DI5PE–02

DTC	P0171	System too Lean (Fuel Trim)

DTC	P0172	System too Rich (Fuel Trim)

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 form 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 LEAN side. (2 trip detection logic)	• Air intake (hose loose) • Fuel line pressure • Injector blockage, leak • Heated oxygen sensor (bank 1 sensor 1) malfunction • Mass air flow meter • Engine coolant temp. sensor
P0172	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)	• Fuel line pressure • Injector blockage, leak • Heated oxygen sensor (bank 1 sensor 1) malfunction • Mass air flow meter • Engine coolant temp. sensor

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 total of the short–term fuel trim value and long–term fuel trim value is within + 30 – – 35 %, the system is functioning normally.
- If the vehicle runs out of fuel, the air–fuel ratio is LEAN and DTC P0171 is recorded. The MIL then come on.

INSPECTION PROCEDURE

1	**Check air induction system (See page SF–1).**

NG → **Repair or replace**

OK

2	**Check for heated oxygen sensor (bank 1 sensor 1) data.**

PREPARATION:

(a) Remove the fuse cover on the instrument panel.
(b) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(c) Warm up engine to normal operating temperature.

CHECK:

Read the heated oxygen sensor (bank 1 sensor 1) output voltage and short–term fuel trim.

RESULT:

Pattern	Heated oxygen sensor (bank 1 sensor 1) 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 (bank 1 sensor 1) (See page SF–63).**

1, 2

3	**Check fuel pressure (See page SF–6).**

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF–1).**

OK

4	**Check injector injection (See page SF–28).**

NG → **Replace injector.**

OK

5	Check mass air flow meter and engine coolant temp. sensor (See page SF–39, SF–60).

NG → Repair or replace.

OK

6	Check for spark and ignition (See page IG–1).

NG → Repair or replace.

OK

Check and replace ECM (See page IN–27).