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| DTC | P0171 | System too Lean (Fuel Trim) |
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| DTC | P0172 | System too Rich (Fuel Trim) |
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CIRCUIT DESCRIPTION

"Fuel trim" refers to the feedback compensation value compared against 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 over time 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 MIL lights up.

| DTC No. | DTC Detecting Condition | Trouble Area |
|---------|--|--|
| P0171 | When the air fuel ratio feedback is stable after engine warning up, the fuel trim is considerably in error on the RICH side (2 trip detection logic) | <ul style="list-style-type: none"> • Air intake (hose loose) • Fuel line pressure • Injector blockage • Heated oxygen sensor malfunction • Mass air flow meter • Engine coolant temp. sensor |
| P0172 | When the air fuel ratio feedback is stable after engine warning up, the fuel trim is considerably in error on the LEAN side (2 trip detection logic) | <ul style="list-style-type: none"> • Fuel line pressure • Injector leak, blockage • Heated oxygen sensor malfunction • Mass air flow meter • Engine coolant temp. sensor |

HINT:

- When DTC P0171 is recorded, the actual air-fuel ratio is on the LEAN side. When DTC P0172 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 is recorded. The MIL then comes on.
- If the total of the short-term fuel trim value and long-term fuel trim value is within $\pm 25\%$, the system is functioning normally.

INSPECTION PROCEDURE

| | |
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| 1 | Check air induction system (See page SF-1). |
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NG

Repair or replace.

OK

| | |
|---|---|
| 2 | Check for heated oxygen sensor data. |
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PREPARATION:

- (a) Connect the OBDII scan tool or LEXUS hand-held tester to the DLC3.
 (b) Warm up engine to normal operating temperature.

CHECK:

Read the heated oxygen sensor output voltage and short-term fuel trim.

HINT:

Read the values for the same bank.

RESULT:

| Pattern | Heated oxygen sensor output voltage | Short-term fuel trim |
|---------|--|------------------------|
| 1 | Lean condition (Changes at 0.55 V or less) | Changes at about +20 % |
| 2 | Rich condition (Changes at 0.4 V or more) | Changes at about –20 % |
| 3 | Except 1 and 2 | |

3

**Check for heated oxygen sensor
(See page SF-66).**

1, 2

| | |
|---|--|
| 3 | Check fuel pressure (See page SF-15). |
|---|--|

NG

**Check and repair fuel pump, pressure regulator,
fuel pipe line and filter.**

OK

| | |
|---|---|
| 4 | Check injector injection (See page SF-18). |
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NG

Replace injector.

OK

| | |
|---|---|
| 5 | Check mass air flow meter and engine coolant temp. sensor (See page DI-172 , DI-181). |
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|----|--------------------|
| NG | Repair or replace. |
|----|--------------------|

OK

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| 6 | Check for spark and ignition (See page IG-1). |
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| | |
|----|--------------------|
| NG | Repair or replace. |
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OK

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| Check and replace ECM (See page IN-29). |
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