

**DTC P1391: INTERMITTENT LOSS OF CMP OR CKP**

**NOTE:** For circuit identification and wiring diagram, see **WIRING DIAGRAMS** article. If Powertrain Control Module (PCM) is replaced, PCM must be reprogrammed. See **PROGRAMMING**. After each repair procedure has been completed, reconnect all components. Perform **POWERTRAIN VERIFICATION TEST VER-5** under **VERIFICATION TESTS** to ensure system is functioning properly.

**Description**

Camshaft Position (CMP) sensor and Crankshaft Position (CKP) sensor signals are monitored with engine running or cranking. DTC will set when PCM senses failure counter reaches 20 failures for 2 consecutive trips. Possible causes are: CKP sensor improperly installed, defective CKP sensor, defective CMP sensor, defective PCM, defective tone wheel/flexplate, defective connectors or defective wiring.

**Testing**

1. Turn ignition on. Using scan tool, read DTCs. If GOOD TRIP counter is displayed and equal to zero, go to next step. If GOOD TRIP counter is not displayed and equal to zero, go to step 10.
2. Using oscilloscope connected to ground, backprobe CMP sensor signal circuit (Tan/Yellow wire) at CMP sensor connector. See **Fig. 27** or **Fig. 28**. Start engine and observe oscilloscope pattern. If CMP sensor signal pattern is not consistent, go to next step. If CMP sensor signal pattern is consistent, go to step 6.
3. Visually inspect related wiring harness. Check for chafed, pierced, pinched or partially broken wires. Visually inspect related wiring harness connectors. Check for broken, bent, pushed out or corroded terminals. Ensure CKP and CMP sensors are properly installed and mounting bolts are tight. Refer to any Technical service Bulletins (TSB) that may apply. If any of these conditions are present, repair as necessary. If none of these conditions are present, go to next step.
4. Turn ignition off. Remove CMP sensor. Inspect tone wheel/pulse ring for damage, foreign material or excessive movement. Repair or replace tone wheel/pulse ring as necessary. If tone wheel/pulse ring is okay, go to next step.
5. If no other possible causes are remaining, replace CMP sensor.
6. Using oscilloscope connected to ground, backprobe CKP sensor signal circuit (Gray/Black wire) at CKP sensor connector. See **Fig. 29** or **Fig. 30**. Start engine and observe oscilloscope pattern. If CKP sensor signal pattern is not consistent, go to next step. If CKP sensor signal pattern is consistent, go to step 10.
7. Visually inspect related wiring harness. Check for chafed, pierced, pinched or partially broken wires. Visually inspect related wiring harness connectors. Check for broken, bent, pushed out or corroded terminals. Ensure CKP and CMP sensors are properly installed and mounting bolts are tight. Refer to any technical service bulletins that may apply. If any of these conditions are present, repair as necessary. If none of these conditions are present, go to next step.
8. Turn ignition off. Remove CKP sensor. Inspect tone wheel/flexplate for damage, foreign material or excessive movement. Repair or replace tone wheel/flexplate as necessary. If tone wheel/flexplate is okay, go to next step.
9. If no other possible causes are remaining, replace CKP sensor.

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10. Turn ignition off. Using oscilloscope connected to ground, backprobe CKP signal circuit (Gray/Black wire) at terminal No. 32 at PCM C1 connector. See **Fig. 4**. Turn ignition on and observe oscilloscope pattern. If CKP sensor did not generate any pulses, go to next step. If CKP sensor generated any pulses, replace CKP sensor.
11. Turn ignition off. Using oscilloscope connected to ground, backprobe CMP signal circuit (Tan/Yellow wire) at terminal No. 33 at PCM C1 connector. Turn ignition on and observe oscilloscope pattern. If CMP sensor did not generate any pulses, go to next step. If CMP sensor generated any pulses, replace CMP sensor.
12. Turn ignition off. Using oscilloscope connected to ground backprobe CKP signal circuit (Gray/Black wire) at terminal No. 32 at PCM C1 connector. Start engine. Observe oscilloscope pattern while wiggling related wiring harness and connectors. If no irregularities in oscilloscope pattern exist, go to next step. If any irregularities in oscilloscope pattern exist, carefully inspect harness connectors. Repair connectors as necessary. If connectors are okay, replace CKP sensor.
13. Turn ignition off. Using oscilloscope connected to ground, backprobe CMP signal circuit (Tan/Yellow wire) at terminal No. 33 at PCM C1 connector. Start engine. Observe oscilloscope pattern while wiggling related wiring harness and connectors. If no irregularities in oscilloscope pattern exist, go to next step. If any irregularities in oscilloscope pattern exist, carefully inspect harness connectors. Repair connectors as necessary. If connectors are okay, replace CMP sensor.
14. Conditions that set DTC are not present at this time. Perform the following to help identify intermittent condition:
  - With engine running at normal operating temperature, wiggle related wiring harness while monitoring related parameters on scan tool. If voltage changes or DTC sets while wiggling wiring harness, repair connectors or wiring harness where wiggling caused voltage to change or DTC to set.
  - Review freeze frame information on scan tool. Duplicate conditions present when DTC was set.
  - Refer to any technical service bulletins that may apply.
  - Visually inspect related wiring harness. Check for chafed, pierced, pinched or partially broken wires.
  - Visually inspect related wiring harness connectors. Check for broken, bent, pushed out or corroded terminals.

If a problem is found, repair as necessary. If no problems are found, test is complete.