DTC P0171

Circuit Description

The powertrain control module (PCM) controls the air/fuel metering system in order to provide the best possible combination of driveability, fuel economy, and emission control. Fuel delivery is controlled differently during Open Loop and Closed Loop. During Open Loop, the PCM determines fuel delivery based on sensor signals, without heated oxygen sensor (HO2S) input. During Closed Loop, the PCM adds HO2S inputs and level of purge to calculate the short and long term fuel trim adjustments. If the HO2S indicates a lean condition, the fuel trim values will be above 0 percent. If the HO2S indicates a rich condition, the fuel trim values will be below 0 percent. The short term fuel trim values change rapidly in response to the HO2S voltage signals. The long term fuel trim makes coarse adjustments in order to maintain an air/fuel ratio of 14.7:1. A block of cells contain information arranged in combinations of engine RPM and engine load for a full range of vehicle operating conditions. The long term fuel trim diagnostic is based on an average of cells currently being used. The PCM selects the cells based on the engine speed and load. If the PCM detects an excessively lean condition, DTC P0171 sets.

DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC P0171 Fuel Trim System Lean

Conditions for Running the DTC

- DTCs P0030, P0036, P0068, P0069, P0101, P0102, P0103, P0106, P0107, P0108, P0117, P0118, P0120, P0121, P0122, P0123, P0125, P0128, P0130, P0131, P0132, P0133, P0134, P0135, P0136, P0137, P0138, P0140, P0141, P0201-P0204, P0220, P0222, P0223, P0300, P0301-P0304, P0442, P0443, P0446, P0449, P0451, P0452, P0453, P0454, P0455, P0496, P0506, P0507, P1133, P1134, P1516, P2101, P2119, P2120, P2125, P2135, P2138, P2176 are not set.
- The engine is in Closed Loop status.
- The engine coolant temperature (ECT) is between -7 and +120°C (+19.4 and +248°F).
- The intake air temperature (IAT) is between -7 and +145°C (+19.4 and +293°F).
- The manifold absolute pressure (MAP) is between 15-100 kPa (2.2-14.5 psi).
- The vehicle speed is less than 132 km/h (82 mph).
- The engine speed is between 400-6,100 RPM.
- The mass air flow (MAF) is between 1-512 g/s.
- The barometric pressure (BARO) is greater than 74 kPa (10.7 psi).
- The fuel level is greater than 10 percent.
- DTC P0171 runs continuously once the above conditions have been met.

Conditions for Setting the DTC

- The long term fuel trim (FT) weighted average value is more than a calibrated value.
- The above condition is present for more than 2 minutes.

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

- Test for fuel contamination. Small amounts of water can be delivered to the fuel injectors and cause a lean exhaust indication. A lean exhaust indication can also be caused by too much alcohol in the fuel. Refer to Alcohol/Contaminants-in-Fuel Diagnosis .
- The system will go lean if an injector is not supplying enough fuel.
- A lean condition could be present during high fuel demand due to a fuel pump that does not pump enough fuel, a plugged fuel filter, or a restricted fuel pipe.
- Review the Failure Records with a scan tool. If an intermittent condition is suspected, refer to Intermittent Conditions .

Test Description

The number below refers to the step number on the diagnostic table.

8. If conditions were not corrected, a worn cam, worn intake or exhaust valves, or other engine mechanical failure may be at fault.

Step	Action	Values	Yes	No
1	Did you perform the Diagnostic System Check - Vehicle?	--	Go to Step 2	Go to Diagnostic System Check - Vehicle
2	Are any DTCs other than DTC P0171 also set?	--	Go to Diagnostic Trouble Code (DTC) List - Vehicle	Go to Step 3

3	1. Install a scan tool. 2. Review the Freeze Frame/Failure Records and record the displayed data for this DTC. 3. Select Fuel Trim Data parameter. 4. Start the engine. 5. Observe the Long Term FT parameter with a scan tool. Is the Long Term FT parameter greater than the specified value?	18%	Go to Step 4	Go to Diagnostic Aids
4	1. Operate the engine at idle. 2. Observe the Heated Oxygen Sensor (HO2S) parameters with a scan tool. Does the scan tool indicate that the values are within the specified range and fluctuating?	40-900 mV	Go to Step 5	Go to Step 6
5	1. Turn OFF the engine. 2. Visually and physically inspect the following items: • The vacuum hoses for splits, kinks, and proper connections--Refer to Emission Hose Routing Diagram . • Properly functioning fuel injectors--Refer to Fuel Injector Solenoid Coil Test . • If fuel pressure is too low, this DTC may set. Refer to Fuel System Diagnosis . • Fuel contamination--Refer to Alcohol/Contaminants-in-Fuel Diagnosis . Did you find and correct the condition?	--	Go to Step 9	Go to Step 8
6	1. Turn OFF the engine. 2. Turn ON the ignition, with the engine OFF. 3. Observe the manifold absolute pressure (MAP) sensor pressure parameter with a scan tool. Refer to Altitude Versus Barometric Pressure . 4. The MAP sensor pressure should be within the range specified for your altitude. Does the MAP indicate the correct barometric pressure?	--	Go to Step 7	Go to DTC P0106
	1. Turn OFF the engine. 2. Inspect for the following conditions: • The HO2S for proper installation • Ensure that the electrical connectors			

7	and wires are secured and not contacting the exhaust system. • The HO2S signal circuit for an open or a short to ground--Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	--	Go to Step 9	Go to Fuel System Diagnosis
8	1. Operate the engine at idle. 2. Inspect for the following conditions: • Missing, loose, or leaking exhaust components • Vacuum leaks at the intake manifold, throttle body, and injector O-rings • The air induction system and air intake ducts for leaks • The crankcase ventilation system for leaks • The evaporative canister purge pipes for obstructions or plugging Did you find and correct the condition?	--	Go to Step 9	Go to Symptoms - Engine Mechanical
9	**Important:** After repairs, use the scan tool Fuel Trim Reset function in order to reset the Long Term Fuel Trim. 1. Turn ON the ignition, with the engine OFF. 2. Clear the DTCs with a scan tool. 3. Turn OFF the ignition for 30 seconds. 4. Start the engine. 5. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	--	Go to Step 2	Go to Step 10
10	Observe the Capture Info with a scan tool. Have any other DTCs not been diagnosed?	--	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK