DTC P2090 OR P2091

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 P2090

Exhaust Camshaft Position (CMP) Actuator Solenoid Control Circuit Low Voltage

DTC P2091

Exhaust Camshaft Position (CMP) Actuator Solenoid Control Circuit High Voltage

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open	Short to Voltage	Signal Performance
Exhaust CMP Actuator Solenoid Control	P2090	P0013	P2091	P0014
Exhaust CMP Actuator Solenoid Ignition 1 Voltage	-	P0013	-	-

CIRCUIT/SYSTEM DESCRIPTION

The camshaft position (CMP) actuator is attached to each camshaft and is hydraulically operated in order to change the angle of the camshaft relative to crankshaft position (CKP). The CMP actuator solenoid is controlled by the control module. The control module sends a pulse width modulated 12-volt signal to a CMP actuator solenoid. The solenoid controls the amount of engine oil flow to a

CMP actuator. The CMP actuator can change the camshaft angle a maximum of 25 degrees. The control module increases the pulse width to accomplish the desired camshaft operation.

CONDITIONS FOR RUNNING THE DTC

The engine is running.

CONDITIONS FOR SETTING THE DTC

The ECM detects an open, short to ground, or a short to voltage on the control circuit or an open on the ignition voltage circuit for more than 2 seconds.

ACTION TAKEN WHEN THE DTC SETS

DTCs P2090 and P2091 are Type B DTCs.

CONDITIONS FOR CLEARING THE MIL/DTC

DTCs P2090 and P2091 are Type B DTCs.

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

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

IMPORTANT: The supply of clean pressurized engine oil to the CMP actuator is essential to CMP actuator performance.

1. Observe the engine oil level. The engine oil level should be within operating range. Refer to **Approximate Fluid Capacities** .
2. Ensure that the vehicle has the correct engine oil and is not old, burnt or contains additives. Refer to Checking Things Under the Hood in Service and Appearance Care within the Owner's Manual.
    - If the vehicle has the incorrect engine oil, is old, burnt, or contains additives, change the oil and filter.
3. Test the engine oil pressure for correct operation. Refer to **Oil Pressure Diagnosis and Testing** .
4. Allow the engine to reach operating temperature.
5. Set the parking brake and place the vehicle in Park for automatic, or Neutral for manual.
6. Observe the Exh. CMP Variance parameter. The Exh. CMP Variance will rise for 1-2 seconds until the Exh. CMP Angle parameter matches the Desired Exh. CMP parameter. The Exh. CMP Variance should again return to 0 degrees.

IMPORTANT: The engine will run rough and may require throttle input to keep running.

7. Command the CMP actuator to 24 degrees. The Desired Exh. CMP parameter should match the Exh. CMP Angle parameter.
8. 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 data.

CIRCUIT/SYSTEM TESTING

1. Ignition ON, measure for battery voltage between the CMP actuator solenoid ignition voltage and ground.

- If less than battery voltage, test the CMP actuator solenoid ignition voltage circuit for an open, short to ground.

2. Connect a test lamp between the CMP actuator solenoid control circuit and battery voltage. The test lamp should not illuminate.
   - If the test lamp illuminates, test the CMP actuator solenoid control circuit for a short to ground. If the circuit tests normal, replace the control module.
3. Measure for 0 volts between the CMP actuator solenoid control and ground.
   - If voltage is present, test the control circuit for a short to voltage. If the circuit tests normal, replace the control module.
4. Command the CMP actuator solenoid ON. The test lamp should turn ON and OFF.
   - If the test lamp does not turn ON and OFF, test the CMP actuator solenoid control circuit for an open or high resistance. If the circuit tests normal, replace the control module.
5. If all circuits test normal, test or replace the CMP actuator solenoid.

COMPONENT TESTING

1. Measure the resistance of each CMP actuator solenoid valve assembly. Resistance should be between 8-12 ohms.
2. Connect a jumper wire between the CMP actuator solenoid control circuit at the solenoid and a good ground. Connect a fused jumper wire to the CMP actuator solenoid ignition voltage circuit at the solenoid. Momentarily touch the fused jumper to B+. Observe the spool valve inside the CMP actuator. The spool valve should move from fully closed to fully opened position.

REPAIR PROCEDURES

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

- **Camshaft Position Sensor Replacement - Exhaust**
- **Control Module References** for replacement, setup, and programming

