine OFF.
- Measure the voltage between the FICM connector C pin 10, harness side and ground.

**Is any voltage indicated?**

| Yes   | No                 |
|---|--------------------|
| REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test. | GO to <b>V10</b> . |

#### V10 CHECK THE CAMSHAFT POSITION SIGNAL FOR A SHORT TO GROUND

- Key OFF.
- Measure the resistance between the FICM connector C pin 10, harness side and ground.

**Is the resistance greater than 10,000 ohms?**

| Yes                | No  |
|--------------------|---|
| GO to <b>V11</b> . | REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test. |

#### V11 CHECK THE CAMSHAFT POSITION SIGNAL FOR AN OPEN

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- Measure the resistance between the FICM connector C pin 10, harness side and the PCM engine connector pin 20, harness side.

**Is the resistance less than 5 ohms?**

| Yes                | No  |
|--------------------|---|
| GO to <b>V12</b> . | REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test. |

#### **V12 CHECK THE CMP SENSOR**

- Inspect the CMP sensor for misalignment and improper installation.
- Remove the CMP sensor.
- Inspect the CMP sensor for damage.

**Is a concern present?**

| Yes  | No  |
|--|---|
| REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test. | INSTALL a new PCM. CLEAR the DTCs. REPEAT the self-test |