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| <b>DTC</b> | <b>P0171</b> | <b>System too Lean (A/F Lean Malfunction, Bank 1)</b> |
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| <b>DTC</b> | <b>P0172</b> | <b>System too Rich (A/F Rich Malfunction, Bank 1)</b> |
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| <b>DTC</b> | <b>P0174</b> | <b>System too Lean (A/F Lean Malfunction, Bank 2)</b> |
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| <b>DTC</b> | <b>P0175</b> | <b>System too Rich (A/F Rich Malfunction, Bank 2)</b> |
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## CIRCUIT DESCRIPTION

Fuel trim refers to the feedback compensation value compared to the basic injection time. Fuel trim includes short-term fuel trim and long-term fuel trim.

Short-term fuel trim is the short-term fuel compensation used to maintain the air-fuel ratio at its ideal theoretical value. The signal from the heated oxygen sensor indicates whether the air-fuel ratio is RICH or LEAN compared to the ideal theoretical value, triggering a reduction in fuel volume if the air-fuel ratio is rich, and an increase in fuel volume if it is lean.

Long-term fuel trim is overall fuel compensation carried out long-term to compensate for continual deviation of the short-term fuel trim from the central value due to individual engine differences, wear overtime and changes in the usage environment.

If both the short-term fuel trim and long-term fuel trim are LEAN or RICH beyond a certain value, it is detected as a malfunction and the check engine warning light on the multi information display.

| DTC No.        | DTC Detecting Condition  | Trouble Area   |
|----------------|--|--|
| P0171<br>P0174 | When air-fuel ratio feedback is stable after engine warming up, fuel trim is considerably in error on LEAN side (2 trip detection logic) | <ul style="list-style-type: none"> <li>• Air induction system</li> <li>• Injector blockage</li> <li>• Vacuum sensor</li> <li>• Water temp. sensor</li> <li>• Fuel pressure</li> <li>• Gas leakage on exhaust system</li> <li>• Open or short in oxygen sensor (bank 1, 2 sensor 1)</li> <li>• Oxygen sensor (bank 1, 2 sensor 1)</li> <li>• Engine ECU</li> </ul>  |
| P0172<br>P0175 | When air-fuel ratio feedback is stable after engine warming up, fuel trim is considerably in error on RICH side (2 trip detection logic) | <ul style="list-style-type: none"> <li>• Injector leak, blockage</li> <li>• Vacuum sensor</li> <li>• Water temp. sensor</li> <li>• Ignition system</li> <li>• Fuel pressure</li> <li>• Gas leakage on exhaust system</li> <li>• Open or short in oxygen sensor (bank 1, 2 sensor 1)</li> <li>• Oxygen sensor (bank 1, 2 sensor 1)</li> <li>• Engine ECU</li> </ul> |

HINT:

- When the DTC P0171 or P0174 is recorded, the actual air–fuel ratio is on the LEAN side. When DTC P0172 or P0175 is recorded, the actual air–fuel ratio is on the RICH side.
- If the vehicle runs out of fuel, the air–fuel ratio is LEAN and DTC P0171 and P0174 is recorded. The check engine warning light then comes on.
- If the total of the short–term fuel trim value and long–term fuel trim value is within –35 to +40 %, the system is functioning normally.

WIRING DIAGRAM

Refer to DTC P0125 on [page DI-113](#).

INSPECTION PROCEDURE

HINT:

Read freeze frame data using OBD scan tool or hand–held tester. Because freeze frame records the engine conditions when the malfunction is detected. When troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.



NG

Repair or replace.

OK

5 Check fuel pressure (See page FI-6)

NG

Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page FI-6)

OK

6 Check gas leakage on exhaust system.

NG

Repair or replace.

OK

7 Check output voltage of oxygen sensor (bank 1, 2 sensor 1) during idling.

PREPARATION:

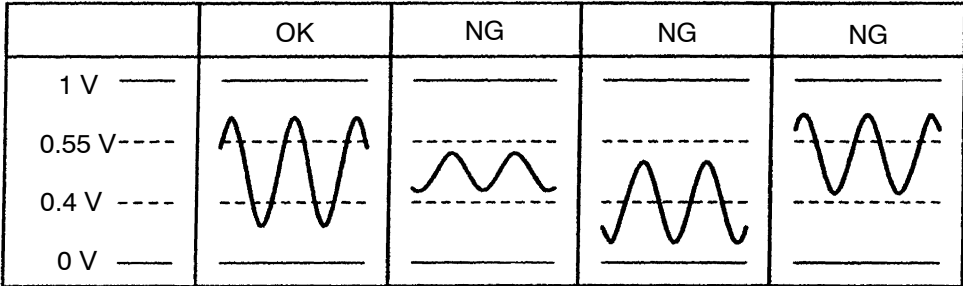
Warm up the oxygen sensor with the engine speed at 2,500 rpm for approx. 90 sec.

CHECK:

Used the OBD scan tool or hand-held tester to read the output voltage of the oxygen sensor during idling.

OK:

Oxygen sensor output voltage:  
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



A00292

OK

Go to step 9.

NG

**8** Check for open and short in harness and connector between engine ECU and oxygen sensor (bank 1, 2 sensor 1) (See page N-30).

NG

Repair or replace harness or connector.

OK

Replace oxygen sensor.

**9** Perform confirmation driving pattern (See page DI-118).

Go

**10** Is there DTC P0171, P0172, P0174 or P0175 being output again?

YES

Check and replace engine ECU (See page DI-73).

NO

**11** Did vehicle runs out of fuel in past?

NO

Check for intermittent problems (See page DI-93).

YES

DTC P0171, P0172, P0174, or P0175 is caused by running out of fuel.