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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 that is based on sensor signals, without oxygen sensor input. During Closed Loop the PCM adds oxygen sensor inputs to calculate short and long term fuel trim fuel delivery adjustments. If the oxygen sensors indicate a lean condition, fuel trim values will be above 0 percent. If the oxygen sensors indicate a rich condition, fuel trim values will be below 0 percent. The values for the short term fuel trim change rapidly in response to the heated oxygen sensor (HO2S) voltage signals. Long term fuel trim makes coarse adjustments in order to maintain an air/fuel ratio of 14.7:1. If the PCM detects an excessively lean condition, DTC P0171 will set.

DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC P0171 Fuel Trim System Lean Bank 1

Conditions for Running the DTC

- DTCs P0101, P0102, P0103, P0107, P0108, P0121, P0122, P0123, P0131, P0132, P0133, P0134, P0135, P0137, P0138, P0140, P0141, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0401, P0403, P0404, P0405, P0442, P0443, P0446, P0449, P0506, P0507, or P1404 are not set.
- The engine coolant temperature (ECT) is between 20-110°C (68-230°F).
- The intake air temperature (IAT) is between 18-70°C (64-158°F).
- The manifold absolute pressure (MAP) is between 15-105 kPa (2.1-15.2 psi).
- The vehicle speed is less than 132 km/h (82 mph).
- The engine speed is between 600-4,000 RPM.
- The barometric pressure (BARO) is more than 70 kPa (10.1 psi).
- The idle purge is enabled.
- The mass air flow (MAF) is between 5-150 g/s.
- The fuel level is more than 10 percent.
- The scan tool is not commanding device control.

Conditions for Setting the DTC

- The value average of the long term fuel trim is above 20 percent.
- All of the above conditions are present for 6 seconds.
- This diagnostic runs continuously when the above conditions have been met.

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

- The system will go lean if an injector is not providing enough fuel.
- A lean condition could be present during high fuel demand due to a fuel pump that does not pump enough fuel.
- Excessive resistance in the ignition 1 voltage and/or fuel injector circuits may cause the following symptoms:
  - A lean condition
  - Misfire
  - Rough idle
- Fuel contamination, such as water and alcohol, will affect fuel trim.
- Review the Failure Records with a scan tool. If an intermittent condition is suspected, refer to Intermittent Conditions .
- This DTC may set due to poor idle characteristics. A possible cause may be uncontrolled fueling due to an open or high resistance in the HO2S 1 low signal circuit. Before replacing any component, ensure that this condition does not exist.

Test Description

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

5. Refer to Fuel System Diagnostics for a possible fuel condition if conditions were not corrected.

8. If conditions were not corrected, a worn cam, worn intake, exhaust values, or other engine mechanical failures 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	**Important:** Refer to the DTCs that are set, other than P0171, before continuing. 1. Install the scan tool. 2. Start and idle the engine at normal operating temperature in Closed Loop. 3. Record the data for the long term fuel trim. 4. Turn OFF the engine. 5. Turn ON the ignition, with the engine OFF. 6. Review the Freeze Frame/Failure Records and record displayed data for this DTC. Does the scan tool indicate that the long term fuel trim is greater than the specified value?	23%	Go to Step 3	Go to Diagnostic Aids
3	1. Operate the engine at idle. 2. Observe the HO2S parameters with a scan tool. Does the scan tool indicate that the values are within the specified range and fluctuating?	200-800 mV	Go to Step 4	Go to Step 5
4	1. Turn OFF the engine. 2. Visually and physically inspect the following items: • Vacuum hoses for splits, kinks, and proper connections--Refer to Emission Hose Routing Diagram . • Ensure that the vehicle has sufficient fuel in the tank. 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
5	1. Turn OFF the engine. 2. Inspect for the following conditions: • The heated oxygen sensor (HO2S) for proper installation • Ensure electrical connectors and wires are secured and not contacting the exhaust system • For a short between the signal circuit and the low reference circuit • Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	--	Go to Step 9	Go to Step 6
6	Test the HO2S 1 low signal circuit for an open or high resistance. Refer to Circuit Testing and Wiring Repairs . Did you find and correct the condition?	--	Go to Step 9	Go to Step 7
7	Test for a short between the signal circuit and the low reference circuit or 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: • For missing, loose, or leaking exhaust components, from the HO2S forward • For vacuum leaks at the intake manifold, the throttle body, and the injector O-rings • The air induction system and the air intake ducts for leaks • The secondary air injection (AIR) system, if equipped, for leaks, incorrect air delivery, and a shut off valve that is not closing • The crankcase ventilation system for leaks--Refer to Crankcase Ventilation System Inspection/Diagnosis .	--	Go to Step 9	Go to Symptoms - Engine Mechanical

	Did you find and correct the condition?			

9	**Important:** After repairs, use the Fuel Trim Reset function on the scan tool to reset the long term fuel.
	
	  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 in 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. Are there any DTCs that have not been diagnosed?	--	Go to Diagnostic Trouble Code (DTC) List - Vehicle	System OK