DTC P0171 OR P0172

DIAGNOSTIC INSTRUCTIONS

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC DESCRIPTORS

DTC P0171

Fuel Trim System Lean

DTC P0172

Fuel Trim System Rich

CIRCUIT/SYSTEM DESCRIPTION

The engine control module (ECM) 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 (CL). During Open Loop, the ECM determines fuel delivery based on sensor signals without heated oxygen sensor (HO2S) input. During CL, the ECM adds HO2S inputs and level of purge to calculate the short and long term fuel trim (FT) adjustments. If the HO2S indicates a lean condition, the FT values will be above 0 percent. If the HO2S indicates a rich condition, the FT values will be below 0 percent. The short term FT values change rapidly in response to the HO2S voltage signals. The long term FT 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 FT diagnostic is based on an average of cells currently being used. The ECM selects the cells based on the engine speed and load. The FT diagnostic will conduct a test to determine if a rich failure actually exists or if excessive vapor from the evaporative emission (EVAP) canister is causing a rich condition.

If the ECM detects an excessively lean condition, DTC P0171 sets. If the ECM detects an excessively rich condition, DTC P0172 sets.

CONDITIONS FOR RUNNING THE DTC

- DTCs P0030, P0053, P0068, P0101, P0102, P0103, P0106, P0107, P0108, P0116, P0117, P0118, P0120, P0121, P0122, P0123, P0128, P0131, P0132, P0133, P0134, P0135, P0201-P0204, P0220, P0222, P0223, P0300, P0442, P0443, P0446, P0449, P0451, P0452, P0453, P0454, P0455, P0496, P0506, P0507, P060D, P1133, P1516, P2101, P2119, P2120, P2122, P2123, P2125, P2127, P2128, P2135, P2138, P2176, P2A00 are not set.
- The engine is in CL 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.
- The vehicle speed is less than 132 km/h (82 mph).
- The engine speed is between 400-6,100 RPM.
- The MAF is between 1-512 g/s.
- The barometric pressure (BARO) is more than 74 kPa.
- The fuel level is more than 10 percent.
- These DTCs run continuously when the above conditions have been met.

CONDITIONS FOR SETTING THE DTC

- The long term FT weighted average value is more or less than a calibrated value.
- The above condition is present for approximately 3 minutes after the conditions for running the DTC have been met.

ACTION TAKEN WHEN THE DTC SETS

DTCs P0171 and P0172 are Type B DTCs.

CONDITIONS FOR CLEARING THE MIL/DTC

DTCs P0171 and P0172 are Type B DTCs.

REFERENCE INFORMATION

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

Scan Tool Reference

Control Module References for scan tool information

CIRCUIT/SYSTEM VERIFICATION

IMPORTANT: Disregard any transmission symptoms, antilock brake system (ABS) indicators, and traction control system (TCS) indicators until any fuel trim faults are repaired. A fuel trim fault may cause default actions such as harsh

shifts and illumination of the ABS/TCS indicators.

1. Verify that other DTCs are not set.
   - If any DTCs are set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .
2. Allow the engine to reach operating temperature. With the engine running, observe the HO2S parameter with a scan tool. The HO2S value should vary from approximately 40 mV to approximately 900 mV, and respond to fueling changes.
   - If the value does not vary from approximately 40 mV to approximately 900 mV, refer to **DTC P0131, P0132, P0137, or P0138** or **DTC P0133, P0134, P013A, P013B, P013E, P013F, P0140, P1133, P2270, P2271, or P2A00**.

IMPORTANT: EVAP purge enablement may cause the FT to be momentarily outside the normal range.

3. The normal Short Term FT parameter should be between +10 percent and -10 percent, with near 0 percent the optimum, with the engine running at operating temperature.
4. The Long Term FT parameter should be between +10 percent and -10 percent, with near 0 percent the optimum, with the engine running at operating temperature.

CIRCUIT/SYSTEM TESTING

P0171

Allow the engine to reach operating temperature. With the engine running, observe the Long Term FT parameter with a scan tool. The value should be less than approximately 20 percent with the engine running at operating temperature.

- If the value is not less than 20 percent, inspect for the following:

- With the ignition ON and the engine OFF, observe the manifold absolute pressure (MAP) sensor parameter. The MAP sensor pressure should be within the range specified for your altitude. Refer to **Altitude Versus Barometric Pressure** .
  - If the MAP sensor does not indicate the correct barometric pressure, refer to **DTC P0106**.
- With the engine idling, observe the mass air flow (MAF) sensor parameter. The MAF sensor parameter should be between 2-6 g/s at idle.
  - If the MAF sensor parameter is not between 2-6 g/s at idle, refer to **DTC P0101 or P1101** or **DTC P0102 or P0103**.
- Vacuum hoses for splits, kinks, and improper connections
- Insufficient fuel in the tank
- Low fuel pressure-Refer to **Fuel System Diagnosis** .
- Ethanol concentration greater than 15 percent-Refer to **Alcohol/Contaminants-in-Fuel Diagnosis** .
- Fuel contamination-Refer to **Alcohol/Contaminants-in-Fuel Diagnosis** .
- Malfunctioning fuel injectors-Refer to **Fuel Injector Diagnosis (w/J39021 or w/Tech 2)** or **Fuel**

Injector Diagnosis (w/CH47976) .

- Missing, loose, or leaking exhaust components from the HO2S forward-Refer to **Symptoms - Engine Exhaust** .
- 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 or for a missing air filter element
- A cracked EVAP canister
- Evaporative pipes obstructed or leaking
- The crankcase ventilation system for leaks-Refer to **Crankcase Ventilation System Inspection/Diagnosis** .
- The HO2S for improper installation and for electrical wires or connectors that may have contacted the exhaust system
- The HO2S signal circuit open, shorted to ground, or shorted to the low reference circuit
- Malfunctioning engine components-Refer to **Symptoms - Engine Mechanical** .

P0172

Allow the engine to reach operating temperature. With the engine running, observe the Long Term FT parameter with a scan tool. The value should be more than approximately -20 percent with the engine running at operating temperature.

- If the value is not more than -20 percent, inspect for the following:

- With the engine idling and the transmission in the Park or Neutral position, observe the manifold absolute pressure (MAP) sensor parameter. The MAP sensor parameter should be between 19-42 kPa.
  - If the MAP sensor parameter is not between 19-42 kPa, refer to **DTC P0106**.
- With the engine idling, observe the mass air flow (MAF) sensor parameter. The MAF sensor parameter should be between 2-6 g/s at idle.
  - If the MAF sensor parameter is not between 2-6 g/s at idle, refer to **DTC P0101 or P1101** or **DTC P0102 or P0103**.
- Vacuum hoses for splits, kinks, and improper connections
- The air intake duct for being collapsed or restricted
- The air filter for being dirty or restricted
- Objects blocking the throttle body
- Excessive fuel in the crankcase due to leaking fuel injectors
- The evaporative emissions control system for improper operation
- Excessive fuel pressure-Refer to **Fuel System Diagnosis** .
- Malfunctioning fuel injectors-Refer to **Fuel Injector Diagnosis (w/J39021 or w/Tech 2)** or **Fuel Injector Diagnosis (w/CH47976)** .
- Fuel contamination-Refer to **Alcohol/Contaminants-in-Fuel Diagnosis** .
- The HO2S for improper installation and for electrical wires or connectors that may have contacted the exhaust system
- The HO2S signal circuit shorted to voltage

REPAIR PROCEDURES

- **Air Cleaner Assembly Replacement**
- **Air Cleaner Element Replacement**
- **Air Cleaner Outlet Duct Replacement**
- **Evaporative Emission Canister Purge Solenoid Valve Replacement**
- **Evaporative Emission Canister Replacement**
- **Evaporative Emission Canister Vent Solenoid Valve Replacement**
- **Evaporative Emission Hoses/Pipes Replacement - Engine**
- **Evaporative Emission Hoses/Pipes Replacement - Engine/Chassis**
- **Fuel Hose/Pipes Replacement - Chassis**
- **Fuel Injector Replacement**
- **Fuel Pump Module Replacement**
- **Fuel System Cleaning**
- **Fuel Tank Draining**
- **Heated Oxygen Sensor 1 Replacement**
- **Manifold Absolute Pressure Sensor Replacement**
- **Mass Airflow Sensor Replacement**
- **Throttle Body Assembly Replacement**

REPAIR VERIFICATION

IMPORTANT: After repairs, use the scan tool Fuel Trim Reset function in order to reset the Long Term Fuel Trim.

1. Install any components or connectors that have been removed or replaced during diagnosis.
2. Perform any adjustment, programming, or setup procedures that are required when a component or module is removed or replaced.
3. Turn ON the ignition, with the engine OFF.

IMPORTANT: DO NOT clear codes with the engine running. The codes may reset in the same ignition cycle.

4. Clear the DTCs.
5. Turn OFF the ignition for 60 seconds.
6. Start the engine.
7. Duplicate the Conditions for Running the DTC and use the Freeze Frame/Failure Records, if applicable, in order to verify the DTC does not reset. If the DTC resets or another DTC is present, refer to the **Diagnostic Trouble Code (DTC) List - Vehicle** and perform the appropriate diagnostic procedure.
8. To verify that the performance of the catalytic converter has not been affected by the condition that set this DTC, perform the Repair Verification for DTC P0420. Refer to **DTC P0420**.

