

## DTC P0641-P0643, P0651-P0653, or P0697-P0699 (ECM DTC)

### 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 P0641:** 5-Volt Reference 1 Circuit

**DTC P0642:** 5-Volt Reference 1 Circuit Low Voltage

**DTC P0643:** 5-Volt Reference 1 Circuit High Voltage

**DTC P0651:** 5-Volt Reference 2 Circuit

**DTC P0652:** 5-Volt Reference 2 Circuit Low Voltage

**DTC P0653:** 5-Volt Reference 2 Circuit High Voltage

**DTC P0697:** 5-Volt Reference 3 Circuit

**DTC P0698:** 5-Volt Reference 3 Circuit Low Voltage

**DTC P0699:** 5-Volt Reference 3 Circuit High Voltage

### Circuit/System Description

The engine control module (ECM) has 3 5-volt reference circuits. The ECM provides the 5-volt reference to various sensors. Each reference circuit provides a 5-volt reference for greater than one sensor. An open, short to ground, or short voltage on one of the 5-volt reference circuits can affect all the components connected to that 5-volt reference circuit. The ECM monitors the voltage on the 5-volt reference circuits.

### Conditions for Running the DTC

- The ignition is ON for greater than 2 seconds.
- DTCs P0641, P0642, P0643, P0651, P0652, P0653, P0697, P0698, and P0699 run continuously when the above condition is met.

### Conditions for Setting the DTC

The 5-volt reference circuit voltage is above or below a predetermined threshold. The condition

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exists, then a 5 second delay for MIL ON.

## **Action Taken When the DTC Sets**

DTCs P0641, P0642, P0643, P0651, P0652, P0653, P0697, P0698, and P0699 are Type A DTCs.

## **Conditions for Clearing the DTC**

DTCs P0641, P0642, P0643, P0651, P0652, P0653, P0697, P0698, and P0699 are Type A DTCs.

## **Diagnostic Aids**

- The 5-volt reference 1 circuit provides 5 volts to the following sensors:
  - Fuel tank pressure (FTP) sensor terminal C, if equipped
  - Engine oil pressure (EOP) sensor terminal B
- The 5-volt reference 2 circuit provides 5 volts to the following sensors:
  - All four camshaft position (CMP) sensors terminal 3
  - Accelerator pedal position (APP) sensor 1
- The 5-volt reference 3 circuit provides 5 volts to the following sensors:
  - Throttle position (TP) sensor 1 and 2 terminal E
  - Crankshaft position (CKP) sensor terminal 3
  - Accelerator pedal position (APP) sensor 2 terminal 1
  - A/C pressure sensor terminal 1
- If the condition is intermittent, move the related harnesses and connectors with the engine operating. Monitor the scan tool 5-volt Reference Circuit Test Status parameters for the affected components. The circuit test status parameter will change from OK or Not Run to Fault if there is a condition with the circuit or a connection.

## **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 ON, observe the DTC information with a scan tool. DTC P0641, P0642, P0643, P0651, P0652, P0653, P0697, P0698, or P0699 should not set.
2. Observe the appropriate scan tool 5-volt Reference Circuit Test Status parameter. The parameter should display OK or Not Run.
3. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

## Circuit/System Testing

**Note:** Additional DTCs will set when disconnecting the components.

1. Ignition OFF, disconnect the harness connector of all appropriate sensors for the applicable DTC. Refer to Diagnostic Aids.
2. Ignition ON, test for 4.6-5.2 V between one of the affected 5-volt reference circuits and ground.
  - If the voltage is less than the specified range, test for a short to ground or for an open between the ECM and the circuit splice. If the circuit test normal, replace the ECM.
  - If the voltage is greater than the specified range, test for a short to voltage on the 5-volt reference circuit. If the circuit test normal, replace the ECM.

**Note:** A short to voltage on the signal circuit of certain components may cause this DTC to set.

3. Connect each component associated with the affected 5-volt reference circuit one at a time while monitoring the appropriate scan tool 5-Volt Reference Circuit Status parameter. The parameter should continue to display OK.
  - If the parameter displays Fault when a component is connected, test the signal circuit of that component for a short to voltage. If the circuit tests normal, replace the component.

## Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

- [Engine Oil Pressure Sensor and/or Switch Replacement](#)
- [Camshaft Position Sensor Replacement - Bank 1 \(Right Side\) Intake](#)
- [Camshaft Position Sensor Replacement - Bank 1 \(Right Side\) Exhaust](#)
- [Camshaft Position Sensor Replacement - Bank 2 \(Left Side\) Intake](#)
- [Camshaft Position Sensor Replacement - Bank 2 \(Left Side\) Exhaust](#)