DTC P0106

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 DESCRIPTOR

DTC P0106

Manifold Absolute Pressure (MAP) Sensor Performance

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
5-Volt Reference	P0107, P0452, P0532, P0641	P0106, P0107	P0107	P0108, P0533, P0641	P0106, P0107
MAP Sensor Signal	P0107	P0106, P0107	P0107	P0108	P0106, P0107, P1101
Low Reference	-	P0106, P0108	P0106, P0108	-	P0106, P0108

TYPICAL SCAN TOOL DATA

MAP Sensor

Circuit	Short to Ground	Open	Short to Voltage
Operating Conditions: Engine running, transmission in Park or Neutral **Parameter Normal Range:** 20-48 kPa, varies with altitude			
5-Volt Reference	0 kPa	0 kPa	127 kPa
MAP Sensor Signal	0 kPa	0 kPa	127 kPa
Low Reference	-	127 kPa	-

CIRCUIT DESCRIPTION

The intake flow rationality diagnostic provides the within-range rationality check for the mass air flow (MAF), manifold absolute pressure (MAP), and the throttle position (TP) sensors. This is an explicit model-based diagnostic containing 4 separate models for the intake system.

- The throttle model describes the flow through the throttle body and is used to estimate the MAF through the throttle body as a function of barometric pressure (BARO), TP, intake air temperature (IAT), and

estimated MAP. The information from this model is displayed on the scan tool as the MAF Performance Test parameter.

- The first intake manifold model describes the intake manifold and is used to estimate MAP as a function of the MAF into the manifold from the throttle body and the MAF out of the manifold caused by engine pumping. The flow into the manifold from the throttle uses the MAF estimate calculated from the above throttle model. The information from this model is displayed on the scan tool as the MAP Performance Test 1 parameter.
- The second intake manifold model is identical to the first intake manifold model except that the MAF sensor measurement is used instead of the throttle model estimate for the throttle air input. The information from this model is displayed on the scan tool as the MAP Performance Test 2 parameter.
- The fourth model is created from the combination and additional calculations of the throttle model and the first intake manifold model. The information from this model is displayed on the scan tool as the TP Performance Test parameter.

The estimates of MAF and MAP obtained from this system of models and calculations are then compared to the actual measured values from the MAF, MAP, and the TP sensors and to each other to determine the appropriate DTC to fail. The following table illustrates the possible failure combinations and the resulting DTC or DTCs.

Scan Tool Diagnostic Test Results

MAF Performance Test	MAP Performance Test 1	MAP Performance Test 2	TP Performance Test	DTCs Passed	DTCs Failed
-	-	OK	OK	P0101, P0106, P0121, P1101	None
OK	OK	Fault	OK	P0101, P0106, P0121, P1101	None
Fault	OK	Fault	OK	P0106, P0121, P1101	P0101
OK	Fault	Fault	OK	P0101, P0121, P1101	P0106
Fault	Fault	Fault	OK	P0121, P1101	P0101, P0106
-	-	OK	Fault	P0101, P0106, P1101	P0121
OK	OK	Fault	Fault	P0101, P0106, P0121, P1101	None
Fault	OK	Fault	Fault	P0101, P0106, P0121	P1101
-	Fault	Fault	Fault	P0101, P0106, P0121	P1101

CONDITIONS FOR RUNNING THE DTC

- DTC P0102, P0103, P0107, P0108, P0112, P0113, P0116, P0117, P0118, P0128, P0335, or P0336 is not set.
- The engine speed is between 400-8,192 RPM.

- The IAT Sensor parameter is between -7° to +125°C (+19° to +257°F).
- The ECT Sensor parameter is between 70-125°C (158-257°F).
- This DTC runs continuously within the enabling conditions.

CONDITIONS FOR SETTING THE DTCS

The engine control module (ECM) detects that the actual measured airflow from MAF, MAP, and TP is not within range of the calculated airflow that is derived from the system of models for more than 2 seconds.

ACTION TAKEN WHEN THE DTC SETS

DTC P0106 is a Type B DTC.

CONDITIONS FOR CLEARING THE MIL/DTC

DTC P0106 is a Type B DTC.

DIAGNOSTIC AIDS

- A wide open throttle (WOT) acceleration from a stop should cause the MAP sensor parameter on the scan tool to increase rapidly to near the BARO Sensor parameter at the time of the 1-2 shift.
- A skewed or stuck engine coolant temperature (ECT) sensor or intake air temperature (IAT) sensor will cause the calculated models to be inaccurate and may cause this DTC to run when it should not. Refer to **Temperature Versus Resistance** .
- The BARO that is used by the ECM to calculate the air flow models is initially based on the MAP sensor at ignition ON. When the engine is running, the ECM will continually update the BARO value near WOT using the MAP sensor and a calculation. A skewed MAP sensor will cause the BARO value to be inaccurate.

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

Special Tools

- **J 23738-A** Mityvac
- **J 35555** Metal Mityvac

CIRCUIT/SYSTEM VERIFICATION

1. Verify that DTC P0641 or P0651 is not set.
    - If any of the DTCs are set, refer to **DTC P0641 or P0651** .
2. Verify that restrictions do not exist in the exhaust system. Refer to **Restricted Exhaust** .
3. Ignition OFF for 90 seconds, determine the current vehicle testing altitude.
4. Ignition ON, engine OFF, observe the scan tool BARO parameter. Compare the parameter to the **Altitude Versus Barometric Pressure** table. The BARO parameter should be within the specified range indicated in the table.
5. Use the scan tool and compare the MAP Sensor parameter to a known good vehicle, under various operating conditions. The reading should be within 5 kPa of the known good vehicle.
6. 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

1. Verify the integrity of the entire air induction system by inspecting for the following conditions:
    - Any damaged components
    - Loose or improper installation
    - An air flow restriction
    - Any vacuum leak
    - Improperly routed vacuum hoses
    - In cold climates, inspect for any snow or ice buildup
    - Verify that restrictions do not exist in the MAP sensor port or vacuum source.
2. Ignition OFF, disconnect the harness connector at the MAP sensor.
3. Ignition OFF, test for less than 5 ohms 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.
4. Ignition ON, 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.

5. Verify the scan tool MAP Sensor parameter is less than 1 kPa.
   - If greater than the specified range, test the signal circuit terminal 3 for a short to voltage. If the circuit tests normal, replace the ECM.
6. Install a 3A fused jumper wire between the signal circuit terminal 3 and the 5-volt reference circuit terminal 1. Verify the scan tool MAP Sensor parameter is greater than 126 kPa.
   - 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.
7. If the circuits test normal, test or replace the MAP sensor.

COMPONENT TESTING

IMPORTANT: You must perform the Circuit/System Testing in order to verify the integrity of the MAP sensor circuits before proceeding with the Component Testing.

Skewed Sensor Test

1. Ignition OFF, remove the vacuum source from the MAP sensor.
2. Ignition ON, observe and record the scan tool MAP sensor pressure parameter. This is the first MAP sensor reading.
3. With the **J 23738-A** or **J 35555** apply 17 kPa (5 in Hg) of vacuum to the MAP sensor. Observe and record the scan tool MAP sensor pressure parameter. This is the second MAP sensor reading.
4. Subtract the second MAP sensor reading from the first MAP sensor reading. Verify that the vacuum decrease is within 4 kPa (1 in Hg) of the applied vacuum.
   - If the vacuum decrease is not within the specified range, replace the MAP sensor.
5. With the **J 23738-A** or **J 35555** , apply 34 kPa (10 in Hg) of vacuum to the MAP sensor. Observe and record the scan tool MAP sensor pressure parameter. This is the third MAP sensor reading.
6. Substract the third MAP sensor reading from the first MAP sensor reading. Verify that the vacuum decrease is within 4 kPa (1 in Hg) of the applied vacuum.
   - If the vacuum decrease is not within the specified range, replace the MAP sensor.

Erratic Signal Test

1. Ignition OFF, remove the MAP sensor.
2. Install a 3A fused jumper wire between the 5-volt reference circuit terminal 1 and the corresponding terminal of the MAP sensor.
3. Install a jumper wire between the low reference circuit terminal 2 of the MAP sensor and ground.
4. Install a jumper wire at terminal 3 of the MAP sensor.
5. Connect a DMM between the jumper wire from terminal 3 of the MAP sensor and ground.

6. Ignition ON, with the **J 23738-A** or **J 35555** , slowly apply vacuum to the sensor while observing the voltage on the DMM. The voltage should vary between 0-5.2 volts, without any spikes or dropouts.
    - If the voltage reading is erratic, replace the MAP sensor.

REPAIR PROCEDURES

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

- **Manifold Absolute Pressure Sensor Replacement**
- **Control Module References** for ECM replacement, setup, and programming

