

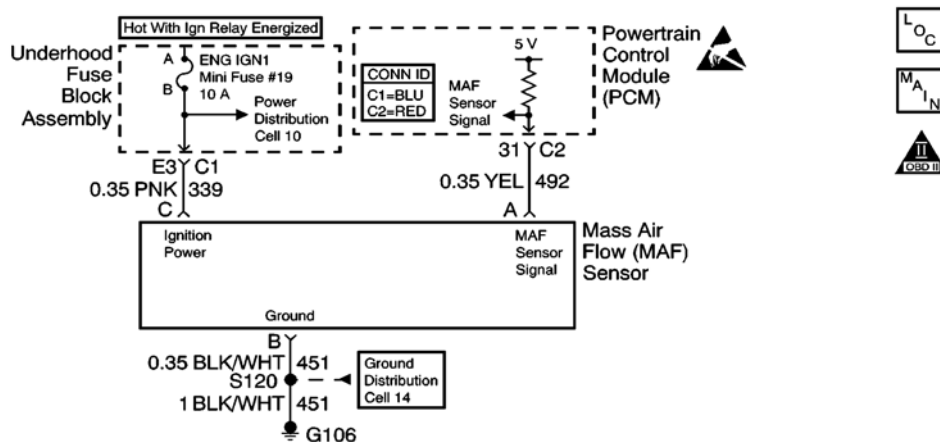
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Document ID# 554013
2000 Chevrolet/Geo Corvette

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DTC P0102 Mass Air Flow (MAF) Sensor Circuit Low Frequency



Circuit Description

The mass air flow (MAF) sensor measures the amount of air ingested by the engine. The direct measurement of the air entering the engine is more accurate than calculating the airflow from the MAP, the IAT and the engine speed (speed/density). The MAF sensor has a battery feed, ground, and a signal circuit.

The MAF sensor used on this engine is a hot wire type. This engine uses the MAF sensor to measure air flow rate. The MAF output frequency is a function of the power required to keep the air flow sensing elements (hot wires) at a fixed temperature above the ambient temperature. Air flowing through the sensor cools the sensing elements. The amount of cooling is proportional to the amount of air flow. The MAF sensor requires a greater amount of current in order to maintain the hot wires at a constant temperature as the air flow increases. The MAF sensor converts the changes in current draw to a frequency signal read by the PCM. The PCM calculates the air flow (grams per second) based on this signal.

The PCM monitors the MAF sensor frequency. The PCM can determine if the sensor is stuck low, stuck high, not providing the airflow value expected for a given operating condition, or that the signal appears to be stuck based on a lack of signal variation expected during the normal operation. This diagnostic monitors for too low of an airflow rate. When the PCM detects that the MAF sensor frequency is below a predetermined value, this DTC sets.

Conditions for Running the DTC

- The engine is operating greater than 0.5 second.
- The engine is at least 300 RPM.
- The ignition voltage is at least 8.0 volts.
- All conditions stable for 2.0 seconds.

Conditions for Setting the DTC

- The mass air flow frequency is less than 10 Hz.
- All conditions met for greater than 1.0 second.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The PCM records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the PCM stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the PCM records the operating conditions at the time of the failure. The PCM writes the conditions to the Freeze Frame and updates the Failure records.
- The PCM utilizes speed density (RPM, MAP, IAT) for fuel management.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A last test failed, or current DTC, clears when the diagnostic runs and does not fail.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Use a scan tool in order to clear the MIL and the DTC.

Diagnostic Aids

Important

- Remove any debris from the PCM\TAC module connector surfaces before servicing the PCM\TAC module. Inspect the PCM\TAC module connector gaskets when diagnosing/replacing the modules. Ensure that the gaskets are installed correctly. The gaskets prevent contaminate intrusion into the PCM\TAC modules.
- For any test that requires probing the PCM or a component harness connector, use the Connector Test Adapter Kit [J 35616-A](#) . Using this kit prevents damage to the harness/component terminals. Refer to [Using Connector Test Adapters](#) in *Wiring Systems*.
- Any un-metered air may cause this DTC to set. Inspect for the following:
 - An engine vacuum leak
 - The PCV system for vacuum leaks
 - An incorrect PCV valve
 - The engine oil dip stick not fully seated
 - The engine oil fill cap loose or missing
- For an intermittent, refer to [Symptoms](#) .

Test Description

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

2. This step tests whether the MAF sensor ignition feed circuit is shorted to a ground. If the fuse is open, repair the circuit as necessary and replace the fuse.
3. Monitoring the MAF sensor frequency will determine if the fault is present or the malfunction is intermittent.
4. Using the Freeze Frame and/or Failure Records data may aid in locating an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame and/or Failure Records data can help determine how many miles since the DTC set. The Fail Counter and Pass Counter can also help determine how many ignition cycles the diagnostic reported a pass and/or a fail. Operate the vehicle within the same freeze frame conditions (RPM, load, vehicle speed, temperature , etc.) that you observed. This isolates when the DTC failed.
5. This step tests whether the 5.0 volts is available to the MAF sensor signal circuit.
6. This step tests if the signal circuit is shorted to another 5.0 volt reference circuit. If another DTC sets, repair the circuits that are shorted together. If no DTCs set it may be necessary to road test the vehicle.
11. Inspect the fuse 19 for being open. If the fuse is open, inspect the MAF sensor ignition feed circuit for a short to ground.
12. This step verifies whether B+ is available to the MAF sensor.

Step	Action	Values	Yes	No
1	Did you perform the Powertrain On-Board Diagnostic (OBD) System Check?	--	Go to Step 2	Go to Powertrain On Board Diagnostic (OBD) System Check
2	Is the ENG-IGN1 fuse open?	--	Go to Step 20	Go to Step 3
3	<ol style="list-style-type: none"> 1. Install a scan tool. 2. Start the engine. 3. Monitor the MAF sensor frequency display on the Engine 2 Data List of the scan tool. Is the MAF sensor frequency below the specified value?	10 Hz	Go to Step 5	Go to Step 4
	<ol style="list-style-type: none"> 1. Turn ON the ignition leaving the engine OFF. 2. Review the Freeze Frame and/or Failure Records data for this DTC and observe the parameters. 3. Turn OFF the ignition for 15 seconds. 4. Start the engine. 5. Operate the vehicle within the conditions required 			

4	<p>for this diagnostic to run, and as close to the conditions recorded in the Freeze Frame/Failure Records as possible. Special operating conditions that you need to meet before the PCM will run this diagnostic, where applicable, are listed in Conditions for Running the DTC.</p> <p>6. Select the Diagnostic Trouble Code (DTC) option, the Specific DTC option, then enter the DTC number using the scan tool.</p> <p>Does the scan tool indicate that this diagnostic failed this ignition?</p>	--	Go to Step 5	Go to Diagnostic Aids
5	<p>1. Turn OFF the ignition. 2. Disconnect the MAF sensor connector. 3. Turn ON the ignition leaving the engine OFF. 4. Measure the voltage between the MAF sensor signal circuit and the battery ground using the DMM . Refer to Measuring Voltage in Wiring Systems.</p> <p>Is the voltage near the specified value?</p>	5V	Go to Step 6	Go to Step 8
6	<p>1. Turn OFF the ignition. 2. Jumper the MAF sensor signal circuit to battery ground using a fused jumper wire. Refer to Using Fused Jumper Wires in Wiring Systems. 3. Turn ON the ignition leaving the engine OFF.</p> <p>Do any additional DTCs set?</p>	--	Go to Step 21	Go to Step 7
7	<p>Attempt to start and idle the engine.</p> <p>Do any additional DTCs set?</p>	--	Go to Step 21	Go to Step 12
8	<p>1. Turn OFF the ignition. 2. Disconnect the PCM. Refer to Powertrain Control Module (PCM) Replacement . 3. Turn ON the ignition leaving the engine OFF. 4. Measure the voltage at the MAF sensor signal circuit at the PCM harness connector using the DMM . Refer to Probing Electrical Connectors in Wiring Systems.</p> <p>Does the DMM display a voltage?</p>	--	Go to Step 15	Go to Step 9
9	<p>1. Turn OFF the ignition. 2. Test for continuity of the MAF sensor signal circuit using the DMM . Refer to Testing for Continuity in Wiring Systems.</p> <p>Does the DMM display OL?</p>	--	Go to Step 16	Go to Step 10
	Test for continuity of the MAF sensor signal circuit to			

10	<p>battery ground using the DMM . Refer to Testing for Continuity in Wiring Systems.</p> <p>Does the DMM display OL?</p>	--	Go to Step 11	Go to Step 17
11	<ol style="list-style-type: none"> 1. Disconnect the TAC module harness connectors. Refer to Powertrain Control Module (PCM) Replacement . 2. Test for continuity between the MAF sensor signal circuit and all other circuits at the PCM\TAC harness connectors using the DMM . Refer to Testing for Continuity in Wiring Systems. <p>Does the DMM display OL?</p>	--	Go to Step 24	Go to Step 18
12	<p>Connect the test lamp J 34142-B between the MAF sensor ignition feed circuit and the ground at the MAF sensor harness connector.</p> <p>Does the test lamp illuminate?</p>	--	Go to Step 14	Go to Step 13
13	<p>Connect the test lamp J 34142-B between the MAF sensor ignition feed circuit and the battery ground.</p> <p>Does the test lamp illuminate?</p>	--	Go to Step 19	Go to Step 20
14	<ol style="list-style-type: none"> 1. Inspect for a poor connection at the MAF sensor harness terminals. Refer to Testing for Intermittent and Poor Connections in Wiring Systems. 2. If you find a poor connection, repair the condition as necessary. Refer to Repairing Connector Terminals in Wiring Systems. <p>Did you find and correct the condition?</p>	--	Go to Step 26	Go to Step 23
15	<p>Repair the short to voltage in the MAF sensor signal circuit. Refer to Wiring Repairs in Wiring Systems.</p> <p>Is the action complete?</p>	--	Go to Step 26	--
16	<p>Repair the open in the MAF sensor signal circuit. Refer to Wiring Repairs in Wiring Systems.</p> <p>Is the action complete?</p>	--	Go to Step 26	--
17	<p>Repair the short to ground in the MAF sensor signal circuit. Refer to Wiring Repairs in Wiring Systems.</p> <p>Is the action complete?</p>	--	Go to Step 26	--
18	<p>Repair the circuits that are shorted together. Refer to Wiring Repairs in Wiring Systems.</p> <p>Is the action complete?</p>	--	Go to Step 26	--
	<p>Repair the MAF sensor ground circuit for an open. Refer</p>			

19	to Wiring Repairs in Wiring Systems. Is the action complete?	--	Go to Step 26	--
20	1. Repair the open or grounded ignition feed circuit to the MAF sensor. Refer to Wiring Repairs in Wiring Systems. 2. Replace the fuse if necessary. Is the action complete?	--	Go to Step 26	--
21	1. Disconnect the PCM\TAC module harness connectors. Refer to Powertrain Control Module (PCM) Replacement . 2. Test for continuity from the MAF signal circuit to all other PCM\TAC module circuits at the PCM\TAC module harness connectors using the DMM . Refer to Testing for Continuity in Wiring Systems. Does the DMM display continuity from the MAF signal circuit to any other circuit?	--	Go to Step 22	Go to Step 25
22	Repair the circuits that are shorted together between the MAF sensor signal circuit and the circuit for which the DMM displayed continuity. Refer to Wiring Repairs in Wiring Systems Is the action complete?	--	Go to Step 26	--
23	Replace the MAF sensor. Refer to Mass Air Flow (MAF) Sensor Replacement . Is the action complete?	--	Go to Step 26	--
24	1. Inspect for a poor connection at the PCM. Refer to Testing for Intermittent and Poor Connections in Wiring Systems. 2. If you find a poor connection, repair as necessary. Refer to Repairing Connector Terminals in Wiring Systems. Did you find and correct the condition?	--	Go to Step 26	Go to Step 25
25	Important Program the replacement PCM. Replace the PCM. Refer to Powertrain Control Module (PCM) Replacement . Is the action complete?	--	Go to Step 26	--
	1. Select the Diagnostic Trouble Code (DTC) option and the Clear DTC Information option using the			

26	<p>scan tool.</p> <ol style="list-style-type: none"> 2. Start the engine and idle at the normal operating temperature. 3. Select the Diagnostic Trouble Code (DTC) option and the Specific DTC option, then enter the DTC number using the scan tool. 4. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text, if applicable. <p>Does the scan tool indicate that this test ran and passed?</p>	--	<p>Go to Step 27</p>	<p>Go to Step 2</p>
27	<p>Select the Capture Info option and the Review Info option using the scan tool.</p> <p>Does the scan tool display any DTCs that you have not diagnosed?</p>	--	<p>Go to the applicable DTC table</p>	<p>System OK</p>

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