

## Computers and Control Systems: Testing and Inspection Procedures

### P0102

#### CIRCUIT DESCRIPTION

The mass air flow (MAF) sensor is an air flow meter that measures the amount of air entering the engine. The powertrain control module (PCM) uses the MAF sensor signal in order to provide the correct fuel delivery for a wide range of engine speeds and loads. A small quantity of air entering the engine indicates a deceleration or idle. A large quantity of air entering the engine indicates an acceleration or high load condition. The MAF sensor has the following circuits:

- ^ An ignition 1 voltage circuit
- ^ A ground circuit
- ^ A signal circuit

The PCM applies a voltage to the sensor on the signal circuit. The sensor uses the voltage in order to produce a frequency based on inlet air flow through the sensor bore. The frequency varies within a range of around **2,000 Hertz** at idle to about **10,000 Hertz** at maximum engine load. DTC P0102 sets if the PCM detects a frequency signal lower than the possible range of a properly operating MAF sensor.

#### CONDITIONS FOR RUNNING THE DTC

- ^ The engine is cranking for **0.5 second** or running for **1 second**.
- ^ The engine speed is more than **50 RPM**.
- ^ The ignition 1 signal is more than **8 volts**.
- ^ The idle air control (IAC) position is more than 5 counts.
- ^ The above conditions are met for more than **0.5 seconds**.

#### CONDITIONS FOR SETTING THE DTC

The PCM detects that the MAF sensor frequency signal is less than **1,200 Hz**. for more than **12 seconds**.

#### ACTION TAKEN WHEN THE DTC SETS

- ^ The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- ^ The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

#### CONDITIONS FOR CLEARING THE MIL/DTC

- ^ The control module turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- ^ A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- ^ A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- ^ Clear the MIL and the DTC with a scan tool.

#### DIAGNOSTIC AIDS

Inspect for the following conditions:

- ^ A misrouted harness
  - Inspect the harness of the MAF sensor in order to verify that the harness is not routed too close to the following components:
    - The secondary ignition wires or coils
    - Any solenoids
    - Any relays
    - Any motors
- ^ A low minimum air rate through the sensor bore may cause this DTC to set at idle or during deceleration. Inspect for any vacuum leaks downstream of the MAF sensor.
- ^ A wide open throttle (WOT) acceleration from a stop should cause the MAF sensor g/s display on the scan tool to increase rapidly. This increase should be from **4-7 g/s** at idle to **150 g/s** or more at the time of the 1-2 shift. If the increase is not observed, inspect for a restriction in the induction system or the exhaust system.
- ^ A resistance of **20 ohms** or more on the ground circuit of the MAF sensor can cause this DTC to set.

If you suspect the condition may be related to aftermarket accessories, refer to Checking Aftermarket Accessories in Diagnostic Aids.

If the condition is intermittent, refer to Intermittent Conditions. See: Diagnosis By Symptom (Computers and Control Systems)/Intermittent Conditions

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