

DTC P0335, P0336, OR P0338**DIAGNOSTIC INSTRUCTIONS**

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS**DTC P0335**

Crankshaft Position (CKP) Sensor Circuit

DTC P0336

Crankshaft Position (CKP) Sensor Performance

DTC P0338

Crankshaft Position (CKP) Sensor Circuit High Duty Cycle

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5-Volt Reference	P0122, P0222, P0335, P0698	P0335	P0123, P0221, P0335, P0533, P0558, P0699, P2138	P0336, P0697, P0698, P0699
CKP Sensor Signal	P0335	P0335	P0335	P0336
			P0123, P0335,	

Low Reference	-	P0335	P0699, P2101, P2138	P0336
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CIRCUIT/SYSTEM DESCRIPTION

The crankshaft position (CKP) sensor circuits consist of an engine control module (ECM) supplied 5-volt reference circuit, low reference circuit, and an output signal circuit. The CKP sensor is an internally magnetic biased digital output integrated circuit sensing device. The sensor detects magnetic flux changes of the teeth and slots of a 58-tooth reluctor wheel on the crankshaft. Each tooth on the reluctor wheel is spaced at 60-tooth spacing, with 2 missing teeth for the reference gap. The CKP sensor produces an ON/OFF DC voltage of varying frequency, with 58 output pulses per crankshaft revolution. The frequency of the CKP sensor output depends on the velocity of the crankshaft. The CKP sensor sends a digital signal, which represents an image of the crankshaft reluctor wheel, to the ECM as each tooth on the wheel rotates past the CKP sensor. The ECM uses each CKP signal pulse to determine crankshaft speed and decodes the crankshaft reluctor wheel reference gap to identify crankshaft position. This information is then used to sequence the ignition timing and fuel injection events for the engine. The ECM also uses CKP sensor output information to determine the camshaft relative position to the crankshaft, to detect cylinder misfire, and to control the camshaft position (CMP) actuator if equipped.

CONDITIONS FOR RUNNING THE DTC

- The engine is cranking or operating.
- The ECM has detected greater than 12 camshaft revolutions.
- The DTCs run continuously once the above conditions are met for greater than 5 seconds.

CONDITIONS FOR SETTING THE DTC

P0335

The ECM does not detect a signal from the CKP sensor. OR, the ECM detects a CKP signal with out reference pulse for more than 6 revolutions. Either condition exists for greater than 4 seconds or a cumulative of 50 seconds.

P0336

The ECM re-syncs the engine position 2,600 or more times during an ignition cycle. OR, the ECM detects 28 or more interruptions in the engine speed signal during an ignition cycle. Either condition exists for greater than 4 seconds or a cumulative of 50 seconds.

P0338

The ECM detects a difference of more than 250 teeth between reference gap position pulses for 4 consecutive crankshaft revolutions in which the same number of pulses are detected each crankshaft revolution or a cumulative of 50 seconds.

ACTION TAKEN WHEN THE DTC SETS

DTCs P0335, P0336, and P0338 are Type A DTCs.

CONDITIONS FOR CLEARING THE DTC

DTCs P0335, P0336, and P0338 are Type A DTCs.

DIAGNOSTIC AIDS

- The ECM uses the camshaft position sensors to determine engine speed and position when there is a CKP sensor condition.
- The engine will operate with a CKP sensor condition only if the ECM has stored the learned reference position of the camshafts in memory. With a crankshaft position sensor condition the engine will go into a limp home mode after a restart. The ECM then calculates engine speed from one of the camshaft position sensors.
- An intermittent condition in the camshaft position (CMP) sensor circuits can cause a CKP DTC to set. Inspect the CMP sensor, harness connections, and related wiring, if you suspect this condition.
- Test the current out-put of the signal circuit if you suspect high resistance in the circuit. The current out-put should be greater than 1 mA when measured on the 400 mA scale.
- A low fuel condition may set DTC P0336. If the fuel tank is allowed to run dry and numerous attempts are made to restart the engine after the initial stall,

DTC P0336 may set. Any other condition that results in fuel starvation where unsuccessful start attempts are made may set DTC P0336.

REFERENCE INFORMATION**Schematic Reference****Engine Controls Schematics****Connector End View Reference****Component Connector End Views****Electrical Information Reference**

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference**Powertrain Diagnostic Trouble Code (DTC) Type Definitions****Scan Tool Reference****Control Module References for scan tool information****CIRCUIT/SYSTEM VERIFICATION**

1. Ignition OFF, inspect the engine wiring harness carrying the CKP sensor circuits for the following conditions:
 - Close routing of aftermarket electrical equipment
 - Close to solenoids, motors, and relays
 - Correct any wire harness routing or component placement conditions if it is determined to be a possible source of electrical interference.
2. Ignition ON, engine OFF, use the live plot function on the scan tool. Select the engine speed parameter and the CKP sensor parameter. Change the minimum

spec to 400 RPM for both parameters. Change the maximum spec to 4,000 RPM for both parameters.

3. Start the engine and observe the scan tool.
4. Quickly accelerate and release the accelerator pedal several times. Do not accelerate past 4,000 RPM. The two graphed lines on the live plot display should track together across the screen.

CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the harness connector at the CKP sensor.
2. Ignition OFF, test for less than 1 ohm of resistance between the low reference circuit terminal 2 and ground.
 - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
3. Ignition ON, engine OFF, test for 4.8-5.2 volts between the 5-volt reference circuit terminal 1 and ground.
 - If less than the specified range, test the 5-volt reference circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the ECM.
 - If greater than the specified range, test the 5-volt reference circuit for a short to voltage. If the circuit tests normal, replace the ECM.
4. Ignition ON, engine OFF, test for 4.8-5.2 volts between the signal circuit terminal 3 and ground.
 - If less than the specified range, test the signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the ECM.
 - If greater than the specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the ECM.
5. Ignition OFF, connect a fused jumper wire to signal circuit terminal 3.
6. Ignition ON, momentarily touch the other end of the fused jumper wire to the battery negative post/negative battery cable junction block repeatedly. The CKP Active Counter and the CMP sensor parameter should change.
 - If the CKP Active Counter and the CMP sensor parameter change, test or replace the CKP sensor.
 - If the CKP Active Counter and the CMP sensor parameter does not

change, replace the ECM.

7. Ignition OFF, inspect the CKP sensor for correct installation.
 - If the sensor is loose, inspect the sensor and the O-ring for damage. Replace as necessary.
8. Inspect the engine for the following conditions:
 - Engine oil for debris
 - Crankshaft reluctor wheel for damage
 - Timing chain, tensioner, and sprockets for wear or damage
 - If debris is found in the engine oil, inspect the internal engine components to determine the cause. Repair or replace any worn or damaged components. Refer to **Camshaft Timing Chain and Sprocket Cleaning and Inspection** and **Camshaft Cleaning and Inspection** .
9. If all circuits and components test normal, test or replace the CKP sensor.

COMPONENT TESTING

IMPORTANT: You must perform the Circuit/System Testing before proceeding with Component Testing.

1. Remove the CKP sensor and inspect the sensor and the O-ring for damage.
 - If the sensor is loose, incorrectly installed, or damaged, replace the CKP sensor.
2. Connect the connector to the CKP sensor.
3. Ignition ON, engine OFF, observe the CKP Active Counter while passing a steel object by the tip of the sensor repeatedly. The CKP Active Counter should increment.
 - If the CKP Active Counter does not increment, replace the CKP sensor.

REPAIR PROCEDURES

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Control Module References** for ECM replacement, setup, and programming
- **Crankshaft Position Sensor Replacement**