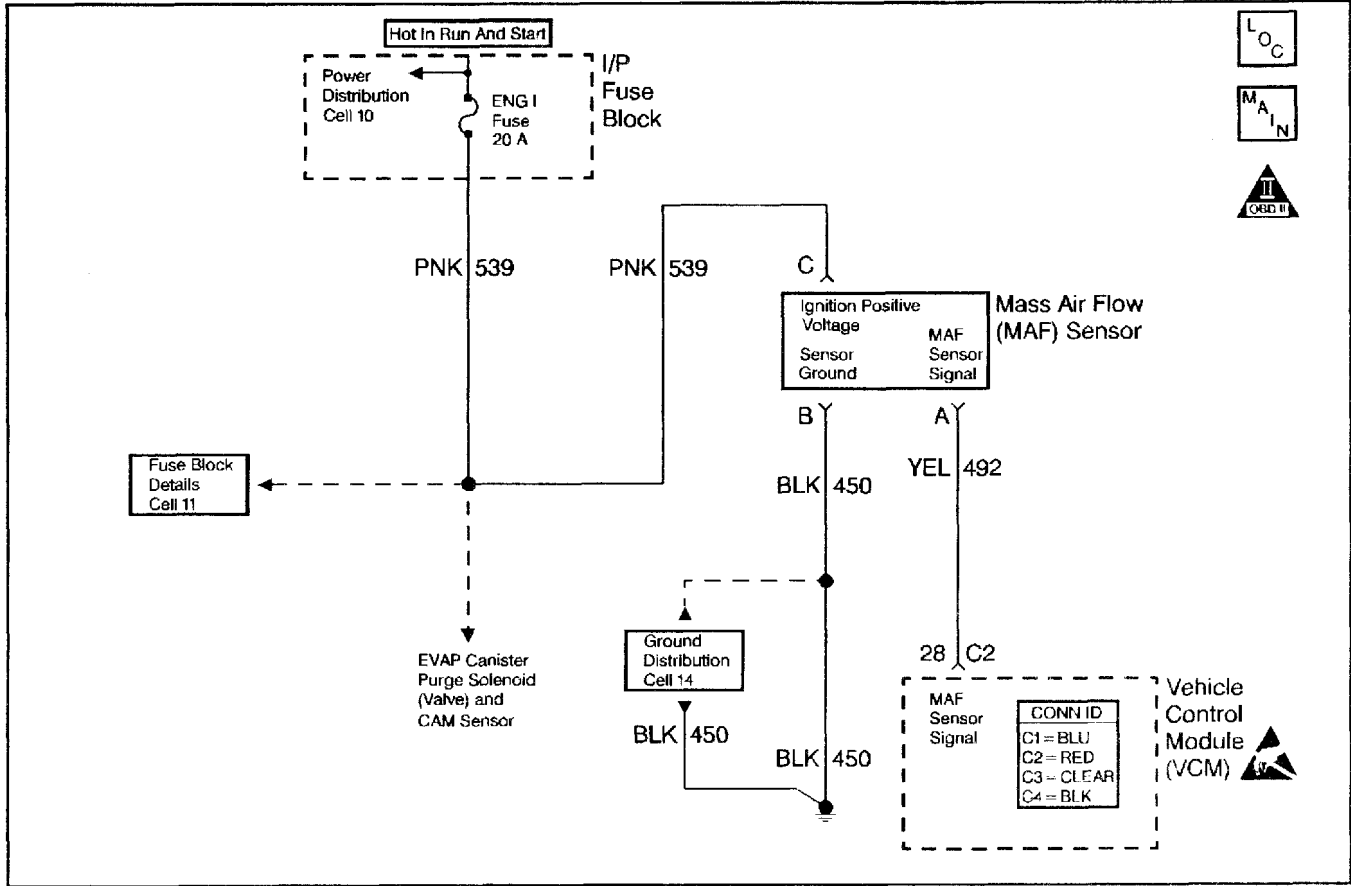


DTC P0102 MAF Sensor Circuit Low Frequency



397444

Circuit Description

The Mass Air Flow (MAF) sensor is an air flow meter. The Control Module supplies the MAF sensor a signal circuit. An ignition voltage is supplied to the MAF sensor by an independent circuit. A ground is supplied to the MAF sensor by an independent circuit. The MAF sensor heats a wire element (or grid) within the MAF sensor to a calculated temperature. As inlet air flows across and cools the grid, the MAF sensor increases current flow to the grid in order to maintain a constant grid temperature. The MAF sensor converts the grid current flow into a frequency signal. The Control Module converts the MAF signal frequency into a grams per second value. During low air flow rates (such as at engine idle), the MAF sensor produces a low frequency signal, and during high air flow rates (such as wide open throttle-road load) the MAF sensor increases the frequency signal. The Control Module monitors the MAF sensor signal frequency to calculate the flow and mass of the air entering the engine.

This DTC is designed to detect an unusually low MAF sensor signal frequency. If a MAF sensor frequency is detected by the VCM below the possible range of a normally operating MAF sensor, this DTC will be set.

Conditions for Running the DTC

Power Up Test

- The engine is OFF
- The ignition is ON for 2 seconds

Low Frequency Test

- The engine speed is more than 300 RPM
- The engine run time is more than 2 seconds
- The system voltage is more than 10 volts
- The throttle position is less than 90 percent

Conditions for Setting the DTC

Power Up Test

MAF frequency is less than 60 Hz for more than 250 ms.

Low Frequency Test

The MAF frequency is less than 300 Hz for more than 250 ms.

Action Taken When the DTC Sets

- The Control Module illuminates the MIL (Malfunction Indicator Lamp) if a failure is detected during 2 consecutive key cycles.
- The Control Module will set the DTC and records the operating conditions at the time the diagnostic fails. The Control Module stores the failure information in the scan tools Freeze Frame and/or the Failure Records.

Conditions for Clearing the MIL/DTC

- The Control Module turns OFF the MIL after 3 consecutive drive trips when the test has Run and Passed.
- A history DTC will clear if no fault conditions have been detected for 40 warm-up cycles (coolant temperature has risen 22°C (40°F) from the startup coolant temperature and the engine coolant temperature is more than 70°C (158°F) during the same ignition cycle).
- Use the scan tool Clear Information function.

Diagnostic Aids

Check for the following conditions:

- A misrouted harness. Inspect the MAF sensor harness in order to ensure that it is not routed too close to high voltage wires such as spark plug leads.
- A damaged harness. Inspect the wiring harness for damage. If the harness appears to be OK, observe the scan tool while moving the connectors and the wiring harnesses related to the MAF sensor. A change in the display indicates the location of the fault.
- A plugged intake air duct or filter element. A wide open throttle acceleration from a stop should cause the Mass Air Flow displayed on a scan tool to increase from about 4-7 g/s at idle to 100 g/s or more at the time of the 1-2 shift. If not, check for a restriction.

An intermittent may be caused by any of the following conditions:

- A poor connection
- Rubbed through wire insulation
- A broken wire inside the insulation

Thoroughly check any circuitry that is suspected of causing the intermittent complaint. Refer to *Intermittents and Poor Connections Diagnosis* in *Wiring Systems*.

If a repair is necessary, then refer to *Wiring Repairs* or *Connector Repairs* in *Wiring Systems*.

Test Description

The numbers below refer to step numbers on the diagnostic table.

2. This step verifies that the problem is present at idle.
6. A voltage reading of less than 4 or more than 6 volts at the MAF sensor signal circuit indicates a malfunction in the wiring or a poor connection.
7. This step verifies that the ignition positive voltage and a good ground are available at the MAF sensor.
11. This step determines if the fuse is open. If the fuse is open, locate and repair the short to ground in the ignition positive voltage circuit.

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| Step | Action | Value(s) | Yes | No |
|------|---|----------|---------------|-----------------------------------|
| 1 | <p>Important: Before clearing DTCs, use the scan tool Capture Info to save the Freeze Frame and the Failure records for reference. The control module's data is deleted once the Clear Info function is used.</p> <p>Did you perform the Powertrain On-Board Diagnostic (OBD) System Check?</p> | — | Go to Step 2 | Go to Powertrain OBD System Check |
| 2 | <p>1. Start the engine.</p> <p>2. With the engine idling, monitor the MAF reading on the scan tool.</p> <p>Is the MAF reading below the specified value?</p> | 2 g/s | Go to Step 4 | Go to Step 3 |
| 3 | <p>1. Turn ON the ignition leaving the engine OFF.</p> <p>2. Review the scan tool Failure Records data.</p> <p>3. Record the scan tool Failure Records data.</p> <p>4. Operate vehicle within the Failure Records conditions as noted.</p> <p>5. Using a scan tool, monitor the Specific DTC information for DTC P0102.</p> <p>Does the scan tool indicate DTC P0102 Failed This Ignition?</p> | — | Go to Step 4 | Go to Diagnostic Aids |
| 4 | <p>Inspect the MAF ignition positive voltage fuse.</p> <p>Is the fuse open?</p> | — | Go to Step 11 | Go to Step 5 |
| 5 | <p>1. Check for the following conditions:</p> <ul style="list-style-type: none"> • Objects blocking the MAF sensor inlet screen. • Crankcase ventilation valve faulty, missing or incorrectly installed. • Vacuum leaks in the following areas: <ul style="list-style-type: none"> • Throttle body • EGR valve flange and pipes • MAP sensor seal • EVAP canister purge valve seal <p>2. If a problem is found, repair as necessary.</p> <p>Did you find a problem?</p> | — | Go to Step 17 | Go to Step 6 |
| 6 | <p>1. Turn OFF the ignition.</p> <p>2. Disconnect the MAF sensor connector.</p> <p>3. Turn ON the ignition leaving the engine OFF.</p> <p>4. Measure the voltage between the MAF signal circuit and battery ground using a J 39200 DMM.</p> <p>Is the voltage near the specified value?</p> | 5.0 V | Go to Step 7 | Go to Step 10 |
| 7 | <p>Connect a test lamp between the MAF sensor ignition positive voltage and ground circuits at the MAF sensor harness connector.</p> <p>Is the test lamp ON?</p> | — | Go to Step 9 | Go to Step 8 |
| 8 | <p>Connect a test lamp between the MAF sensor ignition positive voltage circuit and the battery ground.</p> <p>Is the test lamp ON?</p> | — | Go to Step 12 | Go to Step 13 |
| 9 | <p>Check for a poor connection at the MAF sensor. Repair as necessary. Refer to <i>Connector Repairs in Wiring Systems</i>.</p> <p>Did you make a repair?</p> | — | Go to Step 17 | Go to Step 14 |

DTC P0102 MAF Sensor Circuit Low Frequency (cont'd)

| Step | Action | Value(s) | Yes | No |
|------|---|----------|--------------------------------|---------------|
| 10 | <ol style="list-style-type: none"> 1. Check the MAF signal circuit between the VCM and the MAF sensor for an open, short to ground, short to the MAF ground circuit, or short to voltage. 2. If the MAF signal circuit is open or shorted, repair as necessary. Refer to <i>Wiring Repairs</i> in <i>Wiring Systems</i>. <p>Did you find a problem?</p> | — | Go to Step 17 | Go to Step 15 |
| 11 | <ol style="list-style-type: none"> 1. Check for a short to ground in the MAF ignition positive voltage circuit. Repair as necessary. Refer to <i>Wiring Repairs</i> in <i>Wiring Systems</i>. 2. Replace the open fuse. <p>Is the action complete?</p> | — | Go to Step 17 | — |
| 12 | <ol style="list-style-type: none"> 1. Check the MAF sensor ground circuit for an open. 2. Repair as necessary. Refer to <i>Wiring Repairs</i> in <i>Wiring Systems</i>. <p>Is the action complete?</p> | — | Go to Step 17 | — |
| 13 | <ol style="list-style-type: none"> 1. Check the ignition positive voltage circuit to the MAF sensor for an open. 2. Repair as necessary. Refer to <i>Wiring Repairs</i> in <i>Wiring Systems</i>. <p>Is the action complete?</p> | — | Go to Step 17 | — |
| 14 | <p>Replace the MAF sensor. Refer to <i>MAF Sensor Replacement</i>.</p> <p>Is the action complete?</p> | — | Go to Step 17 | — |
| 15 | <ul style="list-style-type: none"> • Check for a poor connection at the VCM connector. • Repair as necessary. Refer to <i>Connector Repairs</i> in <i>Wiring Systems</i>. <p>Did you find a problem?</p> | — | Go to Step 17 | Go to Step 16 |
| 16 | <ol style="list-style-type: none"> 1. Replace the VCM. 2. Program the new VCM. Refer to <i>VCM Replacement/Programming</i>. 3. Perform the CKP System Variation Learn Procedure. Refer to <i>CKP System Variation Learn Procedure</i>. <p>Is the action complete?</p> | — | Go to Step 17 | — |
| 17 | <ol style="list-style-type: none"> 1. Using the scan tool, clear the DTCs. 2. Start the engine. 3. Allow the engine to idle until the engine reaches normal operating temperature. 4. Select the DTC and the Specific DTC functions. 5. Enter the DTC number which was set. 6. Operate the vehicle, with the Conditions for Setting this DTC, until the scan tool indicates that the diagnostic Ran. <p>Does the scan tool indicate that the diagnostic Passed?</p> | — | Go to Step 18 | Go to Step 2 |
| 18 | <p>Does the scan tool display any additional undiagnosed DTCs?</p> | — | Go to the applicable DTC table | System OK |