

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 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 warming up, the fuel trim is considerably in error on the RICH side (2 trip detection logic)	<ul style="list-style-type: none"> • Air induction system • Injector blockage • Mass air flow meter • Engine coolant temp. sensor • Fuel pressure • Gas leakage on exhaust system • Open or short in A/F sensor (bank 1 sensor 1) circuit • A/F sensor (bank 1 sensor 1)
P0172	When the air-fuel ratio feedback is stable after engine warming up, the fuel trim is considerably in error on the LEAN side. (2 trip detection logic)	<ul style="list-style-type: none"> • Injector leak, blockage • Mass air flow meter • Engine coolant temp. sensor • Ignition system • Fuel pressure • Gas leakage on exhaust system • Open or short in heated oxygen sensor (bank 1 sensor 1) circuit • Heated oxygen sensor (bank 1 sensor 1)

HINT:

- When the 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 $\pm 38\%$, the system is functioning normally.
- The oxygen sensor output voltage and the short-term fuel trim value can be read using the OBD II scan tool or TOYOTA hand-held tester.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool. 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 warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

1	Check air induction system (See page SF-1).
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NG	Repair or replace.
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OK

2	Check injector injection (See page SF-22).
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NG	Replace injector.
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OK

3	Check mass air flow meter and engine coolant temp. sensor (See page SF-63, SF-31).
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NG	Repair or replace.
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OK

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

5 Check fuel pressure (See page SF-6).

NG

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

OK

6 Check gas leakade on exhaust system.

NG

Repair or replace.

OK

7 Check the output voltage of oxygen sensor during idling.

PREPARATION:

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

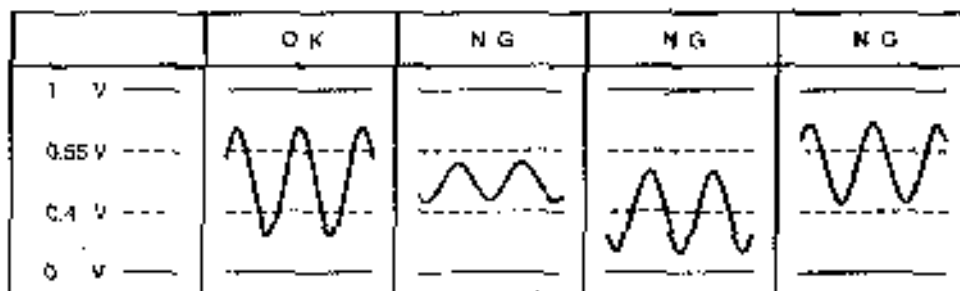
CHECK:

Use the OBD II scan tool or TOYOTA hand-held tester 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).



P18349

OK

Go to step 9.

NG

8 Check for open and short in harness and connector between ECM and oxygen sensor (See page [IN-20](#)).

NG Repair or replace harness or connector.

OK

Replace oxygen sensor.

9 Perform confirmation driving pattern (See page [DI-49](#)).

GO

10 Is there DTC P0171 or P0172 being output again?

YES Check and replace ECM.

NO

11 Did vehicle runs out of fuel in the past?

NO Check for intermittent problems.

YES

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